CITY OF HOBART

SUPPORTING INFORMATION

PLANNING AUTHORITY COMMITTEE MEETING

OPEN PORTION OF THE MEETING

WEDNESDAY, 21 JANUARY 2026
AT 4.00PM
VENUE: COUNCIL CHAMBER, TOWN HALL

TABLE OF CONTENTS

7.1.1 48-50, 52 and 46 New Town Road, 7a, 9 9a and 11 Clare Steet, 5,7,8,11,13 and 15 Seymour Street and Adjacent Road Reservation - Demolition, New Buildings for Multiple Dwellings (23 Units), Visitor Accommodation (38 Units), Food Services, Business and Professional Services (Consulting Rooms), Sport and Recreation, and Associated Works

Attachment C PLN-HOB-2024-0716 - 52 NEW TOWN RD NEW TOWN TAS 7008 - Planning Committee Agenda Documents 3

Attachment D PLN-HOB-2024-0716 - 52 NEW TOWN RD NEW TOWN TAS 7008 - Cultural Heritage Referral Report 1460

Attachment E PLN-HOB-2024-0716 - 52 NEW TOWN RD NEW TOWN TAS 7008 - Development Engineering Referral Report.....1467

Attachment F PLN-HOB-2024-0716 - 52 NEW TOWN RD NEW TOWN TAS 7008 - Stormwater Referral Report.....1483

Attachment G PLN-HOB-2024-0716 - 52 NEW TOWN RD NEW TOWN TAS 7008 - Environmental Development Planner Referral Report.....1493

TasWater

SUBMISSION TO PLANNING AUTHORITY NOTICE - SPAN

Reference
TASWASPAN-HOB-2025-0225

Application Reference
PLN-HOB-2024-0716

Address
52 NEW TOWN RD NEW TOWN TAS 7008

Titles
252465/1

Applicant

Name	Email	Phone	Address	Involvement
Kate Heckelmann	kate@ireneinc.com.au	0401530453	49 Tasma St, North Hobart, Tasmania, Australia, 7000	Applicant

Owner

Name	Email Address	Address
Kate Heckelmann	kate@ireneinc.com.au	49 Tasma St, North Hobart, Tasmania, Australia, 7000
HOBART LGA	coh@hobartcity.com.au	16 Elizabeth Street, Hobart, Tasmania, Australia, 7001
Fifty-two New Town Road Pty Ltd		c/o 49 Tasma Street, North Hobart, 7000, Australia

Relevant Property Title/s

Selected Titles

Total Area: 0m^2

198029/1 252465/1

Council Description of Use and/or Development

Council Proposed Use or Development Description
Demolition, New Buildings for Multiple Dwellings (23 Units), Visitor Accommodation (38 Units), Food Services (Cafe), Business and Professional Services (Consulting Rooms) Sport and Recreation Centre (Wellness Centre) and Associated Works

Response

Pursuant to the Water and Sewerage Industry Act 2008 (TAS)
Section 56P(1) - TasWater imposes the following conditions on the permit for this application:

Conditions

#	Condition	Origin
1	TasWater has assessed the additional documentation provided on 07/11/2025 and advises that TasWater's Submission to Planning Authority Notice remains unchanged.	

Referral Documents

Version	Document Date	Document Type	Description	Prepared By
1	7 Nov 2025	Architectural Plans	Additional Information	Michaela Nolan
1	7 Oct 2025	TasWater Document	SPAN	TasWater

Schedule of Drawings/Documents

Schedule of Drawings/Documents

Prepared By	Drawings / Document No.	Revision No.	Date of Issue

PDA	Concept Sewer and Water	B	19/09/2025
Woods Bagot	Architectural Plans	C	10/09/2025

TasWater Details

Officer Name	Officer Title	Officer Contact Number
Al Cole	Senior Assessment Officer	0439605108

Submitted on **13/11/2025**

Form published: 08/10/2025 08:54

Tasmanian Government PlanBuild TASMANIA

PLANNING APPLICATION

Status:

Reference
PLN-HOB-2024-0716

Address
52 NEW TOWN RD NEW TOWN TAS
7008

Titles
252465/1

Before you start

Before you start your application, you will need to know if you require planning approval or not.
If you are unsure if you require a permit, use the PlanBuild Tasmania Enquiry Service to lodge a request for advice from the relevant Council.
Once your application has been submitted the Council will review your application. If payment has not been made, you will be sent a request for the payment of application fees via PlanBuild Tasmania.
Once the fees have been paid and the Council is satisfied with the information provided, the application will be assessed and you will be notified of the outcome.
If further action is required to assess your application you will receive an email notification containing a task to complete.

Pre-Application Advice

Have you spoken with anyone at Council about this application?

- ☐ Yes - enter details below
- ☐ No - continue to the next section

If yes, provide the name of the person you contacted

Applicant

Name	Email	Phone	Address	Involvement

Owners

Name	Email Address	Address

Certificate(s) of Title

Selected Titles Total Area: 0m^2

198029/1 252465/1

Owner Notification

Are you the sole owner of the land?

- ☐ Yes - continue to the next section
- ☑ No - answer question below

If no, have you notified all owners, joint or part owners of your intention to submit this application?

- [x] Yes - enter owner details below
- [ ] No - you must notify all owners before proceeding with this application

List all owners, joint or part owners as recorded on the Title documents notified:
46 New Town Road - Dominic Di Carlo;7A Clare Street Beth Wardlaw & Andrew Fuller; 9 Clare Street Stephen Sonneveld; 9A Clare Street CHRIS HIRAS; 11 Clare Street Health Union of Australia; 5 Seymour Street DALE EDWARD WEBSTER and PATRICIA CLAIRE WEBSTER; 7 Seymour Street NICHOLAS ANDREW THOMAS and WAN-CHI WU; 9 Seymour Street ANN MARY COLEMAN; 11 Seymour Street GLENN ROBERTSON WOODFALL and VICTORIA JANE WOODFALL; 13 Seymour Street TORELO BARE PTY LTD ; 15 Seymour Street CHENG SHIH WONG

Enter the date that the last owner, joint or part owner was notified
17/03/2025

Declaration

- [x] I declare that all land owners, joint or part owners have been notified of this planning application.

Crown Land Consent

Is Crown Land involved in the proposed use or development?

- [ ] Yes - complete question below
- [x] No - continue to the next section - see further information below
- [ ] Unsure

If yes, has written Crown Land consent been obtained?

- [ ] Yes - upload written consent
- [ ] No - application will not be progressed until consent has been provided

General Manager Consent

Is Council-owned or administered land involved in the proposed use or development?

- [x] Yes - complete question below
- [ ] No - continue to the next section
- [ ] Unsure

If yes, has written consent been obtained from the Council General Manager?

- [x] Yes - upload written consent
- [ ] No - application will not be progressed until consent has been provided

Proposed Use or Development

What is the reason for your planning application?

- [x] I want to change how the property is used
- [x] I want to use the property for visitor accommodation
- [ ] I want to subdivide
- [x] I want to undertake a new development or alteration
- [ ] I want to do a minor boundary adjustment
- [ ] I want to put up a sign(s)
- [ ] I want to demolish
- [ ] I want to do works only
- [ ] Other

If your application is to subdivide, please enter the number of proposed lots.
0

If your application is for signage, please enter the number of signs.

Is the property a Tasmanian Heritage Listed Property?

- [ ] Yes
- [x] No

Is the application for an EPA Activity under the Environmental Management and Pollution Control Act 1994?

- [ ] Yes
- [x] No
- [ ] Unsure

Is the proposed use or development permitted or discretionary?

- [ ] Permitted
- [x] Discretionary
- [ ] Unsure if permitted or discretionary

Provide a full description of the proposed use or development
This application seeks approval for Residential use (Multiple Dwelling (23 units); Visitor accommodation (Short Term Accommodation (38 Units); Food Services use (Café); Business and Professional Services use (Consulting Rooms); and Sport and Recreation use (Wellness Centre) and associated works at 48-52 New Town Road, New Town.

Will the proposed use or development involve a road reserve?

- [x] Yes - complete the section below
- [ ] No - continue to the next section
- [ ] Unsure

If yes, enter the address(es) or locations below:
48-52 New Town Road

If yes, how will the road reserve be affected?
Information provided in GM consent

Value of Works

What is the estimated value of the works?
35200000

Supporting Documents

Version	Document Date	Document Type	Description	Prepared By
1	25 Feb 2025	Architectural Plans	New Town Road - Architectural Drawings	Woods Bagot
1	25 Feb 2025	Architectural Plans	New Town Rowd - Design Report	Woods Bagot
1	19 Feb 2025	Plans	Landscaping Concept Plan	Paul Bangay Studio
1	19 Dec 2024	Planning Scheme - Other Document	Noise Assessment	NVC
1	19 Dec 2024	Stormwater Report	PDA Concept Stormwater Management & Flood Hazard Report (with Annexures)	PDA
1	19 Dec 2024	Stormwater Report	PDA Concept Stormwater Management & Flood Hazard Report (with Annexures)	PDA
1	19 Dec 2024	Access Plan	Traffic Impact Assessment	Keith Midson Traffic
1	6 Mar 2025	Property Title Document	Title Documents for neighbouring effected sites	Kate Heckelmann
1	6 Mar 2025	Property Title Document	Title Documents for neighbouring effected sites	Kate Heckelmann
1	6 Mar 2025	Property Title Document	Title Documents for neighbouring effected sites	Kate Heckelmann
1	6 Mar 2025	Property Title Document	Title Documents for neighbouring effected sites	Kate Heckelmann
1	6 Mar 2025	Property Title Document	Title Documents for neighbouring effected sites	Kate Heckelmann
1	13 Mar 2025	Planning Assessment Report	New Town Road Planning Report	Ireneinc
1	6 Mar 2025	Property Title Document	Title Documents for neighbouring effected sites	Kate Heckelmann
1	6 Mar 2025	Property Title Document	Title Documents for neighbouring effected sites	Kate Heckelmann
1	13 Mar 2025	Property Title Document	Titling Documents for effected neigbouring properties	Titles
1	6 Mar 2025	Property Title Document	Title Documents for neighbouring effected sites	Kate Heckelmann
1	13 Mar 2025	Property Title Document	Titling Documents for effected neigbouring properties	Titles
1	13 Mar 2025	Property Title Document	Titling Documents for effected neigbouring properties	Titles

1	13 Mar 2025	Property Title Document	Titling Documents for effected neigbouring properties	Titles
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1	13 Mar 2025	Property Title Document	Titling Documents for effected neigbouring properties	Titles
1	13 Mar 2025	Council Landowner Consent	Council Consent	Hobart City Council
1	19 Dec 2024	Details	Contamination Management Plan	GES
1	19 Dec 2024	Details	Environmental Site Assessment	GES

Next steps

When you have completed all the necessary fields and attached all required documents to support your application, click on the green 'Save & Submit' button at the top right of this form.

Once submitted, the Council will review your application. A request for the payment of application fees will be sent to you via PlanBuild Tasmania.

Once the fees have been paid and the Council is satisfied with the information provided, the application will be assessed and you will be notified of the outcome.

If further action is required to assess your application you will receive an email notification from PlanBuild which will tell you what you need to provide to continue the application.

Form published: 23/12/2024 12:44



W—B
WOODS BAGOT

DA Drawing List

01 - OVERALL			
DA 0000	TITLE PAGE	F	27/10/25
DA 1000	SITE PLAN - EXISTING	B	06/06/25
DA 1005	SITE DEMOLITION PLAN	C	23/07/25
DA 1010	SITE PLAN - PROPOSED	C	23/07/25
DA 1011	AREA PLANS - PROPOSED	C	10/09/25
DA 1012	AREA PLANS - PROPOSED	C	10/09/25
02 GENERAL ARRANGEMENT PLANS			
DA 2238	LOWER GROUND FLOOR PLAN	D	27/10/25
DA 2200	GROUND FLOOR PLAN	D	27/10/25
DA 2201	LEVEL 01 FLOOR PLAN	B	06/06/25
DA 2202	LEVEL 02 FLOOR PLAN	B	06/06/25
DA 2203	LEVEL 03 FLOOR PLAN	B	06/06/25
DA 2204	ROOF PLAN	B	06/06/25
03 ELEVATIONS & SECTIONS			
DA 3001	OVERALL SECTIONS	B	06/06/25
DA 3002	OVER ALL ELEVATIONS_1	B	06/06/25
DA 3003	OVER ALL ELEVATIONS_2	B	06/06/25
03 NEIGHBOURING SECTIONS			
DA 3431	NEIGHBOURING SECTIONS_5 SEYMOUR STREET	B	06/06/25
DA 3432	NEIGHBOURING SECTIONS_7 SEYMOUR STREET	B	06/06/25
DA 3433	NEIGHBOURING SECTIONS_9 SEYMOUR STREET	B	06/06/25
DA 3434	NEIGHBOURING SECTIONS_11 SEYMOUR STREET	B	06/06/25
DA 3435	NEIGHBOURING SECTIONS_13 SEYMOUR STREET	B	06/06/25
DA 3436	NEIGHBOURING SECTIONS_15 SEYMOUR STREET	B	06/06/25
DA 3437	NEIGHBOURING SECTIONS_9 CLARE STREET	B	06/06/25
DA 3438	NEIGHBOURING SECTIONS_9a CLARE STREET	B	06/06/25
DA 3439	NEIGHBOURING SECTIONS_11 CLARE STREET	B	06/06/25
04 DETAILS			
DA 4201	NTR FOOTPATH - RFI RESPONSE	C	10/09/25
DA 4202	BASEMENT PARKING LAYOUT - RFI RESPONSE	B	10/09/25
DA 4203	NTR DRIVEWAY - RFI RESPONSE	B	10/09/25
07 SUN STUDIES			
DA 7001	SHADOW DIAGRAMS - SUMMER SOLSTICE - DEC 22	A	04/02/25
DA 7002	SHADOW DIAGRAMS - AUTUMN EQUINOX - MAR 22	A	04/02/25
DA 7003	SHADOW DIAGRAMS - WINTER SOLSTICE - JUN 22	A	04/02/25
DA 7004	SHADOW DIAGRAMS - WINTER SOLSTICE - JUN 22	A	04/02/25
DA 7005	SHADOW DIAGRAMS - WINTER SOLSTICE - JUN 22	A	04/02/25
09 RENDERS			
DA 9001	NORTH WEST RENDER VIEW	A	04/02/25
DA 9002	SOUTH WEST RENDER VIEW	A	04/02/25

Project
NEW TOWN RESIDENCES

Address
48-52 NEW TOWN ROAD HOBART

Client
THE HOUSE FAMILY OFFICE

Project number
121978

DEVELOPMENT APPLICATION
NOT FOR CONSTRUCTION
28/10/25



1 SITE PLAN - EXISTING
SCALE 1 : 250

#	Status	Description	Date
A		DEVELOPMENT APPLICATION	04/2025
B		BASEMENT REVISION	06/06/2025

Notes
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DEVELOPMENT APPLICATION NOT FOR CONSTRUCTION 06/06/25

LEGEND
- SITE BOUNDARY
- EASEMENT
- EXISTING

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ORIGIN OF SURVEY INFORMATION
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: +61187MD-1A
DATE: 29/11/2021

PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53851MD-1
DATE: 6/12/2024

Project
NEW TOWN RESIDENCES

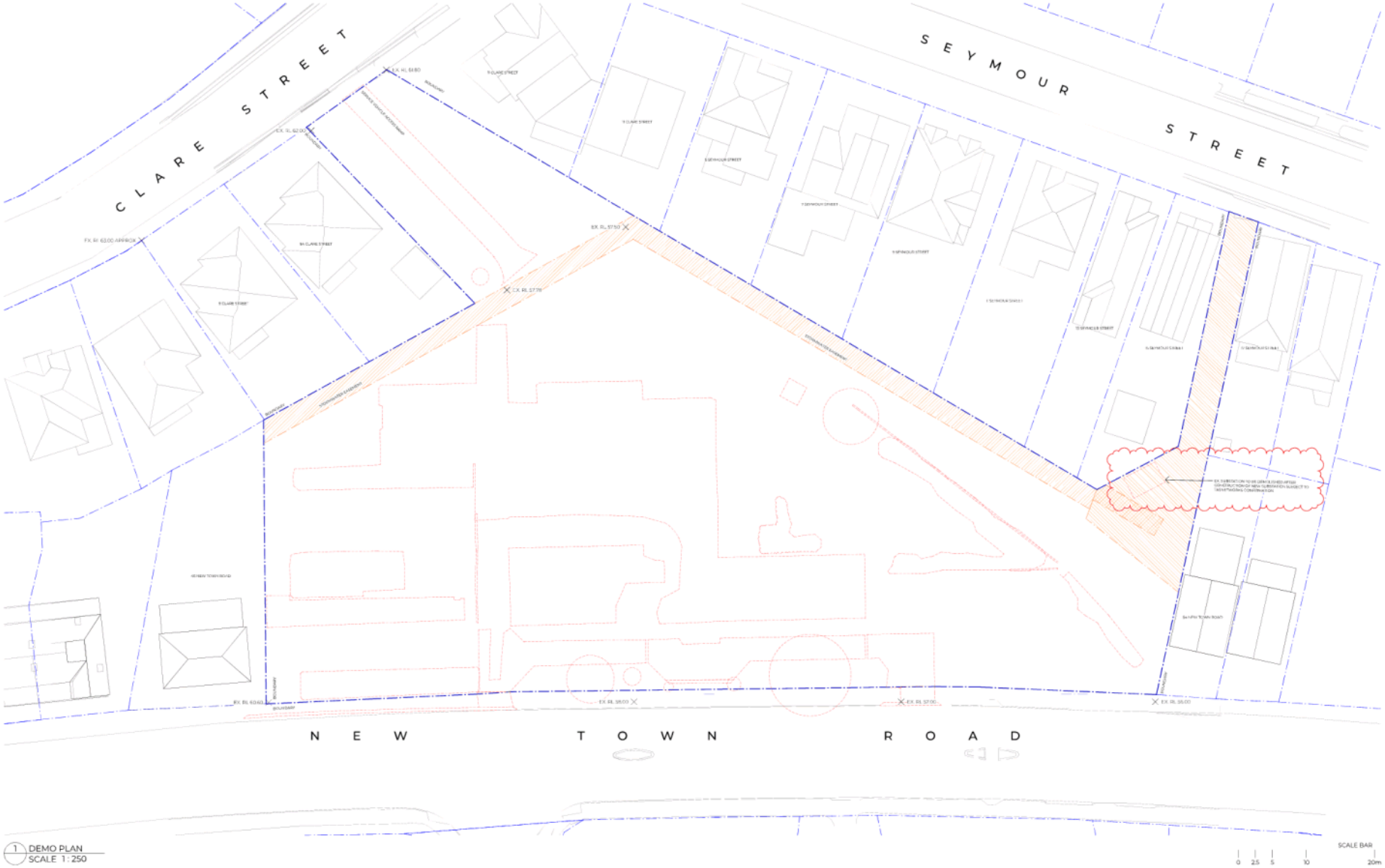
Client
THE HOUSE FAMILY OFFICE

Issuer
W–B
WOODS BAGOT

Project number 121978
Size check 20cm
Checked AJ
Approved JG
Sheet size A1
Scale As indicated

Sheet title
SITE PLAN - EXISTING

Sheet number DA - 1000
Revision B
Status
DEVELOPMENT APPLICATION



1 DEMO PLAN
SCALE 1 : 250

SCALE BAR
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Record revision history

#	Status	Description	Date
A		DEVELOPMENT APPLICATION	04/2025
B		BASEMENT REVISION	06/2025
C		COUNCIL RFI RESPONSE	23/07/25

Notes
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DEVELOPMENT APPLICATION NOT FOR CONSTRUCTION 23/07/25

Data generated: 23/07/2025 6:07:32 PM

LEGEND
- SITE BOUNDARY
- EASEMENT
- TO BE DEMOLISHED / REMOVED

GENERAL NOTES:

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ORIGIN OF SURVEY INFORMATION
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 48187MD-1A
DATE: 29/11/2021

PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53851MD-1
DATE: 6/12/2024

Project
NEW TOWN RESIDENCES

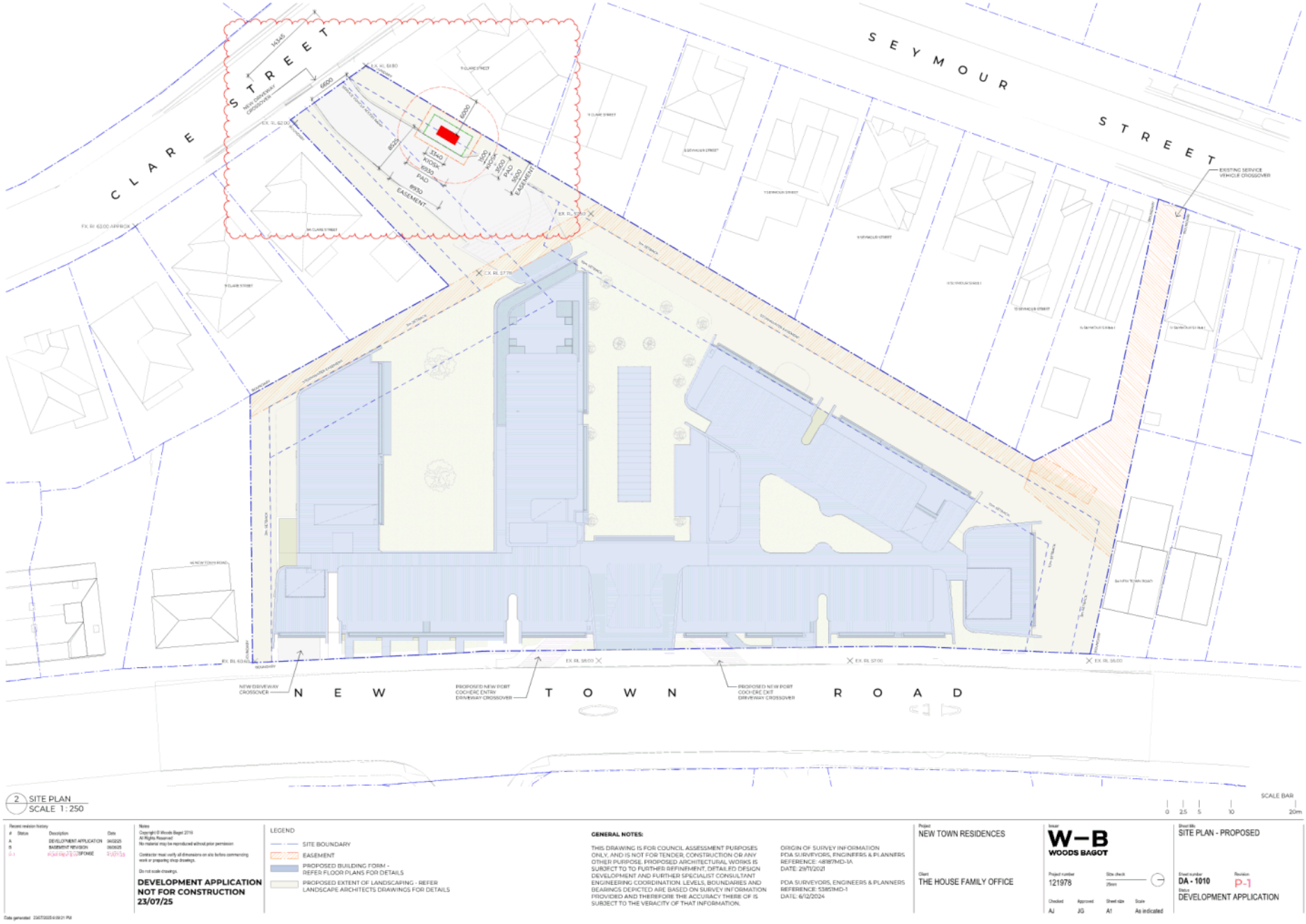
Client
THE HOUSE FAMILY OFFICE

Issuer
W–B WOODS BAGOT

Project number 121978
Size check 20cm
Checked AJ
Approved JG
Sheet size A1
Scale As indicated

Sheet title
SITE DEMOLITION PLAN

Sheet number DA - 1005
Revision C
Status
DEVELOPMENT APPLICATION


CLARE STREET
SEYMOUR STREET
NEW TOWN ROAD
EXISTING SERVICE VEHICLE CROSSOVER
NEW DRIVEWAY CROSSOVER
PROPOSED NEW PORT COCHERE ENTRY DRIVEWAY CROSSOVER
PROPOSED NEW PORT COCHERE EXIT DRIVEWAY CROSSOVER
2 SITE PLAN
SCALE 1 : 250
SCALE BAR
0 2.5 5 10 20m
LEGEND
SITE BOUNDARY
EASEMENT
PROPOSED BUILDING FORM - REFER FLOOR PLANS FOR DETAILS
PROPOSED EXTENT OF LANDSCAPING - REFER LANDSCAPE ARCHITECTS DRAWINGS FOR DETAILS
DEVELOPMENT APPLICATION
NOT FOR CONSTRUCTION
23/07/25
GENERAL NOTES:
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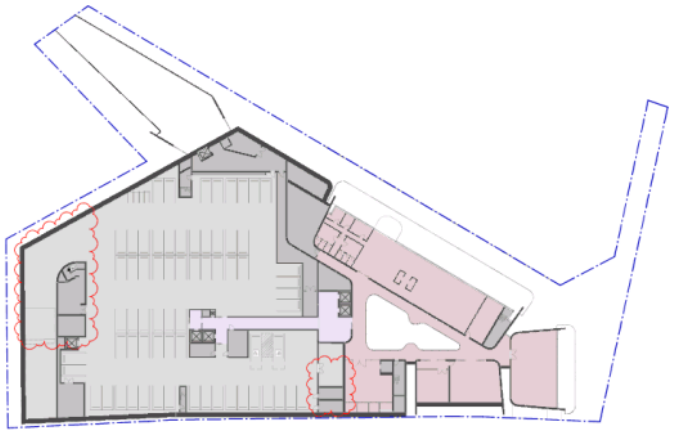
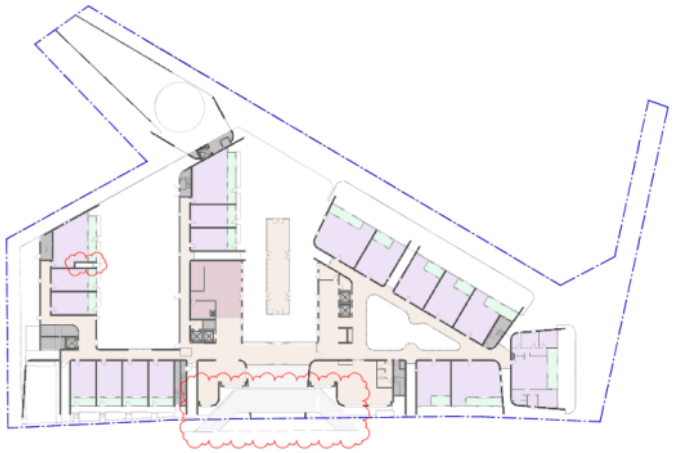
ORIGIN OF SURVEY INFORMATION
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 48187MD-1A
DATE: 29/11/2021
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53851MD-1
DATE: 6/12/2024
NEW TOWN RESIDENCES
THE HOUSE FAMILY OFFICE
W–B
WOODS BAGOT
121978
AJ
JG
A1
As indicated
SITE PLAN - PROPOSED
DA - 1010
P-1
DEVELOPMENT APPLICATION



1 AREA PLAN - LOWER GROUND FLOOR
SCALE 1 : 500



2 AREA PLAN - GROUND FLOOR
SCALE 1 : 500



3 AREA PLAN - LEVEL 1
SCALE 1 : 500

KEY:

- BALCONY
- COMMERCIAL
- COMMON AREA
- PARKING
- RESIDENTIAL
- ROOFTOP
- SERVICES

AREA SCHEDULE

Level	Area
BALCONY	
GROUND FLOOR	243 m²
LEVEL 1	351 m²
LEVEL 2	513 m²
LEVEL 3	413 m²
	1520 m²
COMMERCIAL	
LOWER GROUND FLOOR	1112 m²
GROUND FLOOR	137 m²
	1249 m²
COMMON AREA	
GROUND FLOOR	1042 m²
LEVEL 1	541 m²
LEVEL 2	484 m²
LEVEL 3	126 m²
	2194 m²
PARKING	
LOWER GROUND FLOOR	2656 m²
	2656 m²
RESIDENTIAL	
LOWER GROUND FLOOR	150 m²
GROUND FLOOR	1171 m²
LEVEL 1	1587 m²
LEVEL 2	1374 m²
LEVEL 3	367 m²
	4648 m²
ROOFTOP	
LEVEL 2	55 m²
LEVEL 3	27 m²
	82 m²
Grand total	12349 m²

* GFA CALCULATED FROM INTERNAL FACE OF EXTERNAL WALLS

SCALE BAR
0 5 10 20 40m

Record revision history

#	Status	Description	Date
A		DEVELOPMENT APPLICATION	04/2025
B		COUNCIL RFI RESPONSE	23/07/25
C		COUNCIL RFI RESPONSE	10/09/25

Notes

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DEVELOPMENT APPLICATION NOT FOR CONSTRUCTION 10/09/25

Date generated: 9/09/2025 5:05:28 PM

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Project
NEW TOWN RESIDENCES

Client
THE HOUSE FAMILY OFFICE

Issuer
W–B WOODS BAGOT

Project number
121978

Size check
20mm

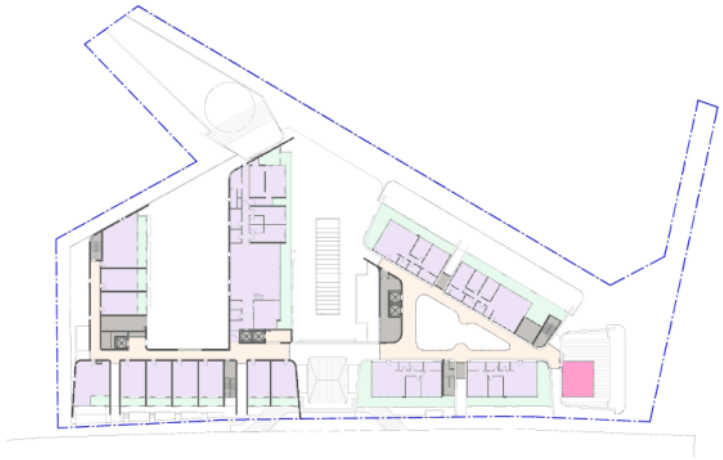
Checked: AJ | Approved: JG | Sheet size: A1 | Scale: As indicated

Sheet title
AREA PLANS - PROPOSED

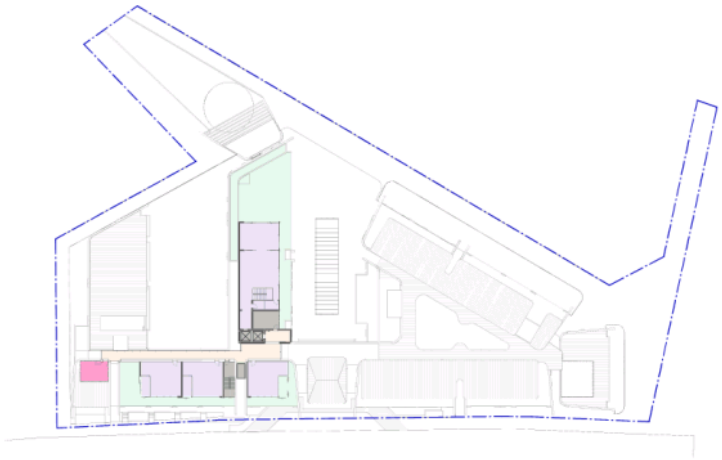
Sheet number
DA - 1011

Revision
C

Status
DEVELOPMENT APPLICATION



3 AREA PLAN - LEVEL 2
SCALE 1:500



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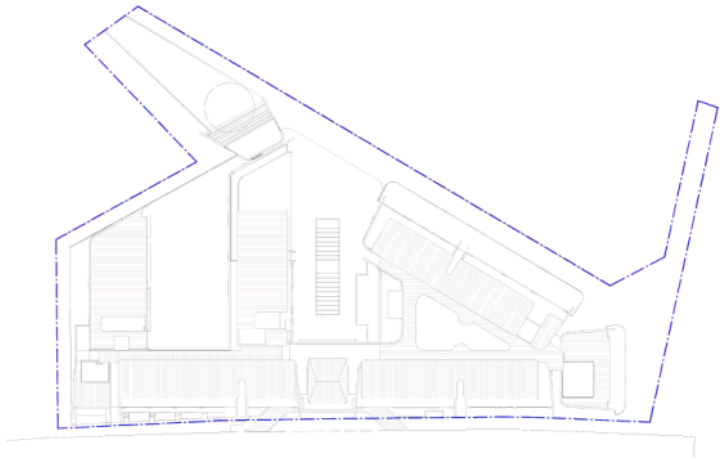
SCALE 1:500



2 AREA PLAN - ROOF
SCALE 1:500

KEY:

- BALCONY
- COMMERCIAL
- COMMON AREA
- PARKING
- RESIDENTIAL
- ROOFTOP
- SERVICES

AREA SCHEDULE

Level	Area
BALCONY	
GROUND FLOOR	243 m²
LEVEL 1	351 m²
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LEVEL 3	413 m²
	1520 m²
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LOWER GROUND FLOOR	1112 m²
GROUND FLOOR	137 m²
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LEVEL 3	27 m²
	82 m²
Grand total	12349 m²

* GFA CALCULATED FROM INTERNAL FACE OF EXTERNAL WALLS

SCALE BAR
0 5 10 20 40m

Record revision history

#	Status	Description	Date
A		DEVELOPMENT APPLICATION	04/2025
B		BASEMENT REVISION	06/2025
C		COUNCIL RFI RESPONSE	10/2025

Notes

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DEVELOPMENT APPLICATION NOT FOR CONSTRUCTION 10/09/25

Date generated: 9/09/2025 9:05:07 PM

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Project
NEW TOWN RESIDENCES

Client
THE HOUSE FAMILY OFFICE

Issuer
W–B WOODS BAGOT

Project number
121978

Size check
20mm

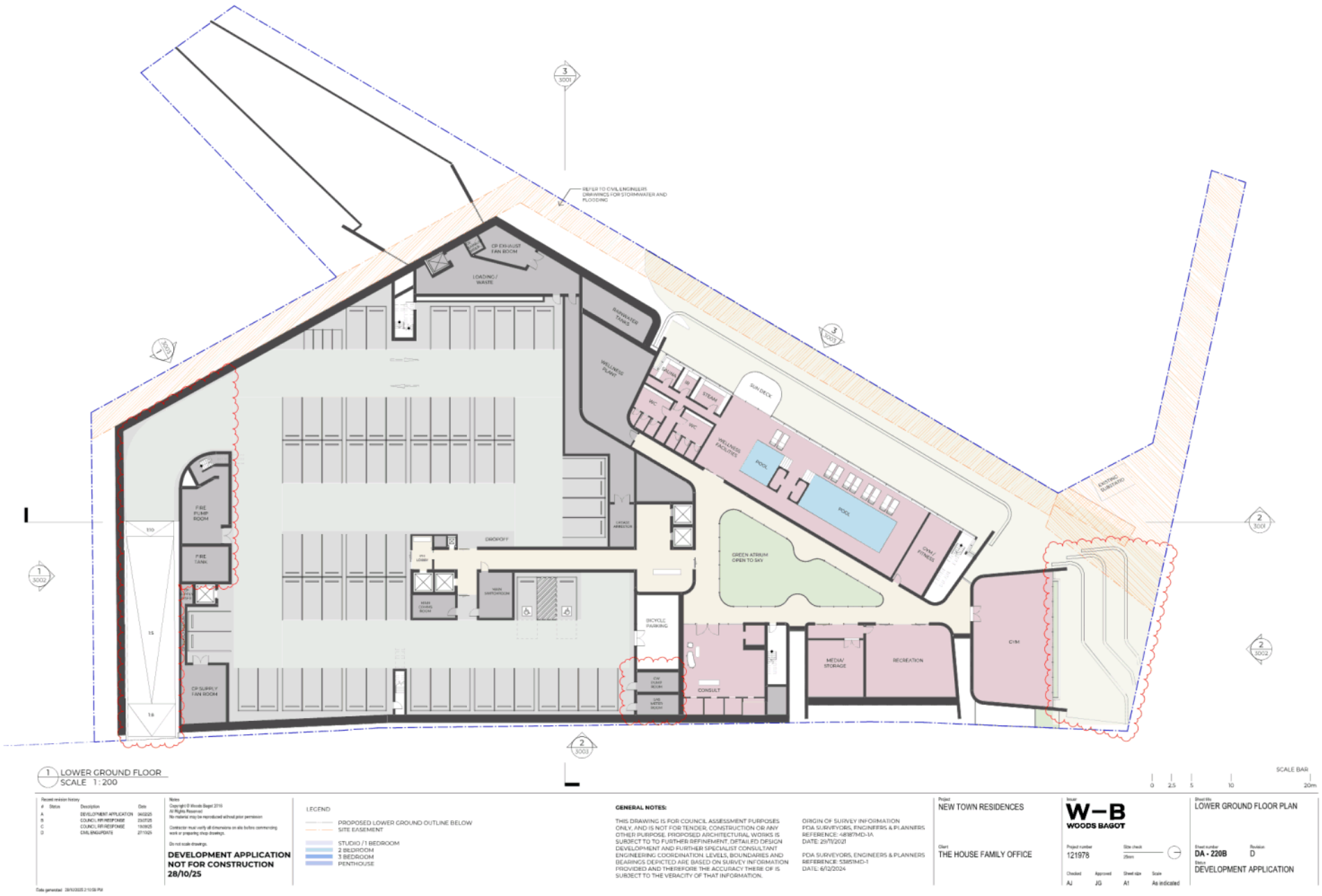
Checked: AJ | Approved: JG | Sheet size: A1 | Scale: As indicated

Sheet title
AREA PLANS - PROPOSED

Sheet number
DA - 1012

Revision
C

Status
DEVELOPMENT APPLICATION


REFER TO CIVIL ENGINEERS DRAWINGS FOR STORMWATER AND FLOODING
CP EXHAUST FAN ROOM
LOADING / WASTE
RAINWATER TANKS
WELLNESS PLANT
SAUNA
IR
STEAM
WC
WC
SUN DECK
WELLNESS FACILITIES
POOL
POOL
GYM / FITNESS
EXISTING SUBSTATIO
FIRE PUMP ROOM
FIRE TANK
DROPOFF
LATAST ARRESTOR
GREEN ATRIUM OPEN TO SKY
MAIN SWITCHROOM
BICYCLE PARKING
CONSULT
MEDIA/ STORAGE
RECREATION
GYM
CP SUPPLY FAN ROOM
LOWER GROUND FLOOR
SCALE 1:200
SCALE BAR
0 2.5 5 10 20m
Recent revision history
Status Description Date
A DEVELOPMENT APPLICATION 04/02/25
B COUNCIL RFI RESPONSE 23/07/25
C COUNCIL RFI RESPONSE 19/09/25
D CIVIL ENGINEERS 27/10/25
Notes
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Do not scale drawings.
DEVELOPMENT APPLICATION
NOT FOR CONSTRUCTION
28/10/25
LEGEND
PROPOSED LOWER GROUND OUTLINE BELOW
SITE EASEMENT
STUDIO /1 BEDROOM
2 BEDROOM
3 BEDROOM
PENTHOUSE
GENERAL NOTES:
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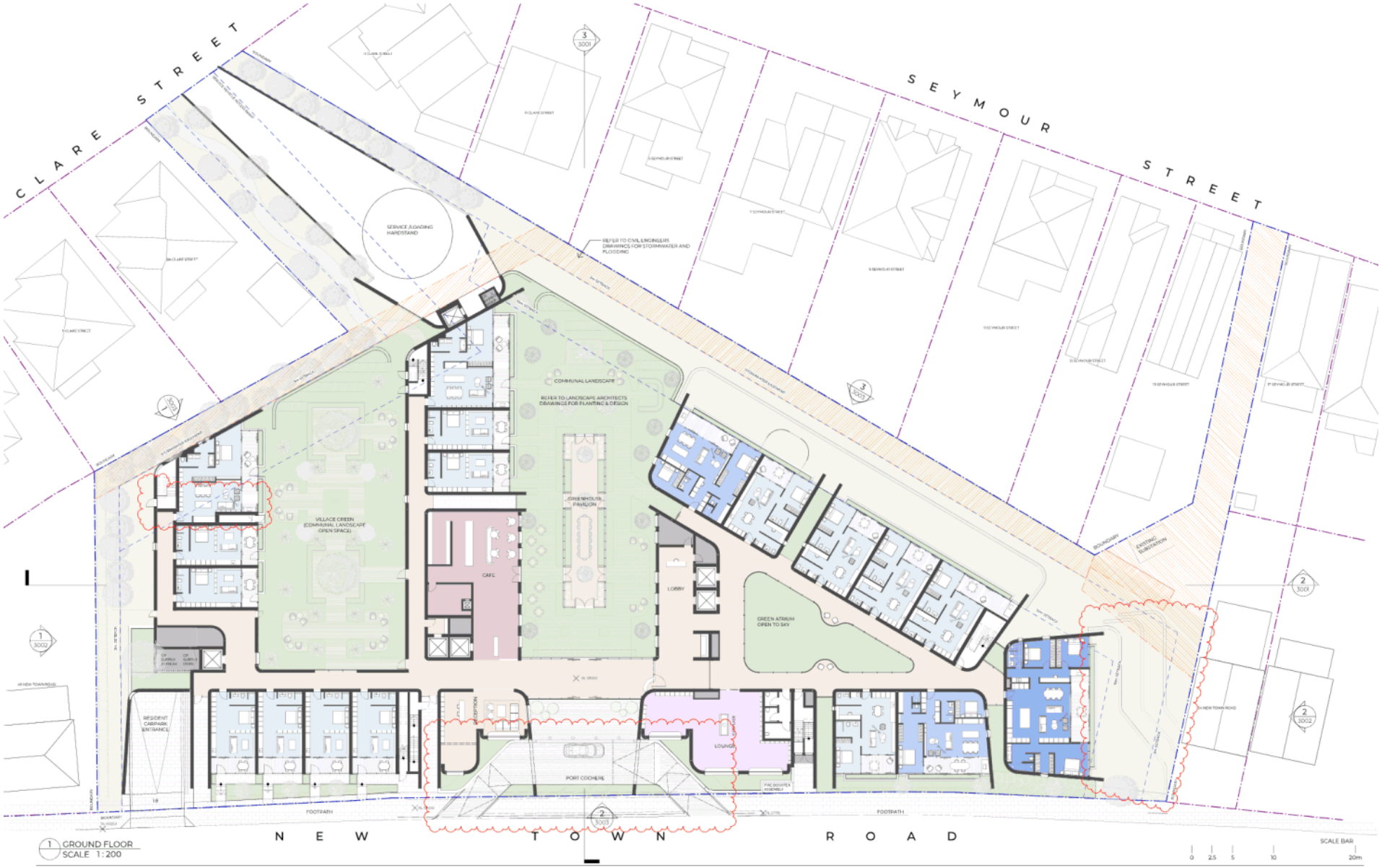
ORIGIN OF SURVEY INFORMATION
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 48187MD-1A
DATE: 29/11/2021
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53851MD-1
DATE: 6/12/2024
Project
NEW TOWN RESIDENCES
Client
THE HOUSE FAMILY OFFICE
Issuer
W–B
WOODS BAGOT
Project number
121978
Size check
25mm
Checked AJ
Approved JG
Sheet size A1
Scale As indicated
Sheet title
LOWER GROUND FLOOR PLAN
Sheet number
DA - 220B
Revision
D
Status
DEVELOPMENT APPLICATION



Record revision history

#	Status	Description	Date
A		DEVELOPMENT APPLICATION	04/2025
B		BASEMENT REVISION	06/2025
C		COUNCIL RFI RESPONSE	10/2025
D		DA/LANDSCAPE	27/10/25

Notes
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DEVELOPMENT APPLICATION NOT FOR CONSTRUCTION 28/10/25

LEGEND

PROPOSED LOWER GROUND OUTLINE BELOW
SITE EASEMENT

STUDIO / 1 BEDROOM
2 BEDROOM
3 BEDROOM
PENTHOUSE

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ORIGIN OF SURVEY INFORMATION
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 48187MD-1A
DATE: 29/11/2021

PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53851MD-1
DATE: 6/12/2024

Project
NEW TOWN RESIDENCES

Client
THE HOUSE FAMILY OFFICE

Issuer
W–B WOODS BAGOT

Project number 121978
Size check 20cm
Checked AJ
Approved JG
Sheet size A1
Scale As indicated

Sheet title
GROUND FLOOR PLAN

Sheet number DA - 2200
Revision D
Status
DEVELOPMENT APPLICATION

Data generated: 28/10/2025 2:10:25 PM



1 LEVEL 1
SCALE 1:200

Recent revision history

#	Status	Description	Date
A		DEVELOPMENT APPLICATION	04/2025
B		BASEMENT REVISION	06/06/2025

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DEVELOPMENT APPLICATION
NOT FOR CONSTRUCTION
06/06/25

LEGEND
PROPOSED LOWER GROUND OUTLINE BELOW
SITE EASEMENT
STUDIO / 1 BEDROOM
2 BEDROOM
3 BEDROOM
PENTHOUSE

GENERAL NOTES:

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ORIGIN OF SURVEY INFORMATION
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 48187MD-1A
DATE: 29/11/2021

PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53851MD-1
DATE: 6/12/2024

Project
NEW TOWN RESIDENCES

Client
THE HOUSE FAMILY OFFICE

Issuer
W–B
WOODS BAGOT

Project number 121978
Size check 20mm
Checked AJ
Approved JG
Sheet size A1
Scale As indicated

Sheet title
LEVEL 01 FLOOR PLAN

Sheet number DA - 2201
Revision B
Status
DEVELOPMENT APPLICATION


1 LEVEL 2
SCALE 1:200
SCALE BAR
0 2.5 5 10 20m
LEGEND
PROPOSED LOWER GROUND OUTLINE BELOW
SITE EASEMENT
STUDIO / 1 BEDROOM
2 BEDROOM
3 BEDROOM
PENTHOUSE
GENERAL NOTES:
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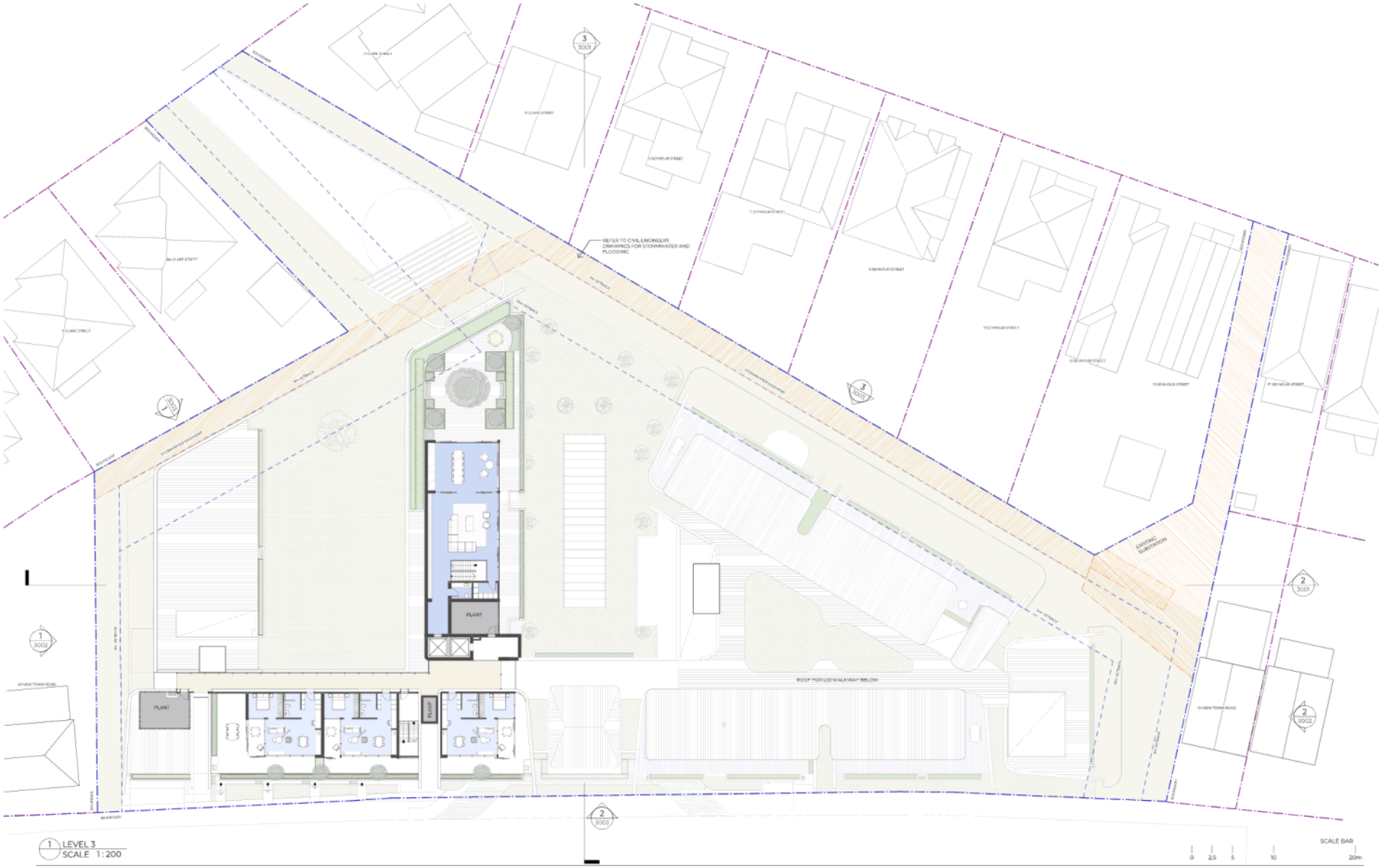
ORIGIN OF SURVEY INFORMATION
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 48187MD-1A
DATE: 29/11/2021
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53851MD-1
DATE: 6/12/2024
DEVELOPMENT APPLICATION
NOT FOR CONSTRUCTION
06/06/25
Project
NEW TOWN RESIDENCES
Client
THE HOUSE FAMILY OFFICE
W–B
WOODS BAGOT
Project number
121978
Checked
AJ
Approved
JG
Sheet size
A1
Scale
As indicated
Sheet title
LEVEL 02 FLOOR PLAN
Sheet number
DA - 2202
Revision
B
Status
DEVELOPMENT APPLICATION



1 LEVEL 3
SCALE 1:200

#	Status	Description	Date
A		DEVELOPMENT APPLICATION	04/2025
B		BASEMENT REVISION	06/06/2025

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DEVELOPMENT APPLICATION NOT FOR CONSTRUCTION 06/06/25

LEGEND

PROPOSED LOWER GROUND OUTLINE BELOW
SITE EASEMENT

STUDIO / 1 BEDROOM
2 BEDROOM
3 BEDROOM
PENTHOUSE

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ORIGIN OF SURVEY INFORMATION
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 48187MD-1A
DATE: 29/11/2021

PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53851MD-1
DATE: 6/12/2024

Project
NEW TOWN RESIDENCES

Client
THE HOUSE FAMILY OFFICE

Issuer
W–B
WOODS BAGOT

Project number
121978

Size check
20mm

Checked
AJ

Approved
JG

Sheet size
A1

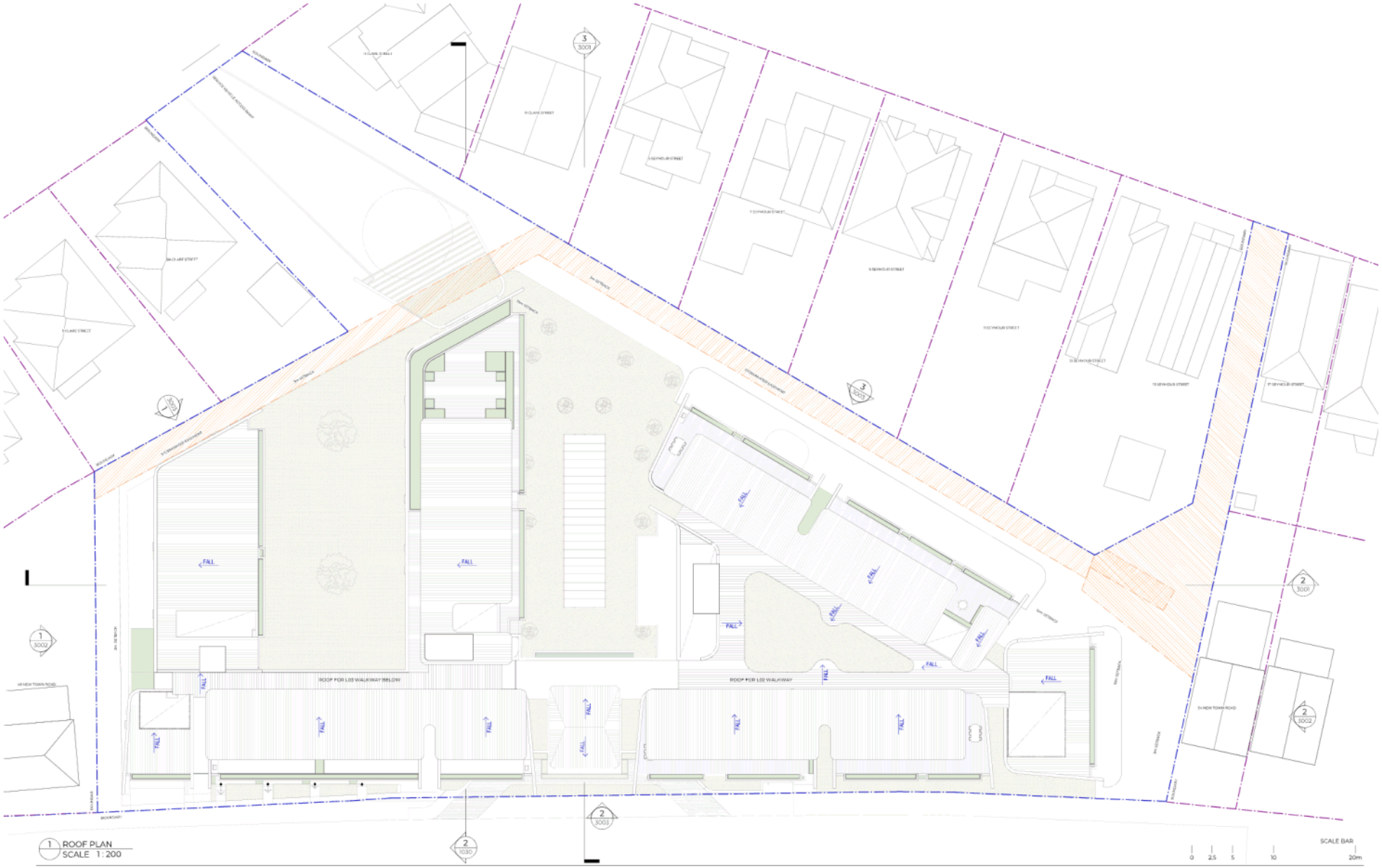
Scale
As indicated

Sheet title
LEVEL 03 FLOOR PLAN

Sheet number
DA - 2203

Revision
B

Status
DEVELOPMENT APPLICATION



1 ROOF PLAN
SCALE 1 : 200

#	Status	Description	Date
A		DEVELOPMENT APPLICATION	04/2025
B		BASEMENT REVISION	06/06/2025

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DEVELOPMENT APPLICATION
NOT FOR CONSTRUCTION
06/06/25

LEGEND

PROPOSED LOWER GROUND OUTLINE BELOW
SITE EASEMENT

STUDIO / 1 BEDROOM
2 BEDROOM
3 BEDROOM
PENTHOUSE

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ORIGIN OF SURVEY INFORMATION
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 48187MD-1A
DATE: 29/11/2021

PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53851MD-1
DATE: 6/12/2024

Project
NEW TOWN RESIDENCES

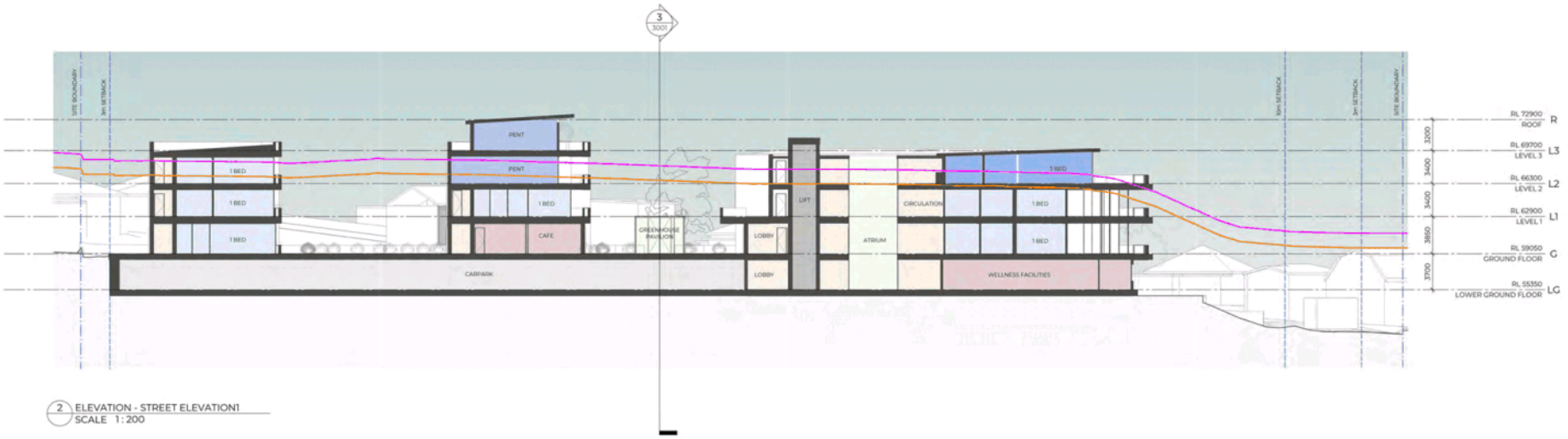
Client
THE HOUSE FAMILY OFFICE

Issuer
W–B
WOODS BAGOT

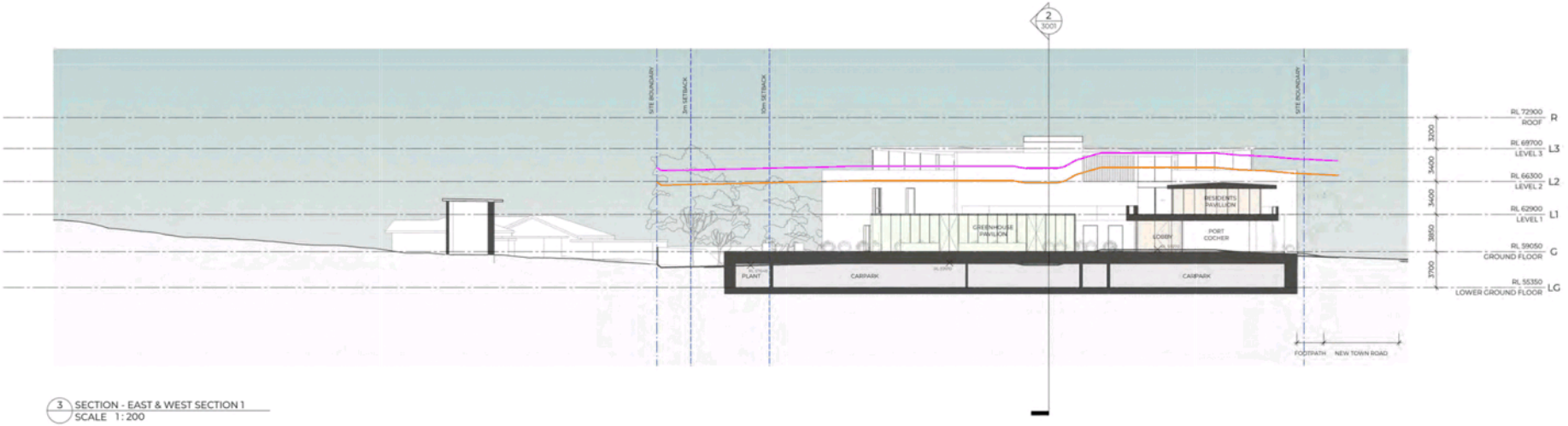
Project number 121978
Size check 20mm
Checked AJ
Approved JG
Sheet size A1
Scale As indicated

Sheet title
ROOF PLAN

Sheet number DA - 2204
Revision B
Status
DEVELOPMENT APPLICATION



2 ELEVATION - STREET ELEVATION1
SCALE 1 : 200



3 SECTION - EAST & WEST SECTION 1
SCALE 1 : 200

SCALE BAR
0 2.5 5 10 20m

Recent revision history

#	Status	Description	Date
A		DEVELOPMENT APPLICATION	04/02/25
B		BASEMENT REVISION	06/06/2025

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DEVELOPMENT APPLICATION NOT FOR CONSTRUCTION 06/06/25

Date generated: 10/06/2025 10:08:59 AM

LEGEND
- 10M HEIGHT PLANE
- 8.5M HEIGHT PLANE
- EXISTING GROUND PLANE

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ORIGIN OF SURVEY INFORMATION
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 48187MD-1A
DATE: 29/11/2021

PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53851MD-1
DATE: 6/12/2024

Project
NEW TOWN RESIDENCES

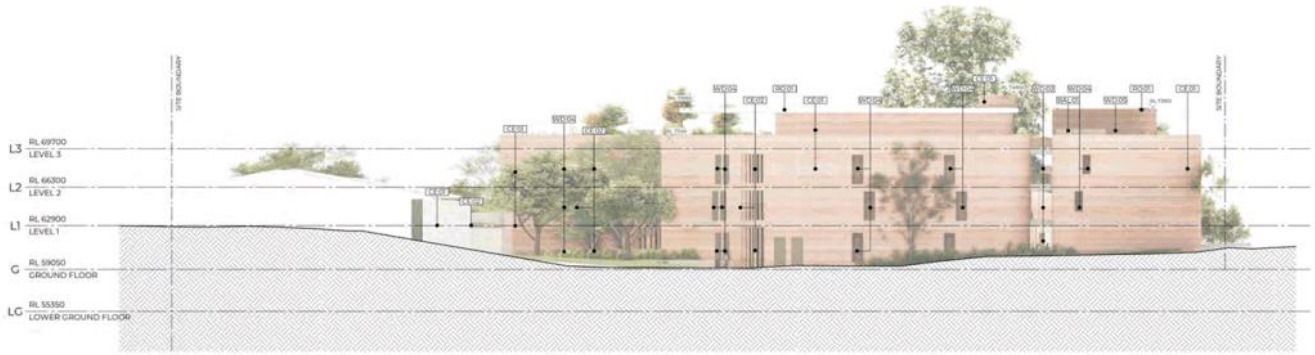
Client
THE HOUSE FAMILY OFFICE

Issuer
W–B
WOODS BAGOT

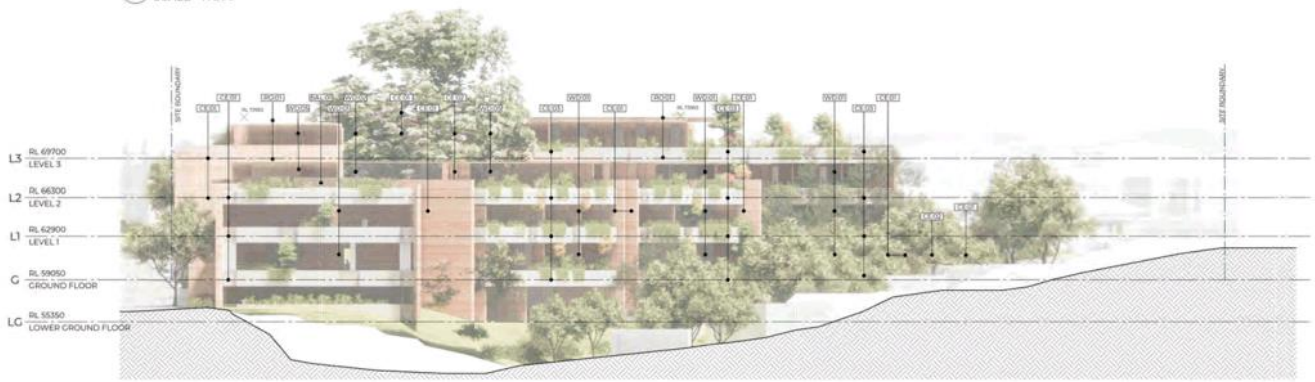
Project number 121978
Size check 20mm
Checked AJ
Approved JG
Sheet size A1
Scale As indicated

Sheet title
OVERALL SECTIONS

Sheet number DA - 3001
Revision B
Status
DEVELOPMENT APPLICATION



1 ELEVATION - SOUTH
SCALE 1:200



2 ELEVATION - NORTH
SCALE 1:200

SCALE BAR
0 2.5 5 10 20m

Recent revision history

#	Status	Description	Date
A		DEVELOPMENT APPLICATION	04/02/25
B		BASEMENT REVISION	06/06/2025

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DEVELOPMENT APPLICATION NOT FOR CONSTRUCTION 06/06/25

WD01 APARTMENT FIXED AND OPENING WINDOWS
WD02 PROCESS CEILING/LAWN WINDOWS
WD03 COMMERCIAL FULL HEIGHT WINDOWS
WD04 APARTMENT METAL BRUSH WINDOWS
WD05 WIDEFLOW TERRACE FULL HEIGHT GLAZING
CE01 EARTH TONE PRECAST - TEXTURED OXIDE PIGMENT FINISH
CE02 PRECAST BLADE WALL
CE03 PRECAST BALUSTRADE - EXPOSED AGGREGATE
RO01 CORRIER TONE SHEET METAL
WAL01 SERVICES SCREENING

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ORIGIN OF SURVEY INFORMATION
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 48187MD-1A
DATE: 29/11/2021

PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53851MD-1
DATE: 6/12/2024

Project
NEW TOWN RESIDENCES

Client
THE HOUSE FAMILY OFFICE

Issuer
W–B
WOODS BAGOT

Project number
121978

Size check
20mm

Checked AJ
Approved JG
Sheet size A1
Scale As indicated

Sheet title
OVER ALL ELEVATIONS_1

Sheet number
DA - 3002

Revision
B

Status
DEVELOPMENT APPLICATION

Date generated: 15/06/2025 10:09:03 AM



1 ELEVATION - SOUTH WEST
SCALE 1:200



2 ELEVATION - EAST
SCALE 1:200



3 ELEVATION - NORTH WEST
SCALE 1:200

SCALE BAR
0 2.5 5 10 20m

Recent revision history

#	Status	Description	Date
A		DEVELOPMENT APPLICATION	04/02/25
B		BASEMENT REVISION	06/06/2025

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DEVELOPMENT APPLICATION NOT FOR CONSTRUCTION 06/06/25

WD-01 APARTMENT FIXED AND OPENING WINDOWS
WD-02 RECESS CD HALL WAY WINDOWS
WD-03 APARTMENT METAL REVEAL WINDOWS
WD-04 ROOFTOP TERRACE FULL HEIGHT GLAZING

CE-01 EARTH TONE PRECAST - TEXTURED ONSITE PIGMENT FINISH
CE-02 PRECAST BLADE WALL
CE-03 PRECAST BALUSTRADE - EXPOSED AGGREGATE
RO-01 COPPER TONE SHEET METAL
BAL-01 SERVICES SCREENING

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ORIGIN OF SURVEY INFORMATION
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 48187MD-1A
DATE: 29/11/2021

PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53851MD-1
DATE: 6/12/2024

Project
NEW TOWN RESIDENCES

Client
THE HOUSE FAMILY OFFICE

Issuer
W–B
WOODS BAGOT

Project number 121978
Size check 20mm
Checked AJ
Approved JG
Sheet size A1
Scale As indicated

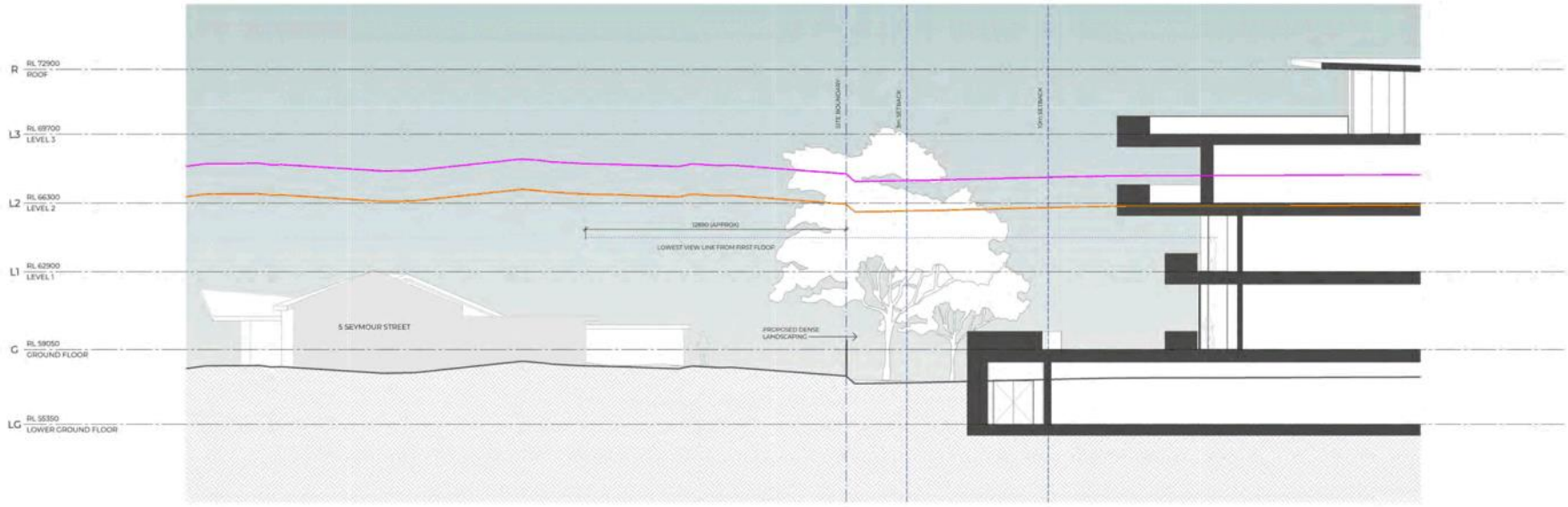
Sheet title
OVER ALL ELEVATIONS_2

Sheet number DA - 3003
Revision B
Status
DEVELOPMENT APPLICATION

Date generated 13/06/2025 12:09:58 AM



1 5 Seymour Street Site Plan
SCALE 1:750



2 5 Seymour Street Section
SCALE 1:100

SCALE BAR
0 1 2 5 10m

Recent revision history
#	Status	Description	Date
A		DEVELOPMENT APPLICATION	04/2025
B		BASEMENT REVISION	06/06/2025

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DEVELOPMENT APPLICATION NOT FOR CONSTRUCTION 06/06/25

Date generated: 10/06/2025 10:09:20 AM

LEGEND
- 10M HEIGHT PLANE
- 8.5M HEIGHT PLANE
- EXISTING GROUND PLANE

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ORIGIN OF SURVEY INFORMATION
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 48187MD-1A
DATE: 29/11/2021

PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53851MD-1
DATE: 6/12/2024

Project
NEW TOWN RESIDENCES

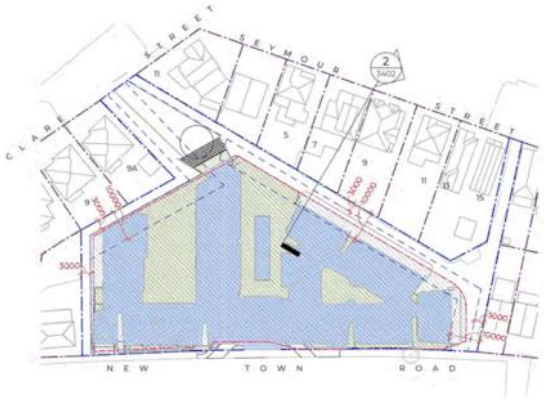
Client
THE HOUSE FAMILY OFFICE

Issuer
W–B WOODS BAGOT

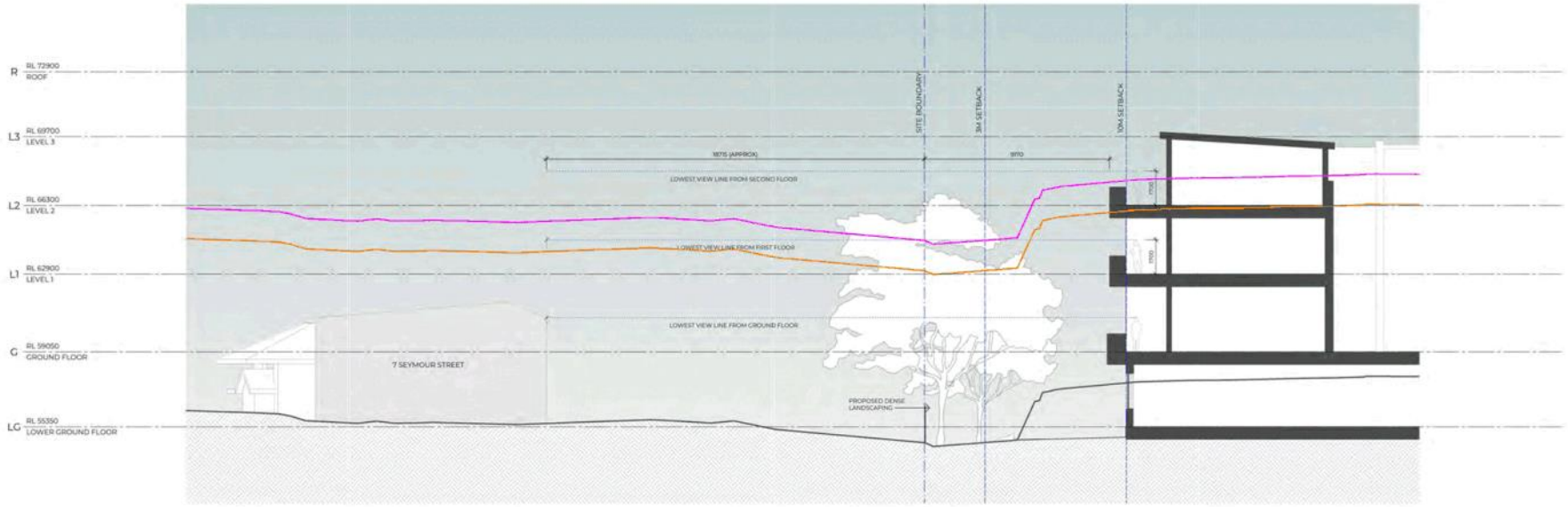
Project number 121978
Size check 10mm
Checked AJ
Approved JG
Sheet size A1
Scale As indicated

Sheet title
NEIGHBOURING SECTIONS_5 SEYMOUR STREET

Sheet number DA - 3401
Revision B
Status DEVELOPMENT APPLICATION



1 7 Seymore Street Site Plan
SCALE 1:750



2 7 Seymour Street Section
SCALE 1:100

SCALE BAR
0 1 2 5 10m

Recent revision history

#	Status	Description	Date
A		DEVELOPMENT APPLICATION	06/02/25
B		BASEMENT REVISION	06/06/2025

Notes
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DEVELOPMENT APPLICATION NOT FOR CONSTRUCTION 06/06/25

LEGEND
- 10M HEIGHT PLANE
- 8.5M HEIGHT PLANE
- EXISTING GROUND PLANE

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ORIGIN OF SURVEY INFORMATION
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 48187MD-1A
DATE: 29/11/2021

PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53851MD-1
DATE: 6/12/2024

Project: NEW TOWN RESIDENCES

Client: THE HOUSE FAMILY OFFICE

Issuer: W–B WOODS BAGOT

Project number: 121978
Size check: 20mm
Checked: AJ
Approved: JG
Sheet size: A1
Scale: As indicated

Sheet title: NEIGHBOURING SECTIONS_7 SEYMOUR STREET

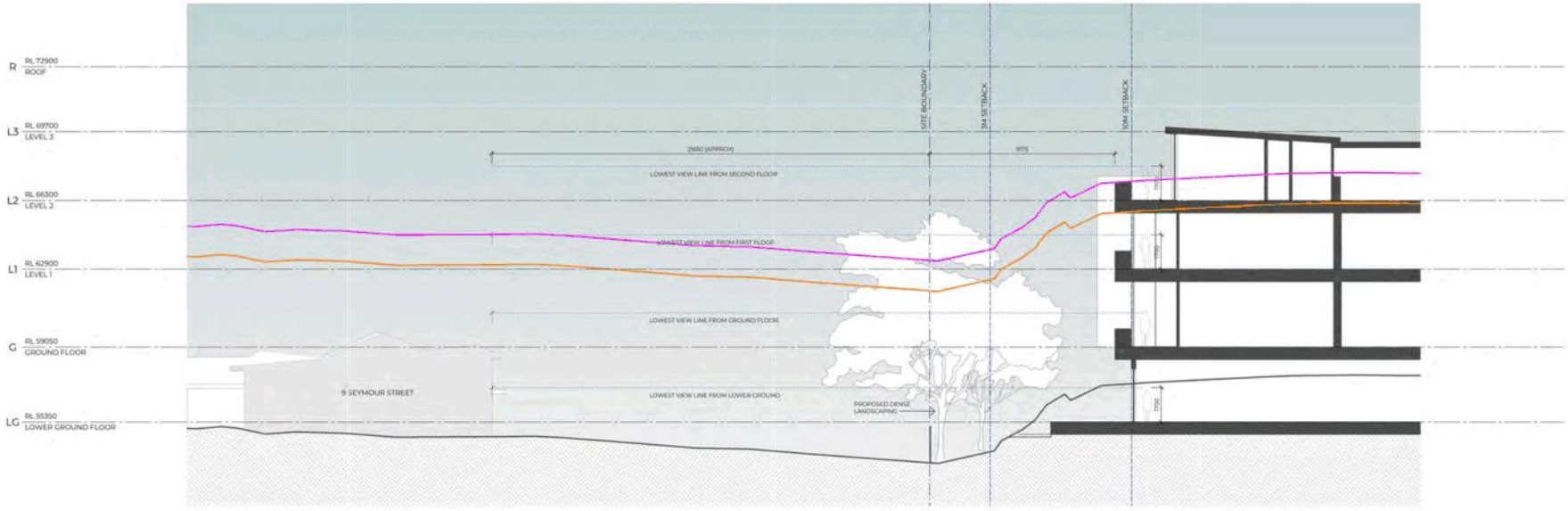
Sheet number: DA - 3402
Revision: B

Status: DEVELOPMENT APPLICATION

Date generated: 10/06/2025 10:00:31 AM



1 9 Seymore Street Site Plan
SCALE 1:750



2 9 Seymour Street Section
SCALE 1:100

SCALE BAR
0 1 2 5 10m

Recent revision history

#	Status	Description	Date
A		DEVELOPMENT APPLICATION	04/2025
B		BASEMENT REVISION	06/06/2025

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DEVELOPMENT APPLICATION NOT FOR CONSTRUCTION 06/06/25

Date generated: 13/06/2025 10:00:43 AM

LEGEND
- 10M HEIGHT PLANE
- 8.5M HEIGHT PLANE
- EXISTING GROUND PLANE

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ORIGIN OF SURVEY INFORMATION
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 48187MD-1A
DATE: 29/11/2021

PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53851MD-1
DATE: 6/12/2024

Project
NEW TOWN RESIDENCES

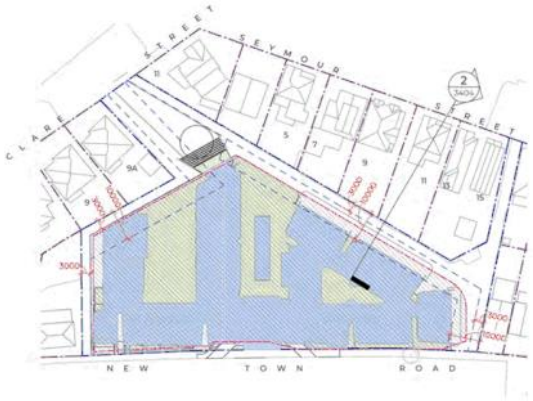
Client
THE HOUSE FAMILY OFFICE

Author
W–B WOODS BAGOT

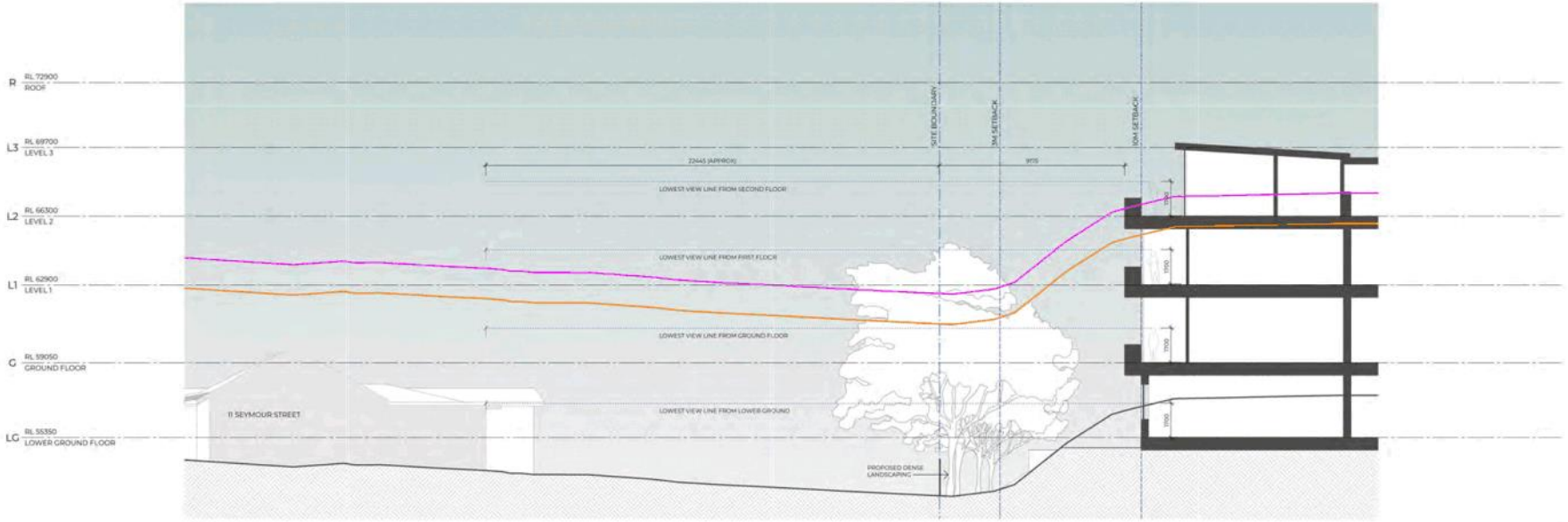
Project number 121978
Size check 20mm
Checked AJ
Approved JG
Sheet size A1
Scale As indicated

Sheet title
NEIGHBOURING SECTIONS_9 SEYMOUR STREET

Sheet number DA - 3403
Revision B
Status DEVELOPMENT APPLICATION



1 11 Seymour Street Site Plan
SCALE 1 : 750



2 11 Seymour Street Section
SCALE 1 : 100

SCALE BAR
0 1 2 5 10m

Recent revision history
A DEVELOPMENT APPLICATION 04/02/25
B BASEMENT REVISION 06/06/2025

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DEVELOPMENT APPLICATION NOT FOR CONSTRUCTION 06/06/25

Date generated: 15/06/2025 10:09:54 AM

LEGEND
10M HEIGHT PLANE
8.5M HEIGHT PLANE
EXISTING GROUND PLANE

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ORIGIN OF SURVEY INFORMATION
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 48187MD-1A
DATE: 29/11/2021

PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53851MD-1
DATE: 6/12/2024

Project
NEW TOWN RESIDENCES

Client
THE HOUSE FAMILY OFFICE

Issue
W–B
WOODS BAGOT

Project number
121978

Size check
20mm

Checked AJ | Approved JG | Sheet size A1 | Scale As indicated

Sheet title
NEIGHBOURING SECTIONS_11 SEYMOUR STREET

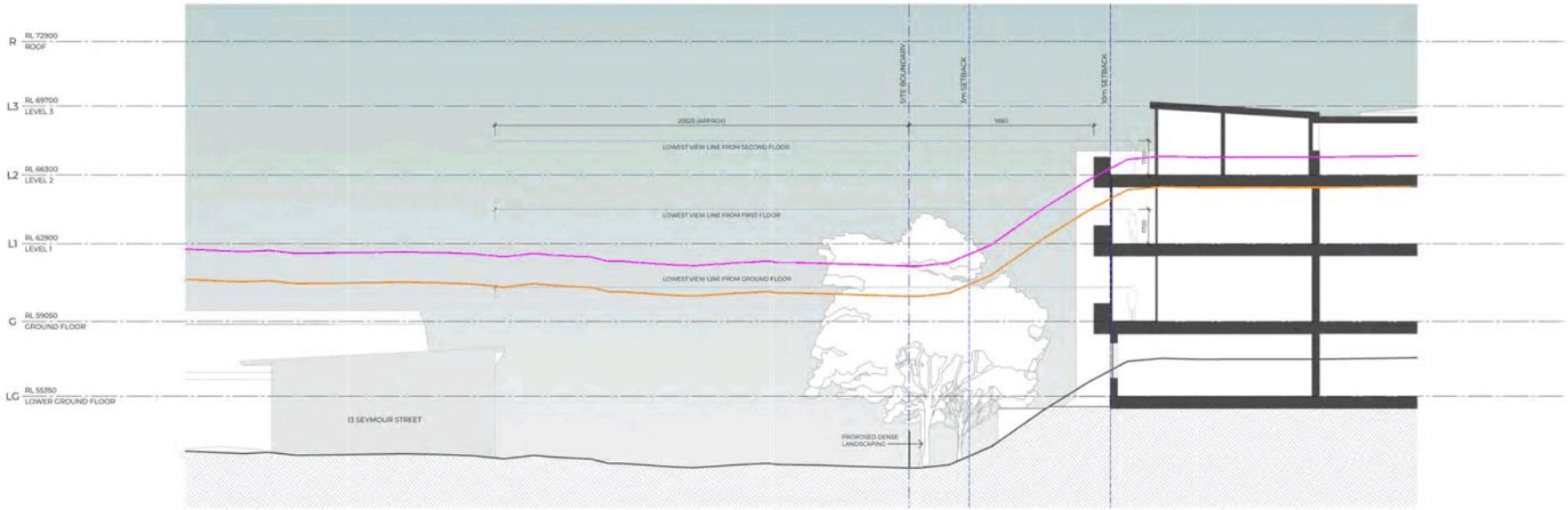
Sheet number
DA - 3404

Revision
B

Status
DEVELOPMENT APPLICATION



1 13 Seymour Street Site Plan
SCALE 1:750



2 13 Seymour Street Section
SCALE 1:100

SCALE BAR
0 1 2 5 10m

Recent revision history

#	Status	Description	Date
A		DEVELOPMENT APPLICATION	04/2025
B		BASEMENT REVISION	06/06/2025

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DEVELOPMENT APPLICATION NOT FOR CONSTRUCTION 06/06/25

Date generated: 13/06/2025 10:10:06 AM

LEGEND
- 10M HEIGHT PLANE
- 8.5M HEIGHT PLANE
- EXISTING GROUND PLANE

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ORIGIN OF SURVEY INFORMATION
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 48187MD-1A
DATE: 29/11/2021

PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53851MD-1
DATE: 6/12/2024

Project
NEW TOWN RESIDENCES

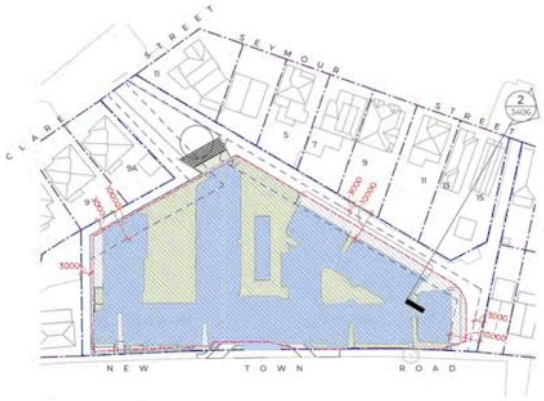
Client
THE HOUSE FAMILY OFFICE

Issuer
W–B WOODS BAGOT

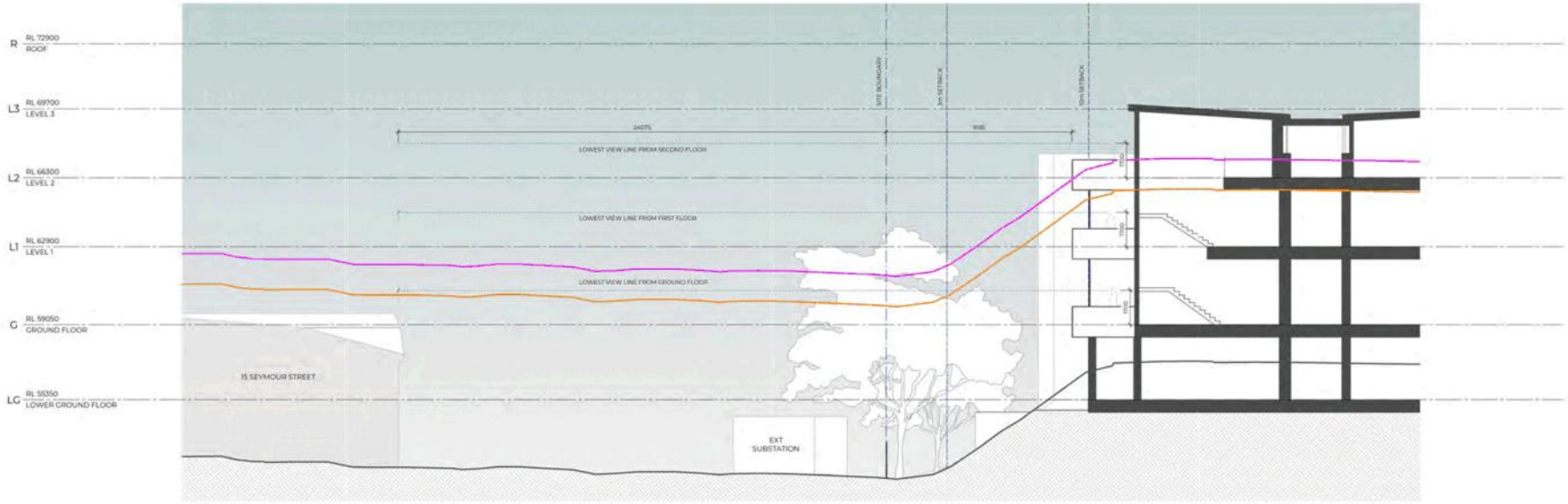
Project number 121978
Size check 10mm
Checked AJ
Approved JG
Sheet size A1
Scale As indicated

Sheet title
NEIGHBOURING SECTIONS_13 SEYMOUR STREET

Sheet number DA - 3405
Revision B
Status DEVELOPMENT APPLICATION



1 15 Seymour Street Site Plan
SCALE 1:750



2 15 Seymour Street Section
SCALE 1:100

SCALE BAR
0 1 2 5 10m

Recent revision history

#	Status	Description	Date
A		DEVELOPMENT APPLICATION	04/02/25
B		BASEMENT REVISION	06/06/2025

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DEVELOPMENT APPLICATION NOT FOR CONSTRUCTION 06/06/25

Date generated: 10/06/2025 10:10:19 AM

LEGEND
- 10M HEIGHT PLANE
- 8.5M HEIGHT PLANE
- EXISTING GROUND PLANE

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ORIGIN OF SURVEY INFORMATION
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 48187MD-1A
DATE: 29/11/2021

PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53851MD-1
DATE: 6/12/2024

Project
NEW TOWN RESIDENCES

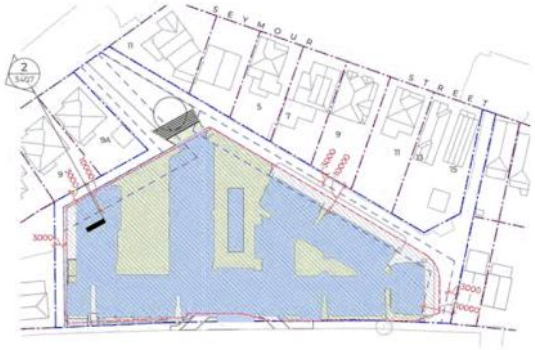
Client
THE HOUSE FAMILY OFFICE

Issuer
W–B WOODS BAGOT

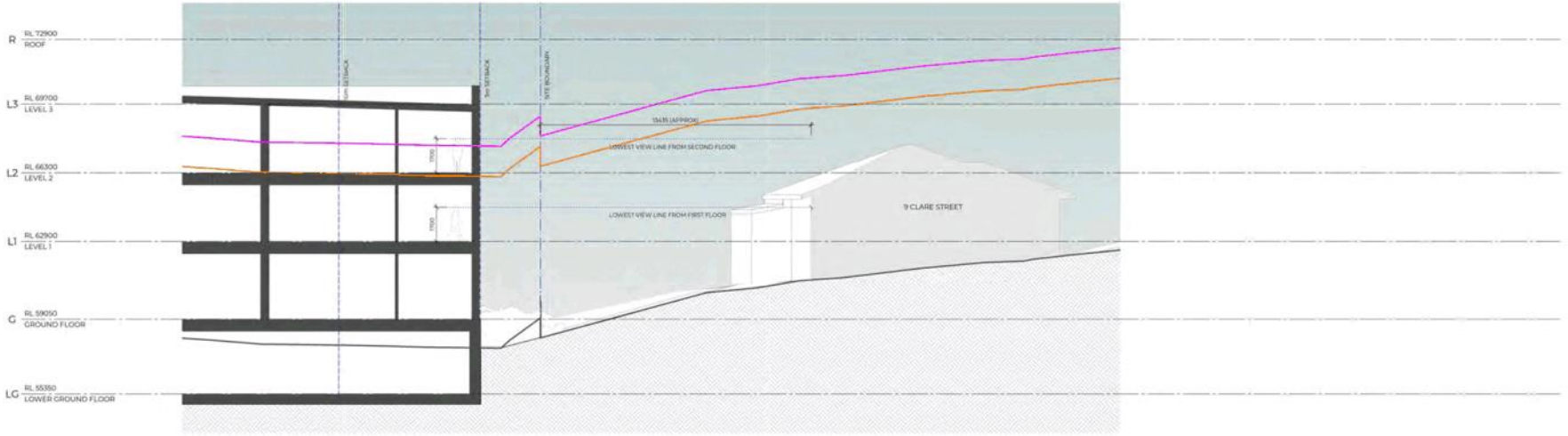
Project number 121978
Size check 10cm
Checked AJ
Approved JG
Sheet size A1
Scale As indicated

Sheet title
NEIGHBOURING SECTIONS_15 SEYMOUR STREET

Sheet number DA - 3406
Revision B
Status DEVELOPMENT APPLICATION



1 9 Clare Street Site Plan
SCALE 1:750



2 9 Clare Street Section
SCALE 1:100

Recent revision history

#	Status	Description	Date
A		DEVELOPMENT APPLICATION	04/02/25
B		BASEMENT REVISION	06/06/2025

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DEVELOPMENT APPLICATION NOT FOR CONSTRUCTION 06/06/25

Date generated: 10/06/2025 10:10:30 AM

LEGEND
- 10M HEIGHT PLANE
- 8.5M HEIGHT PLANE
- EXISTING GROUND PLANE

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ORIGIN OF SURVEY INFORMATION
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 48187MD-1A
DATE: 29/11/2021

PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53851MD-1
DATE: 6/12/2024

SCALE BAR
0 1 2 5 10m

Project
NEW TOWN RESIDENCES

Client
THE HOUSE FAMILY OFFICE

Issuer
W–B
WOODS BAGOT

Project number
121978

Size check
20mm

Checked: AJ | Approved: JG | Sheet size: A1 | Scale: As indicated

Sheet title
NEIGHBOURING SECTIONS_9 CLARE STREET

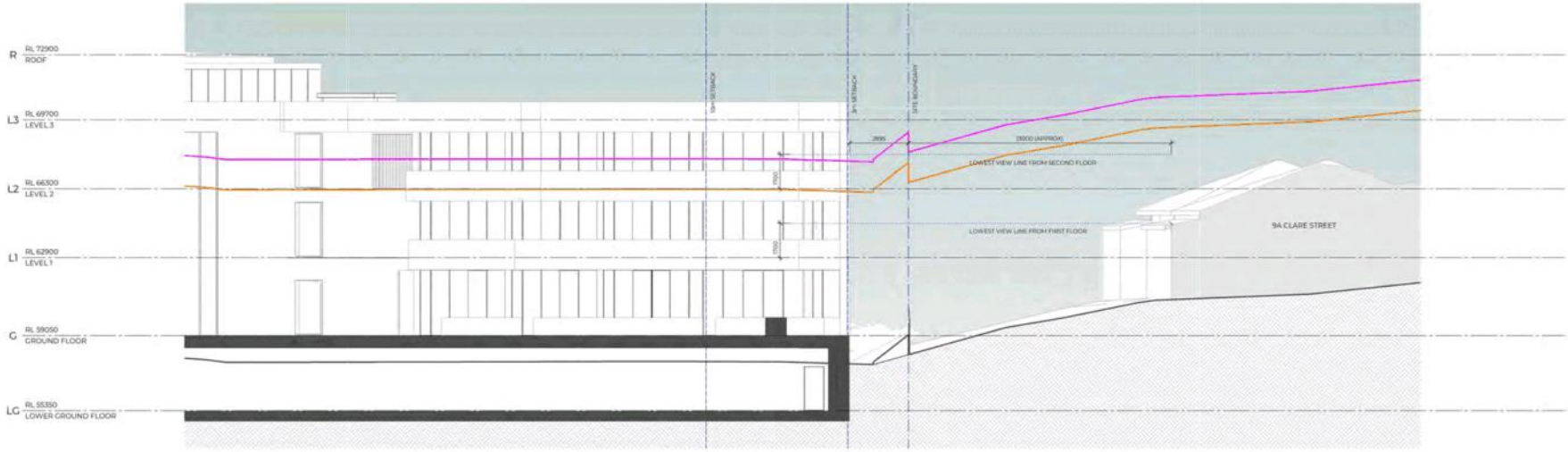
Sheet number
DA - 3407

Revision
B

Status
DEVELOPMENT APPLICATION



1 9a Clare Street Site Plan
SCALE 1:750



2 9A Clare Street Section
SCALE 1:100

SCALE BAR
0 1 2 5 10m

Recent revision history

#	Status	Description	Date
A		DEVELOPMENT APPLICATION	04/02/25
B		BASEMENT REVISION	06/06/2025

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DEVELOPMENT APPLICATION NOT FOR CONSTRUCTION 06/06/25

Date generated: 10/06/2025 10:10:42 AM

LEGEND
- 10M HEIGHT PLANE
- 8.5M HEIGHT PLANE
- EXISTING GROUND PLANE

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ORIGIN OF SURVEY INFORMATION
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 48187MD-1A
DATE: 25/11/2021

PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53851MD-1
DATE: 6/12/2024

Project
NEW TOWN RESIDENCES

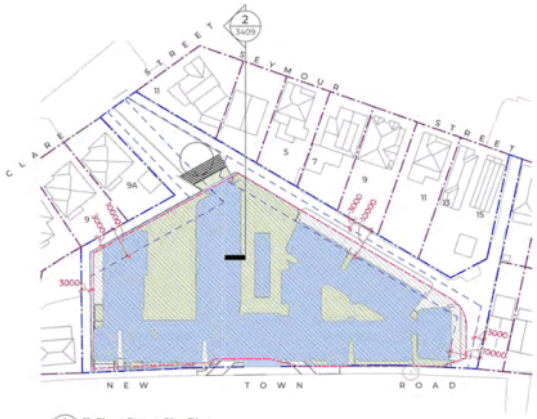
Client
THE HOUSE FAMILY OFFICE

Issuer
W–B WOODS BAGOT

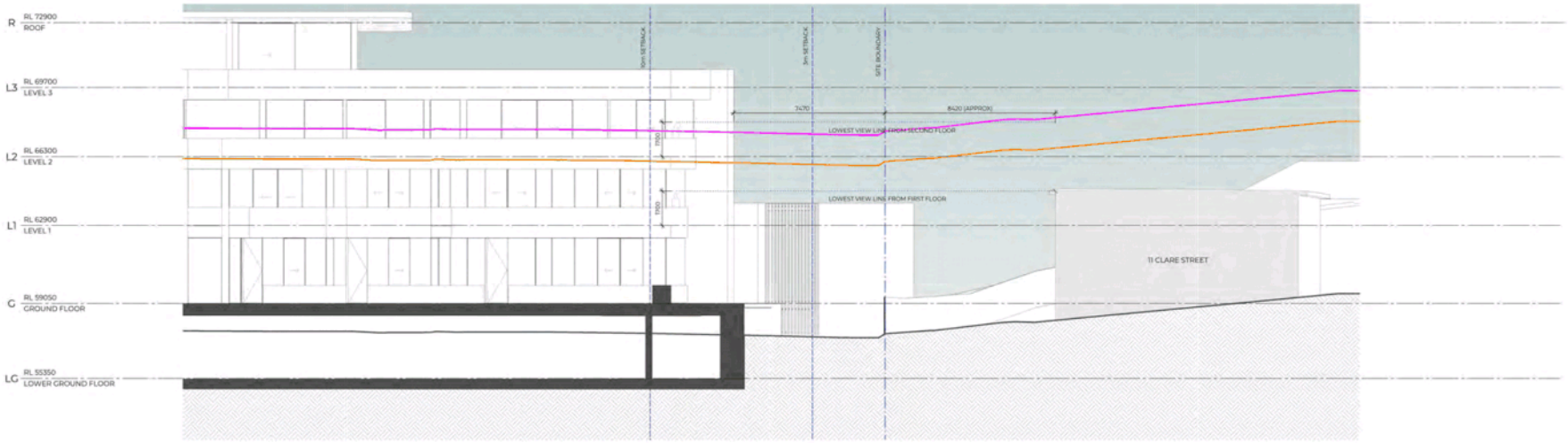
Project number 121978
Size check 10mm
Checked AJ
Approved JG
Sheet size A1
Scale As indicated

Sheet title
NEIGHBOURING SECTIONS_9a CLARE STREET

Sheet number DA - 3408
Revision B
Status DEVELOPMENT APPLICATION



1 11 Clare Street Site Plan
SCALE 1:750



2 11 Clare St Section
SCALE 1:100

SCALE BAR
0 1 2 5 10m

Recent revision history

#	Status	Description	Date
A		DEVELOPMENT APPLICATION	04/02/25
B		BASEMENT REVISION	06/06/2025

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DEVELOPMENT APPLICATION NOT FOR CONSTRUCTION 06/06/25

Date generated: 15/06/2025 10:10:52 AM

LEGEND
- 10M HEIGHT PLANE
- 8.5M HEIGHT PLANE
- EXISTING GROUND PLANE

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ORIGIN OF SURVEY INFORMATION
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 48187MD-1A
DATE: 29/11/2021

PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53851MD-1
DATE: 6/12/2024

Project
NEW TOWN RESIDENCES

Client
THE HOUSE FAMILY OFFICE

Issuer
W–B WOODS BAGOT

Project number 121978
Size check 20mm
Checked AJ
Approved JG
Sheet size A1
Scale As indicated

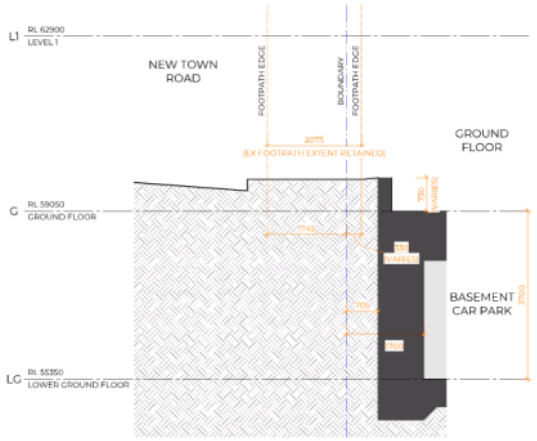
Sheet title
NEIGHBOURING SECTIONS_11 CLARE STREET

Sheet number DA - 3409
Revision B
Status DEVELOPMENT APPLICATION

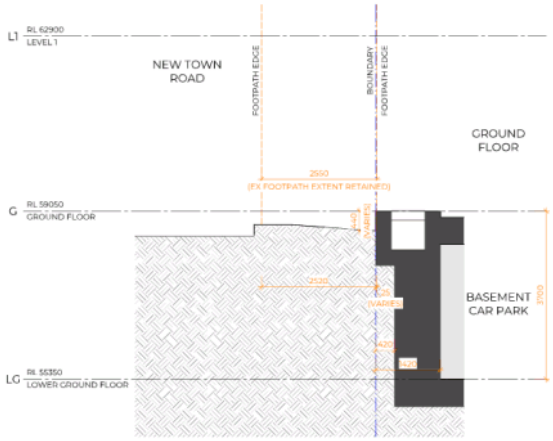


1 GROUND FLOOR - RFI RESPONSE
SCALE 1:200

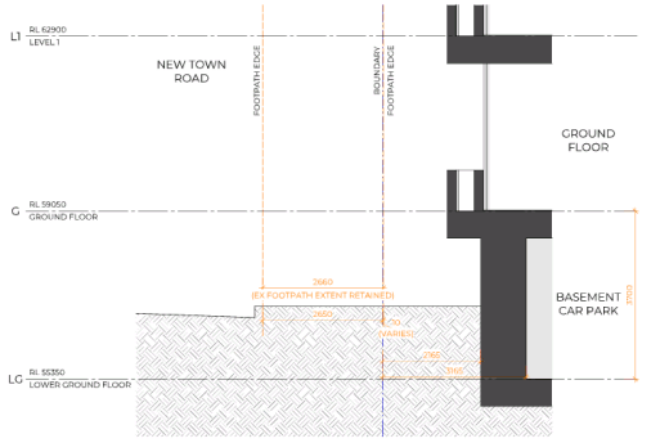
2 LOWER GROUND FLOOR - RFI RESPONSE
SCALE 1:200



3 NEW TOWN ROAD FOOTPATH SECTION - SOUTH
SCALE 1:50



4 NEW TOWN ROAD FOOTPATH SECTION - PORTE COCHERE
SCALE 1:50



5 NEW TOWN ROAD FOOTPATH SECTION - NORTH
SCALE 1:50

SCALE BAR
0 2.5 5 10 20m

#	Status	Description	Date
A		BASEMENT REVISION	08/09/25
B		COUNCIL RFI	17/09/25
C		COUNCIL RFI RESPONSE	19/09/25

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DEVELOPMENT APPLICATION NOT FOR CONSTRUCTION 10/09/25

LEGEND
BOUNDARY
FOOTPATH FROM SURVEY

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ORIGIN OF SURVEY INFORMATION
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 48187MD-1A
DATE: 25/11/2021

PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53851MD-1
DATE: 6/12/2024

Project
NEW TOWN RESIDENCES

Client
THE HOUSE FAMILY OFFICE

Issuer
W–B WOODS BAGOT

Project number 121978
Size check 20mm
Checked AJ
Approved JG
Sheet size A1
Scale As indicated

Sheet title
NTR FOOTPATH - RFI RESPONSE

Sheet number DA - 4201
Revision C
Status
DEVELOPMENT APPLICATION



1 LOWER GROUND FLOOR - PARKING LAYOUT
SCALE 1 : 150

SCALE BAR
0 1.875 3.75 7.5 15m

Record revision history

#	Status	Description	Date
A		COUNCIL RFI RESPONSE	04/08/25
B		COUNCIL RFI RESPONSE	10/09/25

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DEVELOPMENT APPLICATION NOT FOR CONSTRUCTION 10/09/25

Data generated: 9/09/2025 9:09:15 PM

LEGEND
BOUNDARY
FOOTPATH FROM SURVEY

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REFERENCE: 48187MD-1A
DATE: 25/11/2021

PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53851MD-1
DATE: 6/12/2024

Project
NEW TOWN RESIDENCES

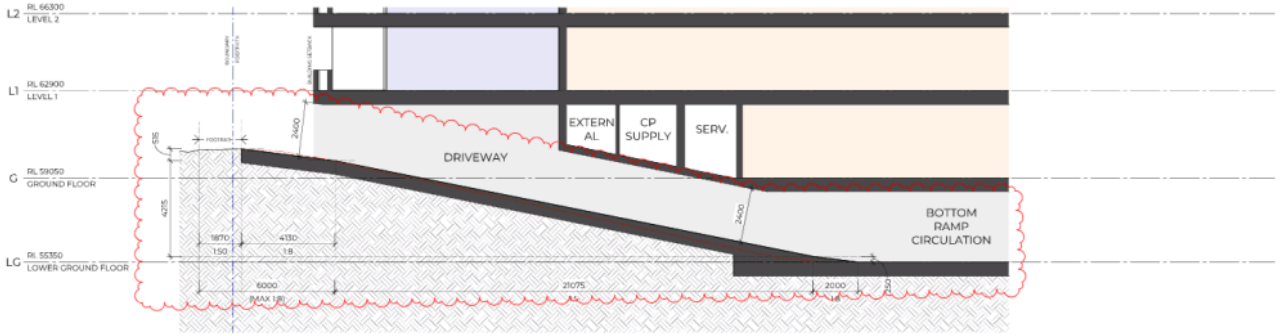
Client
THE HOUSE FAMILY OFFICE

Issuer
W–B WOODS BAGOT

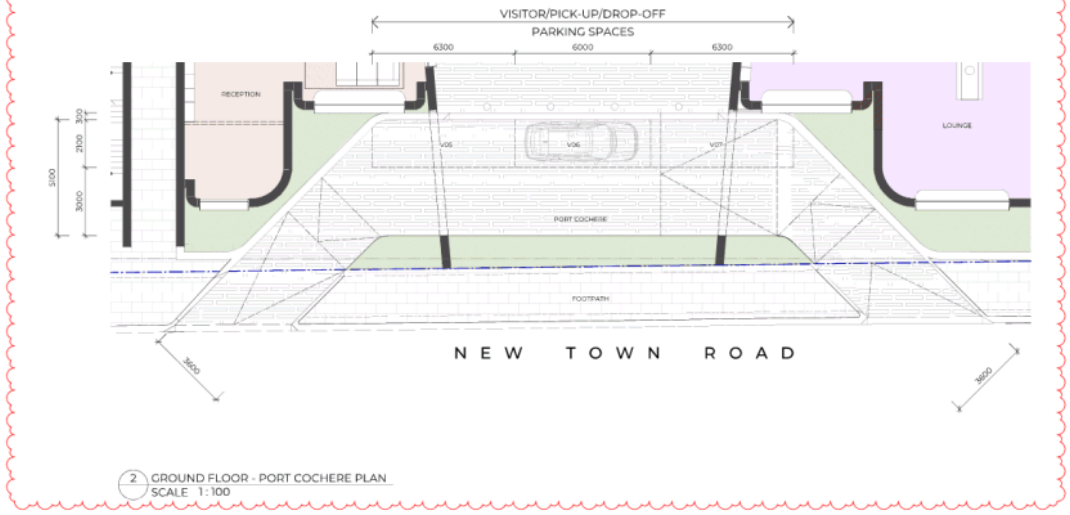
Project number 121978
Size check 20mm
Checked AJ
Approved JG
Sheet size A1
Scale As indicated

Sheet title
BASEMENT PARKING LAYOUT - RFI RESPONSE

Sheet number DA - 4202
Revision B
Status DEVELOPMENT APPLICATION



1 NTR ENTRY RAMP TO LG
SCALE 1:100



2 GROUND FLOOR - PORT COCHERE PLAN
SCALE 1:100

SCALE BAR
0 1 2 5 10m

Recent revision history

#	Status	Description	Date
A		COUNCIL RFI	17/09/25
B		COUNCIL RFI RESPONSE	18/09/25

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DEVELOPMENT APPLICATION NOT FOR CONSTRUCTION 10/09/25

LEGEND
BOUNDARY
FOOTPATH FROM SURVEY

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PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 48187MD-1A
DATE: 25/11/2021

PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53851MD-1
DATE: 6/12/2024

Project
NEW TOWN RESIDENCES

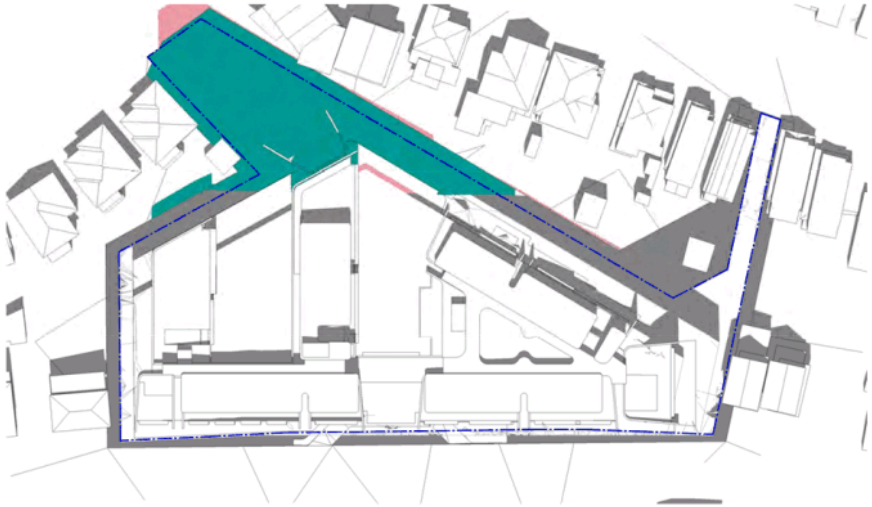
Client
THE HOUSE FAMILY OFFICE

Issuer
W–B WOODS BAGOT

Project number 121978
Size check 20mm
Checked AJ
Approved JG
Sheet size A1
Scale 1:100

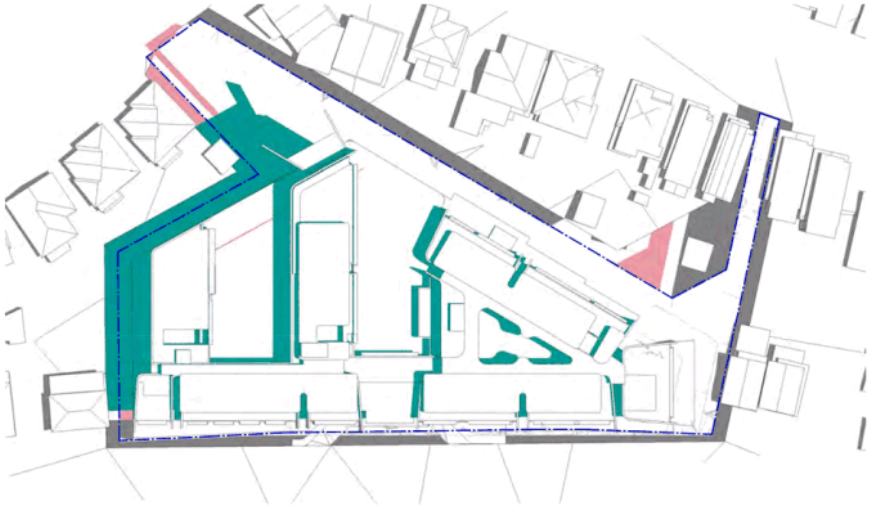
Sheet title
NTR DRIVEWAY - RFI RESPONSE

Sheet number DA - 4203
Revision B
Status
DEVELOPMENT APPLICATION



SITE SHADOWS - SUMMER SOLSTICE 9 AM

SCALE 1:500



SITE SHADOWS - SUMMER SOLSTICE 12 PM

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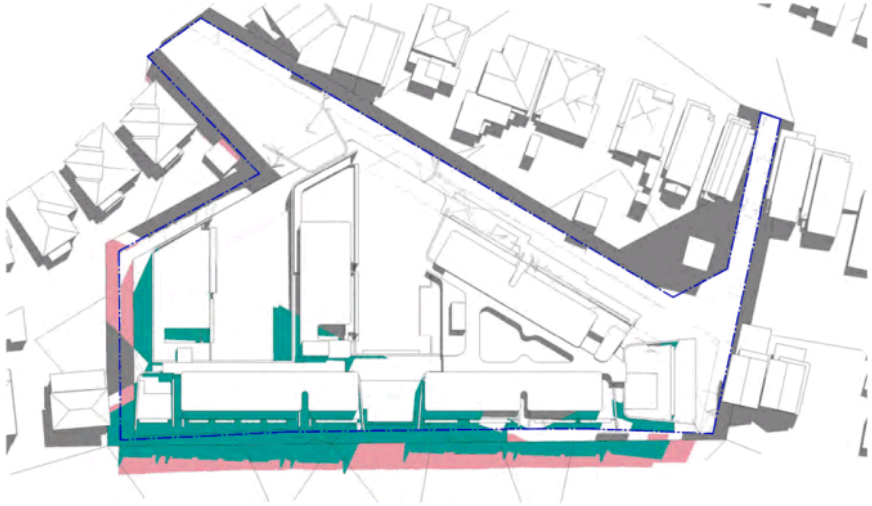

SITE SHADOWS - SUMMER SOLSTICE 3 PM

SCALE 1:500

Recent revision history

#	Status	Description	Date
A		DEVELOPMENT APPLICATION	04/02/25

Notes

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Do not scale drawings.

Data generated: 19/09/2025 10:10:07 AM

SHADOW LEGEND

- ADDITIONAL SHADOW IMPACT CAUSED BY POTENTIAL MAXIMUM ENVELOPE
- PROPOSED SHADOW IMPACT
- EXISTING NEIGHBOURING SHADOWS
- SITE BOUNDARY

Project
NEW TOWN RESIDENCES

Client
THE HOUSE FAMILY OFFICE

Issuer
W–B
WOODS BAGOT

Project number
121978

Size check
20mm

Checked
AJ

Approved
JG

Sheet size
A1

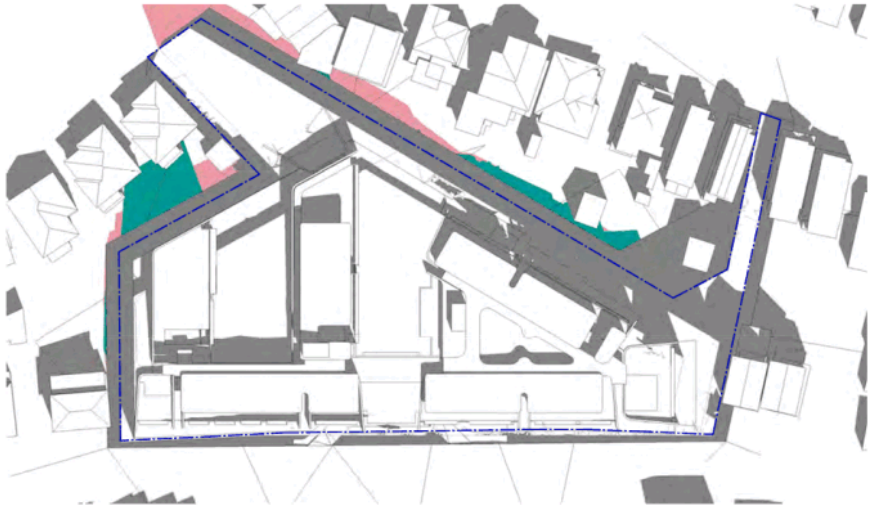
Scale
1 : 100

Sheet title
SHADOW DIAGRAMS - SUMMER SOLSTICE - DEC 22

Sheet number
DA - 7001

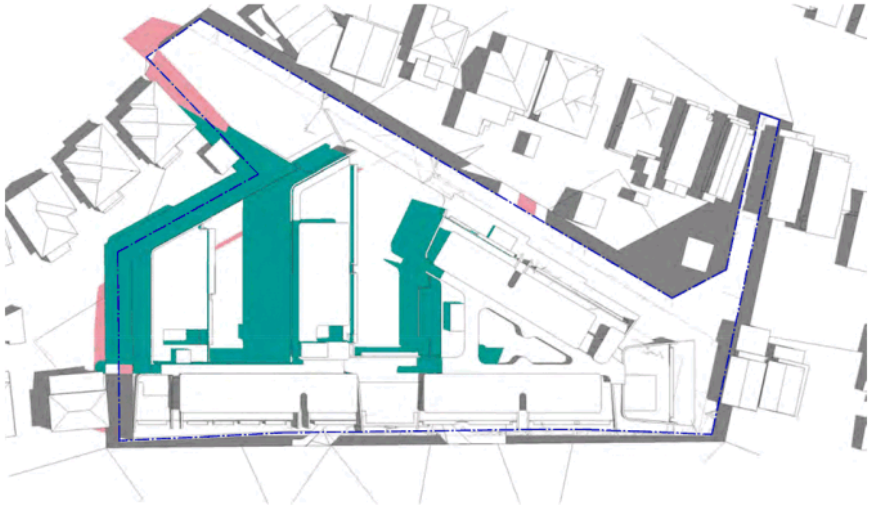
Revision
A

Status
DEVELOPMENT APPLICATION



SITE SHADOWS - MARCH EQUINOX 9 AM

SCALE 1:500



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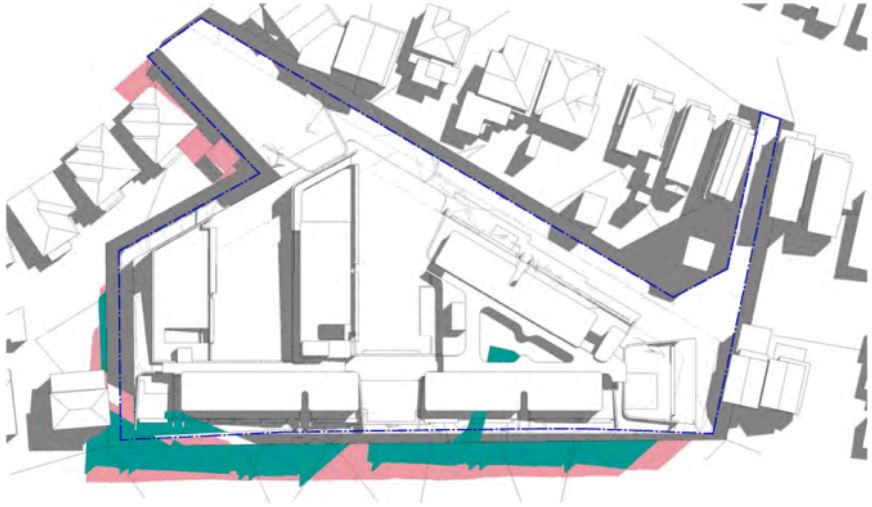

SITE SHADOWS - MARCH EQUINOX 3 PM

SCALE 1:500

Recent revision history

#	Status	Description	Date
A		DEVELOPMENT APPLICATION	04/2025

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Date generated: 15/04/2025 10:11:03 AM

SHADOW LEGEND

- ADDITIONAL SHADOW IMPACT CAUSED BY POTENTIAL MAXIMUM ENVELOPE
- PROPOSED SHADOW IMPACT
- EXISTING NEIGHBOURING SHADOWS
- SITE BOUNDARY

Project
NEW TOWN RESIDENCES

Client
THE HOUSE FAMILY OFFICE

Issuer
W–B
WOODS BAGOT

Project number
121978

Size check
25mm

Checked
AJ

Approved
JG

Sheet size
A1

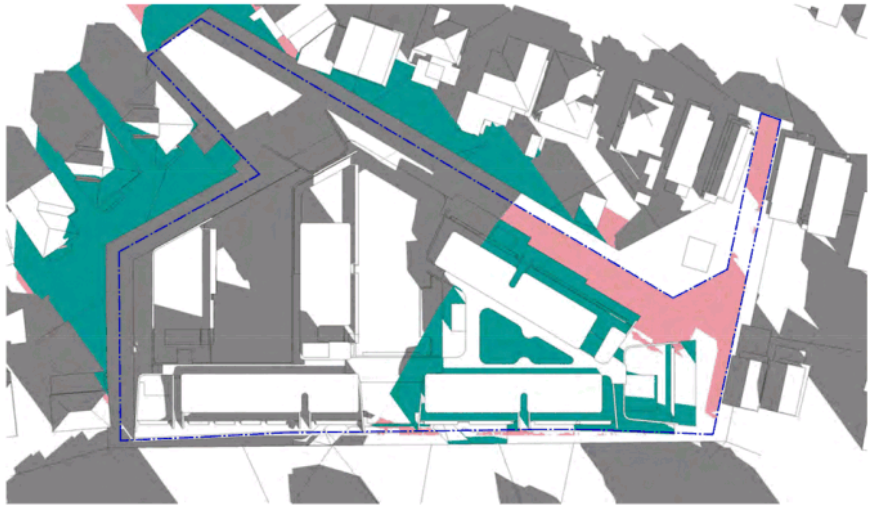
Scale
1 : 100

Sheet title
SHADOW DIAGRAMS - AUTUMN EQUINOX - MAR 22

Sheet number
DA - 7002

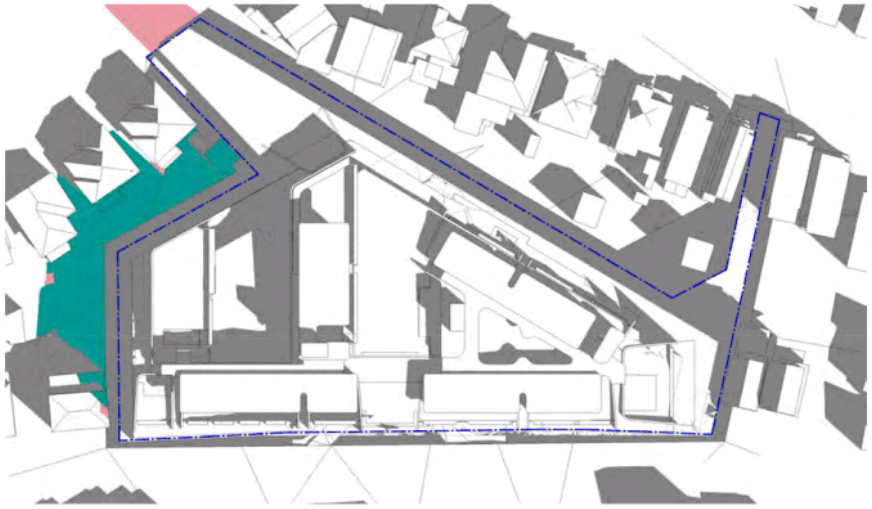
Revision
A

Status
DEVELOPMENT APPLICATION



SITE SHADOWS - WINTER SOLSTICE 9 AM

SCALE 1:500



SITE SHADOWS - WINTER SOLSTICE 10 AM

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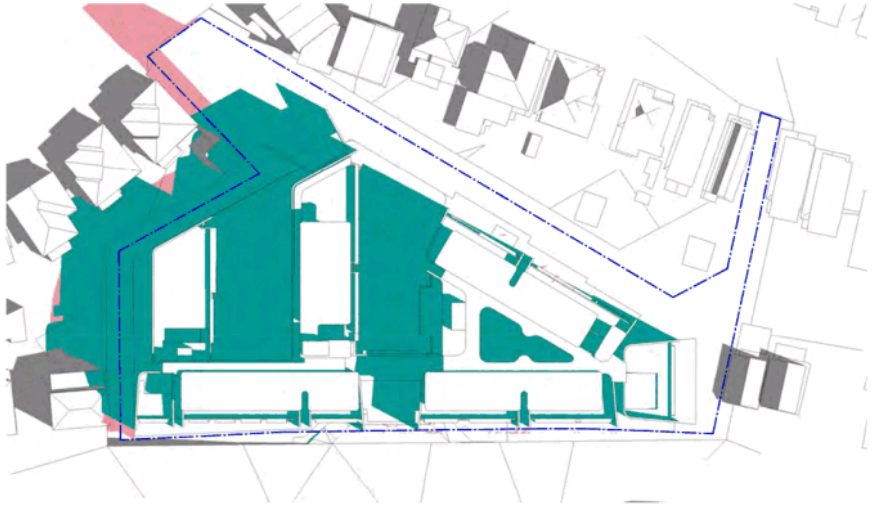
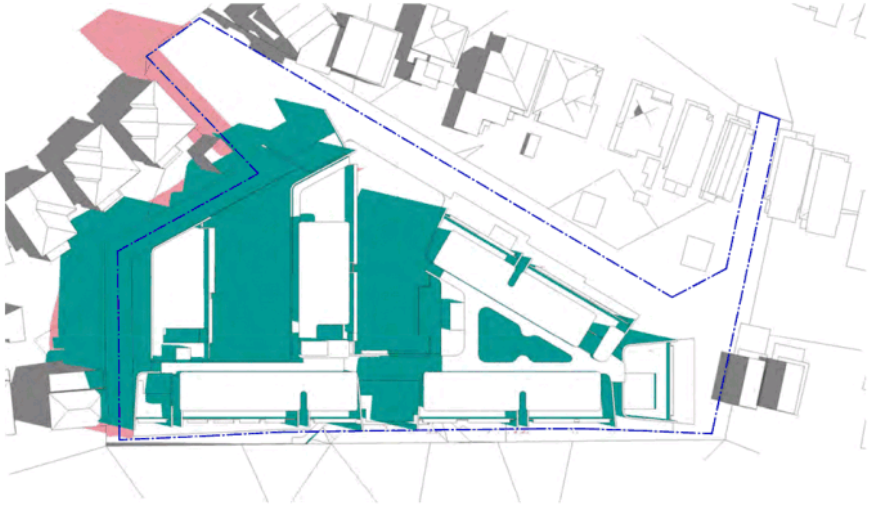


SITE SHADOWS - WINTER SOLSTICE 11 AM

SCALE 1:500



SITE SHADOWS - WINTER SOLSTICE 12 PM

SCALE 1:500

Record revision history

#	Status	Description	Date
A		DEVELOPMENT APPLICATION	04/02/25

Notes
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Data generated: 19/09/2025 10:11:09 AM

SHADOW LEGEND

- ADDITIONAL SHADOW IMPACT CAUSED BY POTENTIAL MAXIMUM ENVELOPE
- PROPOSED SHADOW IMPACT
- EXISTING NEIGHBOURING SHADOWS
- SITE BOUNDARY

Project
NEW TOWN RESIDENCES

Client
THE HOUSE FAMILY OFFICE

Issuer
W–B
WOODS BAGOT

Project number
121978

Size check
25mm

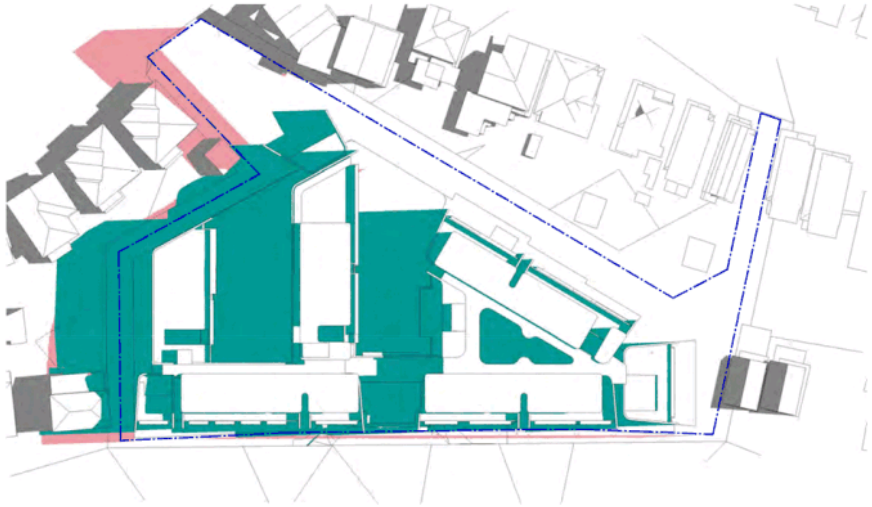
Checked: AJ | Approved: JG | Sheet size: A1 | Scale: 1 : 100

Sheet title
SHADOW DIAGRAMS - WINTER SOLSTICE - JUN 22

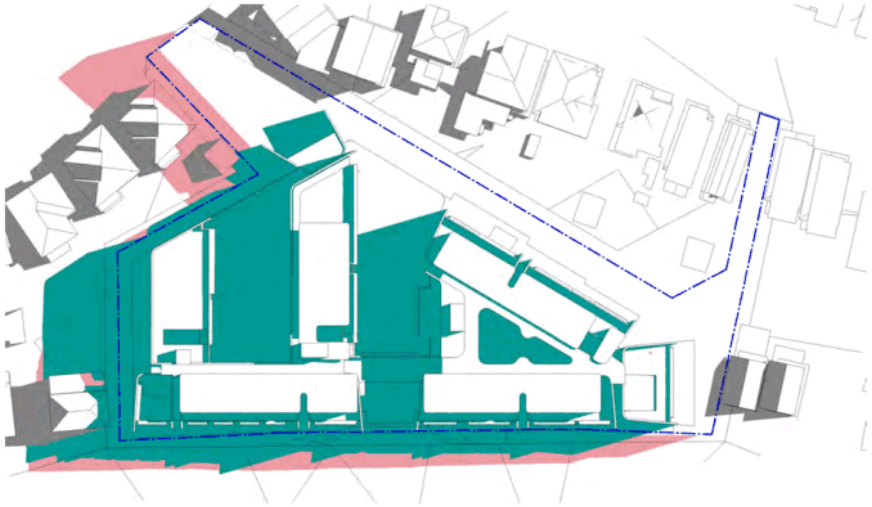
Sheet number
DA - 7003

Revision
A

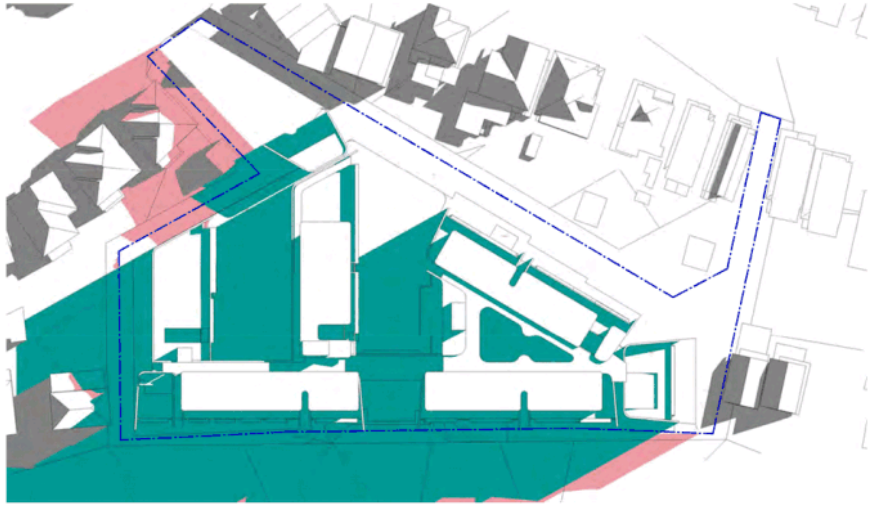
Status
DEVELOPMENT APPLICATION



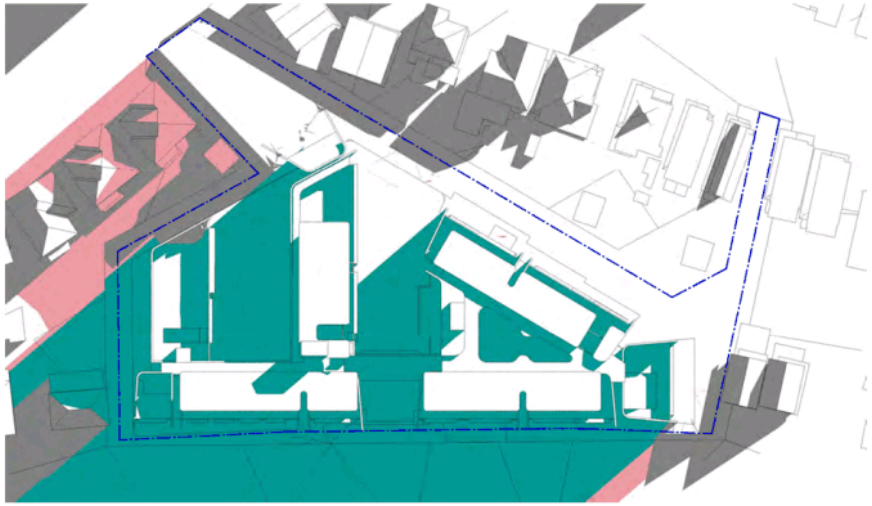
SITE SHADOWS - WINTER SOLSTICE 1 PM
SCALE 1:500



SITE SHADOWS - WINTER SOLSTICE 2 PM
SCALE 1:500



SITE SHADOWS - WINTER SOLSTICE 3 PM
SCALE 1:500



SITE SHADOWS - WINTER SOLSTICE 4 PM
SCALE 1:500

Record revision history

#	Status	Description	Date
A		DEVELOPMENT APPLICATION	04/2025

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Date generated: 15/04/2025 10:11:16 AM

SHADOW LEGEND

- ADDITIONAL SHADOW IMPACT CAUSED BY POTENTIAL MAXIMUM ENVELOPE
- PROPOSED SHADOW IMPACT
- EXISTING NEIGHBOURING SHADOWS
- SITE BOUNDARY

Project
NEW TOWN RESIDENCES

Client
THE HOUSE FAMILY OFFICE

Issuer
W–B
WOODS BAGOT

Project number
121978

Size check
25mm

Checked
AJ

Approved
JG

Sheet size
A1

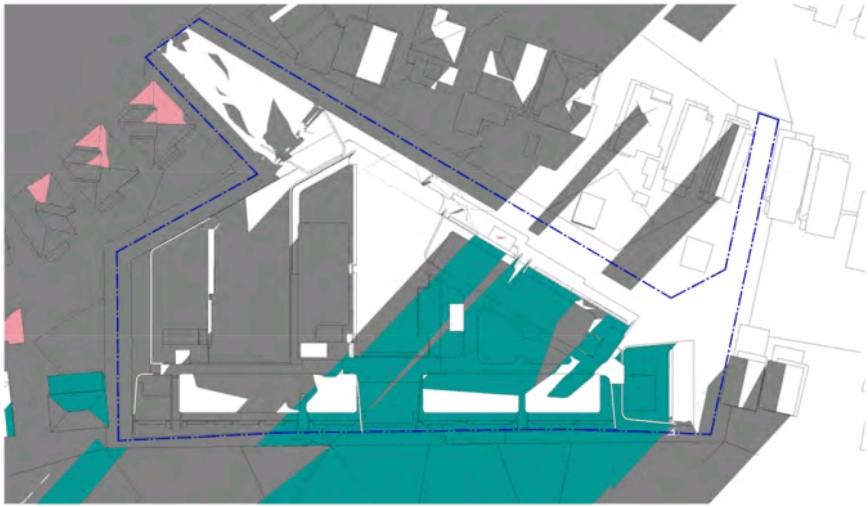
Scale
1 : 100

Sheet title
SHADOW DIAGRAMS - WINTER SOLSTICE - JUN 22

Sheet number
DA - 7004

Revision
A

Status
DEVELOPMENT APPLICATION



SITE SHADOWS - WINTER SOLSTICE 5 PM

SCALE 1:500

Recent revision history

#	Status	Description	Date
A		DEVELOPMENT APPLICATION	04/2025

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SHADOW LEGEND

- ADDITIONAL SHADOW IMPACT CAUSED BY POTENTIAL MAXIMUM ENVELOPE
- PROPOSED SHADOW IMPACT
- EXISTING NEIGHBOURING SHADOWS
- SITE BOUNDARY

Project
NEW TOWN RESIDENCES

Client
THE HOUSE FAMILY OFFICE

Issuer
W–B
WOODS BAGOT

Project number
121978

Size check
20mm

Checked
AJ

Approved
JG

Sheet size
A1

Scale
1 : 100

Sheet title
SHADOW DIAGRAMS - WINTER SOLSTICE - JUN 22

Sheet number
DA - 7005

Revision
A

Status
DEVELOPMENT APPLICATION



New Town Road - North West View

Recent revision history

#	Status	Description	Date
A		DEVELOPMENT APPLICATION	19/02/25

Notes

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NOTE:
Artist Impression Only. Final design may be subjected to changes.

Project
NEW TOWN RESIDENCES

Client
THE HOUSE FAMILY OFFICE

Issuer
W–B
WOODS BAGOT

Project number
121978

Size check
20mm

Checked	Approved	Sheet size	Scale
AJ	JG	A1	1 : 100

Sheet title
NORTH WEST RENDER VIEW

Sheet number
DA - 9001

Revision
A

Status
DEVELOPMENT APPLICATION

Date generated: 19/02/2025 10:11:47 AM



New Town Road - South West View

Recent revision history

#	Status	Description	Date
A		DEVELOPMENT APPLICATION	04/2025

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NOTE:
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Project
NEW TOWN RESIDENCES

Client
THE HOUSE FAMILY OFFICE

Issuer
W–B
WOODS BAGOT

Project number
121978

Size check
25mm

Checked	Approved	Sheet size	Scale
AJ	JG	A1	1 : 100

Sheet title
SOUTH WEST RENDER VIEW

Sheet number
DA - 9002

Revision
A

Status
DEVELOPMENT APPLICATION

GENERAL OUTLINE OF WORKS

All construction (and their work) are to comply in city to all Australian Standards' Building Codes, Environmental Protection' policies, Workplace Health and Safety guidelines, Local Council/Government regulations and Heritage Council requirements.
Project is abound to comply with National Standards.
All relevant permits and approvals are to be obtained by contractor prior to undertaking any works.
Contractor to undertake a full site survey and verify all dimensions prior to undertaking any works. Ensure any required temporary fencing are in place (i.e. Site fence, Temporary pool fencing, Tree Protection zone fencing, Temporary balustrades etc.)
All contractors must be aware of all existing trees to be retained on site. Refer to Arborist report for Tree Protection Zones (TPZ), Structural Root Zones (SRZ) and Principle Pending requirements during all building works. Allow for Root Barriers and Deflectors to excavation as specification at the time of planting (and periodic maintenance thereafter), to resist tree roots for develop away from services, pavements, walls and structures.
Plant supply by PBS Design unless otherwise advised.

SAFETY IN DESIGN

Parts of this design have been identified as posing an assumed risk to health and safety:
- risks associated with plantings/ planters at elevation (fall ability, fall risk to a safe below, subsidence effectiveness / maintenance, etc.)
- maintenance of climbing plants at height
- There are no Australian Standards for use of allergenic/ toxic plants in landscape design. Any plants not classified as 'culinary plants' should not be consumed, and young children & pets should be supervised when interacting with gardens. All plants that produce pollen can trigger hay fever in those who are prone, which is a general risk not confined to the gardens of this project. Allergy sufferers are advised to check for their GP if they have any concerns.
- Seek specialist consultation for bird/ bushfire risk mitigation measures. PBS Design welcomes professional feedback on all safety matters, and will promptly, does not accept liability in these matters as they fall outside of our scope and field of expertise.
- Should any further safety risks be identified within this design, please report to PBS Design immediately.
- Seek professional advice regarding site construction and continuing maintenance.

SURFACE DRAINAGE

SURFACE CONSTRUCTION	TYPICAL SLOPE
Concrete and asphalt paver	1:1.5 - 2.0%
Concrete and natural stone tiles	1:2.0%
Concrete and clinker (brick) paving	1:2.5%
Natural stone paving (2 or V shaped)	1:2.5 - 3.0%
Non-textured path surfaces	2.0 - 3.0%
Permeable mowings (gravel, chippings)	1.0 - 5.0%
Turf	1:1.5 - 2.0%

SLOPE MANAGEMENT

RISE : RUN	GRADIENT	DEGREES	TYPICAL USE	MAX LENGTH
1:100	1%	0.6°	max for lateral fall to drain	
1:20	5%	1.15°	max cross fall to path	
1:33	3%	1.72°		
1:12	8.33%	2.73°	slope of path (note) handrails	30m
1:20	5%	3.58°	ramp with handrails (AS1428.1+)	15m
1:14	7.14%	4.01°	ramp with handrails (AS1428.1+)	9m
1:10	10%	5.74°	step ramp / grand drive max (%s)	
1:8	12.5%	7.13°	threshold ramp	2%
1:7	14.4%	8.1°	rural drive (driveway - CFA)	
1:5	20%	11.3°	rural drive (road - CFA)	50m
1:4	25%	14.04°	ride on mower (max)	
1:3	33%	18.35°	batter to garden/ path (max)*	
1:2	50%	26.57°	batter with stabilisation / whipper snipper	
1:1	100%	45°	significant erosion risk, retain/ mower only	

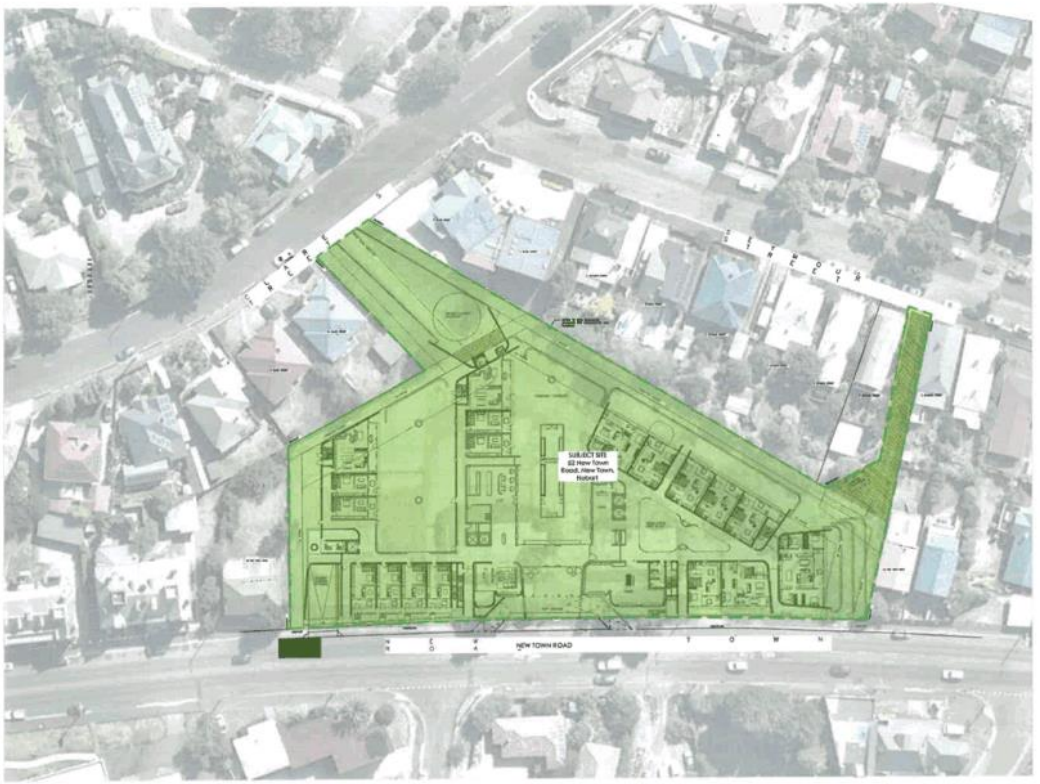
SLIP RATINGS

PBS Design may specify tiled pavers that do not meet slip ratings in their supplied condition. For non-compliant surfaces, apply 'Slipstop' anti-slip treatment (slip-stop.com.au) or similar.
For outdoor spaces (including around pools), a minimum slip rating of P4/R11+ should be achieved. Refer supplier product testing data.

TOLERANCES

Finish the surface to the required level, grade and shape within the following tolerances:
- Under building slabs and load bearing elements: + 0, - 25 mm.
- Pavement subgrades: + 0 - 40 mm.
- Battens: No steeper than the slope shown on the drawings. Make sure flatter slopes do not impact on boundaries or required clear areas to buildings, pavements or landscaping.
- Other ground surfaces: ± 50 mm, provided the area remains free draining and it matches adjacent construction where required. Provide smoothness as normally produced by a scraper blade.

Refer PBS Design Pty Ltd Landscape Specifications for further information.



SITE CONTEXT PLAN - 1:500 @ A1

DETAIL REFORT

NUMBER	TITLE	DATE

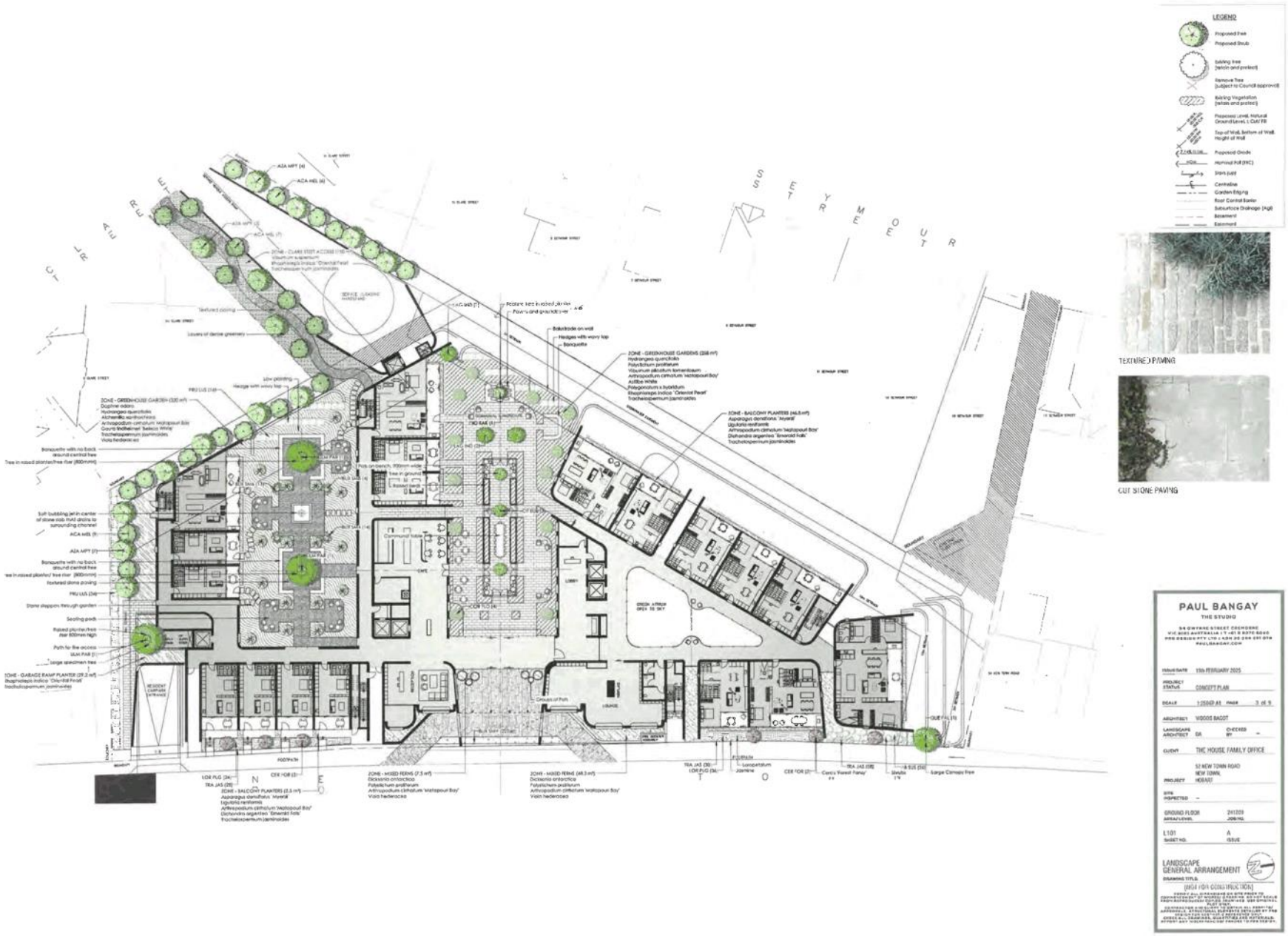
SHEET INDEX

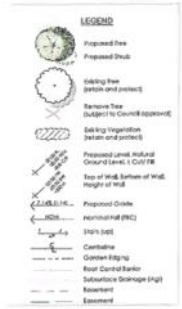
SHEET	DESCRIPTION
A00	COVER SHEET
A01	LANDSCAPE GENERAL ARRANGEMENT - GF
A02	LANDSCAPE GENERAL ARRANGEMENT - 1F
A03	LANDSCAPE GENERAL ARRANGEMENT - LVL 2
A04	LANDSCAPE GENERAL ARRANGEMENT - LVL 3
A05	ROOF LEVEL COVERS
A06	UTILITY SERVICES PLAN
A07	SECTION THROUGH SITE
A08	PLANTING PALETTE
A09	PLANTING PALETTE
A10	PLANTING PALETTE
A11	
A12	
A13	
A14	
A15	
A16	
A17	
A18	
A19	
A20	

PAUL BANGAY
THE STUDIO
84 DAVEY STREET, HOBART
ABN 83 000 000 000

ISSUE DATE: 10th FEBRUARY 2025
PROJECT STATUS: CONCEPT PLAN
SCALE: 1:500 @ A1
PAPER: A1
SHEET: 1 of 9
ARCHITECT: WOOD & BOOT
LANDSCAPE ARCHITECT: BA
DRAWN: BA
CHECKED: BY
CLIENT: THE HOUSE FAMILY OFFICE
PROJECT: 52 NEW TOWN ROAD, NEW TOWN, HOBART
SITE INSPECTED: --
CONTRACT: 241359
APPROVED LEVEL: 200 HO
1:500
SHEET NO: A00
ISSUE: A
COVER SHEET
DRAWING TITLE
(WIP) HDV CONSTRUCTION


LEGEND
PEBBLES
PAUL BANGAY
LANDSCAPE GENERAL ARRANGEMENT
(NOT FOR CONSTRUCTION)

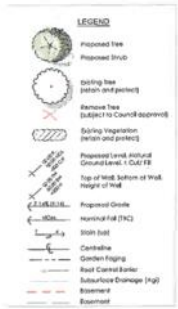

LEGEND
TEXTURED PAVING
CUT STONE PAVING
PAUL BANGAY
THE STUDIO
LANDSCAPE GENERAL ARRANGEMENT


LEGEND
Proposed Tree
Proposed Shrub
Existing Tree (retain and protect)
Remove Tree (subject to Council approval)
Existing Vegetation (retain and protect)
Proposed Level, Natural Ground Level, ± CUT/ FILL
Top of Wall, Bottom of Wall, Height of Wall
Proposed Grade
Handrail (RAC)
Steps (up)
Centreline
Garden Edging
Roof Control Barrier
Subsurface Drainage (Agi)
Basement
Easement

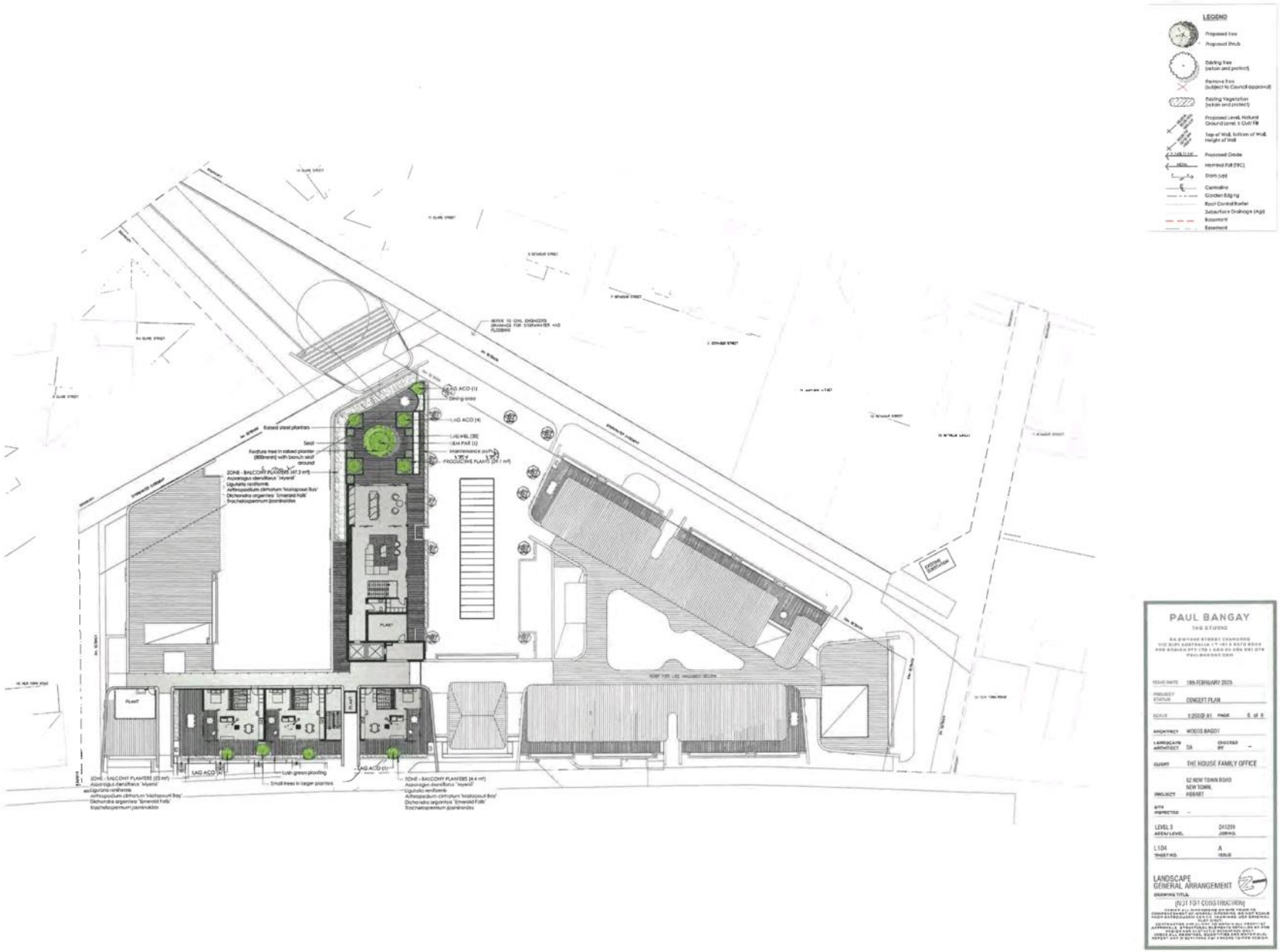

LAG ACO (E)
ZONE - BALCONY PLANTERS (31.8 m²)
Asparagus densiflorus 'Myersii'
Liguliaria reniformis
Arthropodium cirrhatum 'Matapouri Bay'
Dichondra argentea 'Emerald Falls'
Trachelospermum jasminoides
ZONE - BALCONY PLANTERS (14.0 m²)
Asparagus densiflorus 'Myersii'
Liguliaria reniformis
Arthropodium cirrhatum 'Matapouri Bay'
Dichondra argentea 'Emerald Falls'
Trachelospermum jasminoides
LAG ACO (S)
LAG ACO (E)
PLANT
PLANT
PLANT
LAG ACO (E)
ZONE - BALCONY PLANTERS (31.1 m²)
Asparagus densiflorus 'Myersii'
Liguliaria reniformis
Arthropodium cirrhatum 'Matapouri Bay'
Dichondra argentea 'Emerald Falls'
Trachelospermum jasminoides


PAUL BANGAY
THE STUDIO
ISSUE DATE 15th FEBRUARY 2025
PROJECT STATUS CONCEPT PLAN
ARCHITECT WOODS BAGOT
CLIENT THE HOUSE FAMILY OFFICE
92 NEW TOWN ROAD
NEW TOWN
HOBART
LEVEL 1
L102
A
LANDSCAPE GENERAL ARRANGEMENT
(NOT FOR CONSTRUCTION)


PLANT
PLANT
PLANT
PLANT
PLANT
LAD ACO (3)
LAD ACO (3)
LAD ACO (3)
Lush green planting
Small trees in larger planters


LEGEND
Proposed Tree
Proposed Shrub
Existing Tree (retain and protect)
Remove Tree (subject to Council approval)
Existing Vegetation (retain and protect)
Top of Wall, Bottom of Wall, Height of Wall
Proposed Grade
Nominal Fall (1%)
Swale
Centreline
Garden Edging
Root Control Barrier
Subsurface Drainage (Agi)
Basement
Basement


PAUL BANGAY
THE STUDIO
ISSUE DATE 17th FEBRUARY 2025
PROJECT STATUS CONCEPT PLAN
SCALE 1:250@A1 PAGE 5 of 9
ARCHITECT WOODS BAGOT
LANDSCAPE ARCHITECT DA CHECKED BY -
CLIENT THE HOUSE FAMILY OFFICE
PROJECT 57 NEW TOWN ROAD NEW TOWN, HOBART
SITE INSPECTED
LEVEL 2 NPSM LEVEL 24133 JOB NO.
L103 SHEET NO. A ISSUE
LANDSCAPE GENERAL ARRANGEMENT
DRAWING TITLE
(NOT FOR CONSTRUCTION)


LEGEND
Proposed tree
Proposed Shrub
Existing tree (retain and protect)
Remove tree (subject to Council approval)
Existing Vegetation (retain and protect)
Proposed Level, Natural Ground Level, ± Cut/ Fill
Top of Wall, bottom of Wall, Height of Wall
Proposed Grade
Nominal Fall (FFC)
Stairs (up)
Centreline
Garden Edging
Root Control Barrier
Subsurface Drainage (Agg)
Basement
Easement
PAUL BANGAY
THE STUDIO
ISSUE DATE 19th FEBRUARY 2025
PROJECT STATUS CONCEPT PLAN
SCALE 1:250@ A1 PAGE 6 of 9
ARCHITECT WOODS BAGOT
LANDSCAPE ARCHITECT DA
CHECKED BY –
CLIENT THE HOUSE FAMILY OFFICE
PROJECT 52 NEW TOWN ROAD NEW TOWN, HOBART
SITE INSPECTED –
LEVEL 3 AREA/LEVEL 241299 JOB NO.
L104 SHEET NO. A ISSUE
LANDSCAPE GENERAL ARRANGEMENT
DRAWING TITLE
(NOT FOR CONSTRUCTION)
PLANT
LAG ACO (1)
LAG ACO (4)
LAG ACO (1)
Lush green planting
Small trees in larger planters
Raised steel planters
Seat
Feature tree in raised planter (800mm) with bench seat around
ZONE - BALCONY PLANTERS (47.3 m²)
Asparagus densiflorus 'Myersi'
Ligularia reniformis
Arthropodium cirrhatum 'Matapouri Bay'
Dichondra argentea 'Emerald Falls'
Trachelospermum jasminoides
ZONE - BALCONY PLANTERS (23 m²)
Asparagus densiflorus 'Myersi'
Ligularia reniformis
Arthropodium cirrhatum 'Matapouri Bay'
Dichondra argentea 'Emerald Falls'
Trachelospermum jasminoides
ZONE - BALCONY PLANTERS (4.4 m²)
Asparagus densiflorus 'Myersi'
Ligularia reniformis
Arthropodium cirrhatum 'Matapouri Bay'
Dichondra argentea 'Emerald Falls'
Trachelospermum jasminoides

PLANT SCHEDULE LOWER GROUND FLOOR

CODE	BOTANICAL NAME	COMMON NAME	SIZE	MIN. HEIGHT	SIZE (MATURE H)(W)	EV/DEC, EVG/DEC	QTY
TREES							
ACA MIR	Acacia mirbeyi/ter	Blackwood	45L	1.4m+	(2m)H	Ev. Evg	23
ACE PAL	Acer palmatum	Green Leaf Japanese Maple	12L	2m+	4x4m	Ev. Dec	9
AZA MPE	Azara microphylla	Vanilla Tree	100L	2m+	8x5m	Ev. Evg	12
HAG TED	Magnolia grandiflora 'Teddy Bear'	Teddy Bear Magnolia	200L	3m+	4x3m	Ev. Evg	10
NOT OBL	Nothofagus gunnii	Tanglefoot	200L	3m+	8x3m	Ev. Dec	5

PLANT SCHEDULE LOWER GROUND FLOOR

CODE	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	SIZE (MATURE H)(W)	H/V/EX, EVG/DEC
SHRUBS						
BUX SMA	Buxus sempervirens	English Box Sphere	400mm dia.	As Shown	0.4x0.4m	Ex. Evg
BUX SMA	Buxus sempervirens	English Box Sphere	600mm dia.	As Shown	0.6x0.6m	Ex. Evg
BUX SMB	Buxus sempervirens	English Box Sphere	800mm dia.	As Shown	0.8x0.8m	Ex. Evg
SHRUB AREAS						
	ZONE - ATRIUM					
ASP NRS	Asparagus densiflorus 'Myers'	Foxtail Fern	25cm Pot	300mm	0.5x0.5m	Ex. Evg
BLE NTG	Blechnum nudum	Native Hare's-ears	14cm Pot	300mm	0.8x0.8m	Ex. Evg
DIC ANE	Dicksonia antarctica	Soft Tree Fern	45cm Pot	As Shown	3x3m	Ex. Evg
FTJ JPM	Ferns japonica	Japanese Aralia	45cm Pot	1200mm	4x4m	Ex. Evg
POL MOR	Polystichum proliferum	Mother Shield Fern	25cm Pot	400mm	0.4x0.4m	Ex. Evg
ASP BLA	Aspidistra elatior	Cast Iron Plant	25cm Pot	600mm	1x1m	Ex. Evg
SOL SOL	Solenostemon scutellarioides	Baby Sun Rose	7cm Tube	250mm	0.1x0.4m	Ex. Evg
VIO HED	Viola hederacea	Native Violet	7cm Tube	250mm	0.1x0.3m	Ex. Evg
	ZONE - WELLNESS GARDEN					
CHO TER	Choisya ternata	Mexican Orange	25cm Pot	900mm	1.5x2m	Ex. Evg
VIB SUS	Viburnum suspensum	Sandankwa Viburnum	25cm Pot	As Shown	2.5x1.5m	Ex. Evg
RHA OPH	Rhaphiolepis indica 'Oriental Pearl'	Indian Hawthorn	20cm Pot	600mm	0.8x1m	Ex. Evg
	ZONE - GYM TERRACES					
NT MS	Nothofagus moorei 'Nana Mu'ler'	Dwarf Antarctic Beech	25cm Pot	300mm	H1.5m	Ex. Evg
RHA OPH	Rhaphiolepis indica 'Oriental Pearl'	Indian Hawthorn	70cm Pot	600mm	0.8x1m	Ex. Evg
PAR SIE	Parthenocissus sikkimensis	Ivy	14cm Pot	450mm	0.2x2m	Ex. Evg
GROUND COVERS						
TRA JAS	Trachelospermum jasminoides 'compone Bella' frames if present. Fix vines to ground	Star Jasmine	20cm Pot	300mm	0.3x2m	Ex. Evg

TREES



ATRIUM



WELLNESS GARDEN



GYM TERRACES



BALCONY PLANTERS



PLANT SCHEDULE 1ST FLOOR

CODE	BOTANICAL NAME	COMMON NAME	SIZE	MIN. HEIGHT	SIZE (MATURE H)(W)	EV/DEC, EVG/DEC	QTY
TREES							
LAG FOD	Lagerstroemia indica x fauriei 'Acoma'	White Crape Myrtle	45L	1.4m+	3x3m	Ex. Dec	17

PLANT SCHEDULE 1ST FLOOR

CODE	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	SIZE (MATURE H)(W)	H/V/EX, EVG/DEC
SHRUB AREAS						
	ZONE - BALCONY PLANTERS					
ASP MIR	Asparagus densiflorus 'Myers'	Foxtail Fern	30cm Pot	500mm	0.5x0.5m	Ex. Evg
LIG TRA	Ligularia reniformis	Tractor Seat	25cm Pot	600mm	0.6x0.8m	Ex. Dec
ANT CIR	Anthropodium cirrhatum 'Matapouri Bay'	New Zealand Rock Lily	20cm Pot	700mm	0.4x1m	Ex. Evg
DIC ARG	Dichondra argentea 'Emerald Falls'	Emerald Falls Dichondra	20cm Pot	300mm	0.1x1m	Ex. Evg
TRA JAS	Trachelospermum jasminoides 'compone Bella' frames if present. Fix vines to ground	Star Jasmine	20cm Pot	500mm	0.3x2m	Ex. Evg

PLANT SCHEDULE 2ND FLOOR

CODE	BOTANICAL NAME	COMMON NAME	SIZE	MIN. HEIGHT	SIZE (MATURE H)(W)	EV/DEC, EVG/DEC	QTY
TREES							
LAG FOD	Lagerstroemia indica x fauriei 'Acoma'	White Crape Myrtle	45L	1.4m+	3x3m	Ex. Dec	7

PLANT SCHEDULE 2ND FLOOR

CODE	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	SIZE (MATURE H)(W)	H/V/EX, EVG/DEC
SHRUB AREAS						
	ZONE - BALCONY PLANTERS					
ASP MIR	Asparagus densiflorus 'Myers'	Foxtail Fern	30cm Pot	500mm	0.5x0.5m	Ex. Evg
LIG TRA	Ligularia reniformis	Tractor Seat	25cm Pot	600mm	0.6x0.8m	Ex. Dec
ANT CIR	Anthropodium cirrhatum 'Matapouri Bay'	New Zealand Rock Lily	20cm Pot	700mm	0.4x1m	Ex. Evg
DIC ARG	Dichondra argentea 'Emerald Falls'	Emerald Falls Dichondra	20cm Pot	300mm	0.1x1m	Ex. Evg
TRA JAS	Trachelospermum jasminoides 'compone Bella' frames if present. Fix vines to ground	Star Jasmine	20cm Pot	500mm	0.3x2m	Ex. Evg

TREES

PAUL BANGAY
THE STUDIO

ISSUE DATE: 19th FEBRUARY 2025
PROJECT STATUS: CONCEPT PLAN
SCALE: 1st @ A1 PAGE: 7 of 9
ARCHITECT: WOODS BAGOT
LANDSCAPE ARCHITECT: DA
DRAWN BY: -
CLIENT: THE HOUSE FAMILY OFFICE
PROJECT: 52 NEW TOWN ROAD NEW TOWN HOBART
SITE INSPECTED: -
LOWER GROUND FLOOR LEVEL 1 & LEVEL 2
AREA/LEVEL: DA1259
JOB NO.:
L300
SHEET NO.: A
ISSUE:

PLANTING PALETTE
DRAWING TITLE
(NOT FOR CONSTRUCTION)

PLANT SCHEDULE GROUND FLOOR

CODE	BOTANICAL NAME	COMMON NAME	SIZE	MIN. HEIGHT	SIZE (MATURE WHT)	EVERG. EVERGREEN	QTY
TREES							
ACA HEL	Acacia Helmsleyana	Raspberry	45L	1.4mH	12x3m	Ev. Evg	22
AXA MIC	Agapa Microphylla	Yesterday Now	150L	2m+	8x3m	Ev. Evg	14
BET UTI	Betula pendula 'Moss White'	Moss White Silver Birch	150L	3m+	10x3m	De. Dec	14
CER FOR	Cercis canadensis 'Forest Pansy'	Forest Pansy Redbud	75L	2m+	5x3m	De. Dec	6
CUP PIS	Cupaca Sempervirens	Rosemary Bergerac	45L	2m+	4x3m	Ev. Dec	12
LAG IND	Lagerstroemia indica x fauriei 'Natchez'	White Crepe Myrtle	150L	2m+	6x4m	De. Dec	3
QUE PAL	Quercus palustris	Pin Oak	200L	2m+	15x8m	De. Dec	1
ULM PAR	Ulmus parvifolia	Chinese Elm	150L	4m+	12x12m	De. Dec	5
ORCHARD TREES							
CIT SIN	Citrus x limon 'Eureka'	Eureka lemon	75L	1.8m+	4x3m	Ev. Evg	3
DIO KAK	Diospyros kaki 'Jiro'	Japanese Persimmon	45L	1.4m+	6x4m	De. Dec	1

PLANT SCHEDULE GROUND FLOOR

CODE	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	SIZE (MATURE HEIGHT)	HYDRO. EVERGREEN
HEDGES						
BUX SUH	Buxus sempervirens	English Box Standard	400mm dia.	As Shown	0.4x0.4m	Ev. Evg
BUX SUH	Buxus sempervirens	English Box To Hand	600mm dia.	As Shown	0.6x0.6m	Ev. Evg
BUX SUH	Buxus sempervirens	English Box Screen	600mm dia.	As Shown	0.6x0.6m	Ev. Evg
VIB SPI	Viburnum suspensum	Sandankwa Viburnum	35cm Pot	As Shown	3.5x1.5m	Ev. Evg
HEDGES						
PRU LUS	Prunus lusitanica	Portugese Laurel	45cm @ 1.2m+	1000mm	3x2m	Ev. Evg
SHRUB AREAS						
	ZONE - CONVERSE CHAIR					
DAP ODO	Daphne odora	Daphne	25cm Pot	600mm	1x1.5m	Ev. Evg
HYD QUE	Hydrangea quercifolia	Oakleaf Hydrangea	35cm Pot	1000mm	1.8x2.5m	De. Dec
ACO NOS	Alchemilla vestitaflora	Lady's Mantle	25cm Pot	450mm	0.5x0.6m	Hr. Evg
ARI CRI	Arthropodium cirratum 'Matapouri Bay'	New Zealand Rock Lily	35cm Pot	750mm	0.6x1m	Ev. Evg
CAL BRA	Callistemon 'Little John'	Bottlebrush	35cm Pot	1000mm	1.2x1.5m	Ev. Evg
CHO RED	Choisya ternata 'Sundance'	Sundance Mexican Orange	35cm Pot	1000mm	1.2x1.5m	Ev. Evg
COR ATR	Cornus alba 'Sibirica'	Red Barked Dogwood	35cm Pot	1000mm	2x2m	De. Dec
COT MIC	Cotoneaster microphyllus	Rockspray Cotoneaster	35cm Pot	1000mm	0.5x2m	Ev. Evg
DIE SPI	Dietes bicolor 'Spotted'	Fortnight Lily	35cm Pot	1000mm	1.2x1.2m	Ev. Evg
ELA EBB	Elaeagnus ebbingei	Ebbingei	35cm Pot	1000mm	2x2m	Ev. Evg
ESC EXO	Escallonia 'Iveyi'	White Escallonia	35cm Pot	1000mm	2x2m	Ev. Evg
EUO JAP	Euonymus japonicus 'Aureus'	Variegated Box Leaf	35cm Pot	1000mm	2x2m	Ev. Evg
FEI SEL	Feijoa sellowiana	Pineapple Guava	35cm Pot	1000mm	2x2m	Ev. Evg
HEB SPE	Hebe 'Autumn Glory'	Autumn Glory Hebe	25cm Pot	600mm	0.8x0.8m	Ev. Evg
HEB SPE	Hebe 'Wiri Mist'	Wiri Mist Hebe	25cm Pot	600mm	0.8x0.8m	Ev. Evg
HEB SPE	Hebe 'Wiri Charm'	Wiri Charm Hebe	25cm Pot	600mm	0.8x0.8m	Ev. Evg
HEB SPE	Hebe 'Wiri Dawn'	Wiri Dawn Hebe	25cm Pot	600mm	0.8x0.8m	Ev. Evg
HEB SPE	Hebe 'Wiri Image'	Wiri Image Hebe	25cm Pot	600mm	0.8x0.8m	Ev. Evg
HEB SPE	Hebe 'Wiri Joy'	Wiri Joy Hebe	25cm Pot	600mm	0.8x0.8m	Ev. Evg
HEB SPE	Hebe 'Wiri Prince'	Wiri Prince Hebe	25cm Pot	600mm	0.8x0.8m	Ev. Evg
HEB SPE	Hebe 'Wiri Purity'	Wiri Purity Hebe	25cm Pot	600mm	0.8x0.8m	Ev. Evg
HEB SPE	Hebe 'Wiri Splendour'	Wiri Splendour Hebe	25cm Pot	600mm	0.8x0.8m	Ev. Evg
HEB SPE	Hebe 'Wiri Vision'	Wiri Vision Hebe	25cm Pot	600mm	0.8x0.8m	Ev. Evg
HYD MAC	Hydrangea macrophylla 'Oriental Pearl'	Oriental Pearl Hydrangea	35cm Pot	1000mm	1.8x1.5m	De. Dec
LAV ANG	Lavandula angustifolia 'Hidcote'	Hidcote Lavender	25cm Pot	600mm	0.6x0.6m	Ev. Evg
LIG JAP	Ligustrum japonicum 'Rotundifolium'	Japanese Privet	35cm Pot	1000mm	2x2m	Ev. Evg
LIR TUL	Liriope muscari 'Big Blue'	Big Blue Lilyturf	25cm Pot	600mm	0.6x0.6m	Ev. Evg
MYO PAR	Myoporum parvifolium 'Putah Creek'	Creeping Myoporum	25cm Pot	600mm	0.2x2m	Ev. Evg
NAN DOM	Nandina domestica 'Fire Power'	Fire Power Nandina	25cm Pot	600mm	0.6x0.6m	Ev. Evg
PHO TEN	Phormium tenax 'Purpureum'	Purple Flax	35cm Pot	1000mm	2.5x1.5m	Ev. Evg
PHO TEN	Phormium 'Yellow Wave'	Yellow Wave Flax	35cm Pot	1000mm	2.5x1.5m	Ev. Evg
PIT TEN	Pittosporum tenuifolium 'Tom Thumb'	Tom Thumb Kohuhu	35cm Pot	1000mm	0.6x0.6m	Ev. Evg
PIT TEN	Pittosporum tenuifolium 'Tom Tudge'	Tom Tudge Kohuhu	35cm Pot	1000mm	2.5x2.5m	Ev. Evg
POL MYR	Polystichum proliferum	Mother Shield Fern	25cm Pot	400mm	0.4x0.4m	Ev. Evg
POL MYR	Polystichum setiferum	Soft Shield Fern	35cm Pot	400mm	0.4x0.4m	Ev. Evg
RHA ORN	Rhamnus alaternus 'Argenteovariegata'	Variegated Italian Buckthorn	35cm Pot	1000mm	3x3m	Ev. Evg
RHO INDI	Rhododendron 'Gumpo White'	Gumpo White Azalea	25cm Pot	600mm	0.6x0.6m	Ev. Evg
RHO PRI	Rhododendron 'Princess Anne'	Princess Anne Rhododendron	25cm Pot	600mm	0.6x0.6m	Ev. Evg
RHO PRI	Rhododendron 'Princess Elizabeth'	Princess Elizabeth Rhododendron	25cm Pot	600mm	0.6x0.6m	Ev. Evg
RHO PRI	Rhododendron 'Princess Margaret'	Princess Margaret Rhododendron	25cm Pot	600mm	0.6x0.6m	Ev. Evg
RHO PRI	Rhododendron 'Princess Mary'	Princess Mary Rhododendron	25cm Pot	600mm	0.6x0.6m	Ev. Evg
RHO PRI	Rhododendron 'Princess Michiko'	Princess Michiko Rhododendron	25cm Pot	600mm	0.6x0.6m	Ev. Evg
RHO PRI	Rhododendron 'Princess Sayako'	Princess Sayako Rhododendron	25cm Pot	600mm	0.6x0.6m	Ev. Evg
RHO PRI	Rhododendron 'Princess Takamado'	Princess Takamado Rhododendron	25cm Pot	600mm	0.6x0.6m	Ev. Evg
RHO PRI	Rhododendron 'Princess Yuriko'	Princess Yuriko Rhododendron	25cm Pot	600mm	0.6x0.6m	Ev. Evg
RHO PRI	Rhododendron 'Princess Zenko'	Princess Zen

PLANT SCHEDULE 3RD FLOOR

CODE	BOTANICAL NAME	COMMON NAME	SIZE	MIN. HEIGHT	SIZE (MATURE HXW)	EV/N-, EVG/DEC	QTY
TREES							
LAG ACO	Lagerstroemia indica x fauriei 'Acoma'	White Crepe Myrtle	45L	1.6m+	3x3m	Ev, Dec	9
ULM PAR	Ulmus parvifolia	Chinese Elm	100L	4m+	12x10m	Ev, Dec	1

PLANT SCHEDULE 3RD FLOOR

CODE	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	SIZE (MATURE HXW)	EV/DEK, EVG/DEC
HEDGES						
TRA HYP	Trachelospermum jasminoides	Bay, Ho-Eye	40cm (h" - 5mm)	(150mm)	4x0.m	Ev, E-g
SHRUB AREAS						
	ZONE - BALCONY PLANTERS					
ASP MRS	Asparagus densiflorus 'Myersii'	Foxtail Fern	30cm Pot	300mm	0.6x0.8m	Ev, E-g
LIG TEA	Equisetum arvense	Tractor Seed	20cm Pot	400mm	0.6x0.8m	Ev, Dec
ART CIR	Arthropodium cirratum 'Matapouri Bay'	New Zealand Rock Lily	20cm Pot	300mm	0.6x' m	Ev, E-g
DIC ARG	Dichondra argentea 'Emerald Falls'	Emerald Falls Dichondra	20cm Pot	300mm	0 . x m	Ev, E-g
TRA JAS	Trachelospermum jasminoides	Star Jasmine	20cm Pot	300mm	0.6x0m	Ev, E-g
	*remove bolts, burrs if present. Fix vines to ground					
GROUND COVERS						
	PRODUCTIVE PLANTS					
	*to be directed					

TREES



LEVEL 3



PAUL BANGAY
THE STUDIO

ISSUE DATE 15th FEBRUARY 2025
PROJECT STATUS CONCEPT PLAN
SCALE NA @ A1 PAGE 9 of 9
ARCHITECT WOODS BAGOT
LANDSCAPE ARCHITECT DA CHECKED BY –
CLIENT THE HOUSE FAMILY OFFICE
PROJECT 53 NEW TOWN ROAD NEW TOWN, HOBART
SITE INSPECTOR –
AREA/LEVEL 3rd FLOOR
JOB NO. 241209
SHEET NO. L352
ISSUE A

PLANTING PALETTE
DRAWING TITLE
[NOT FOR CONSTRUCTION]

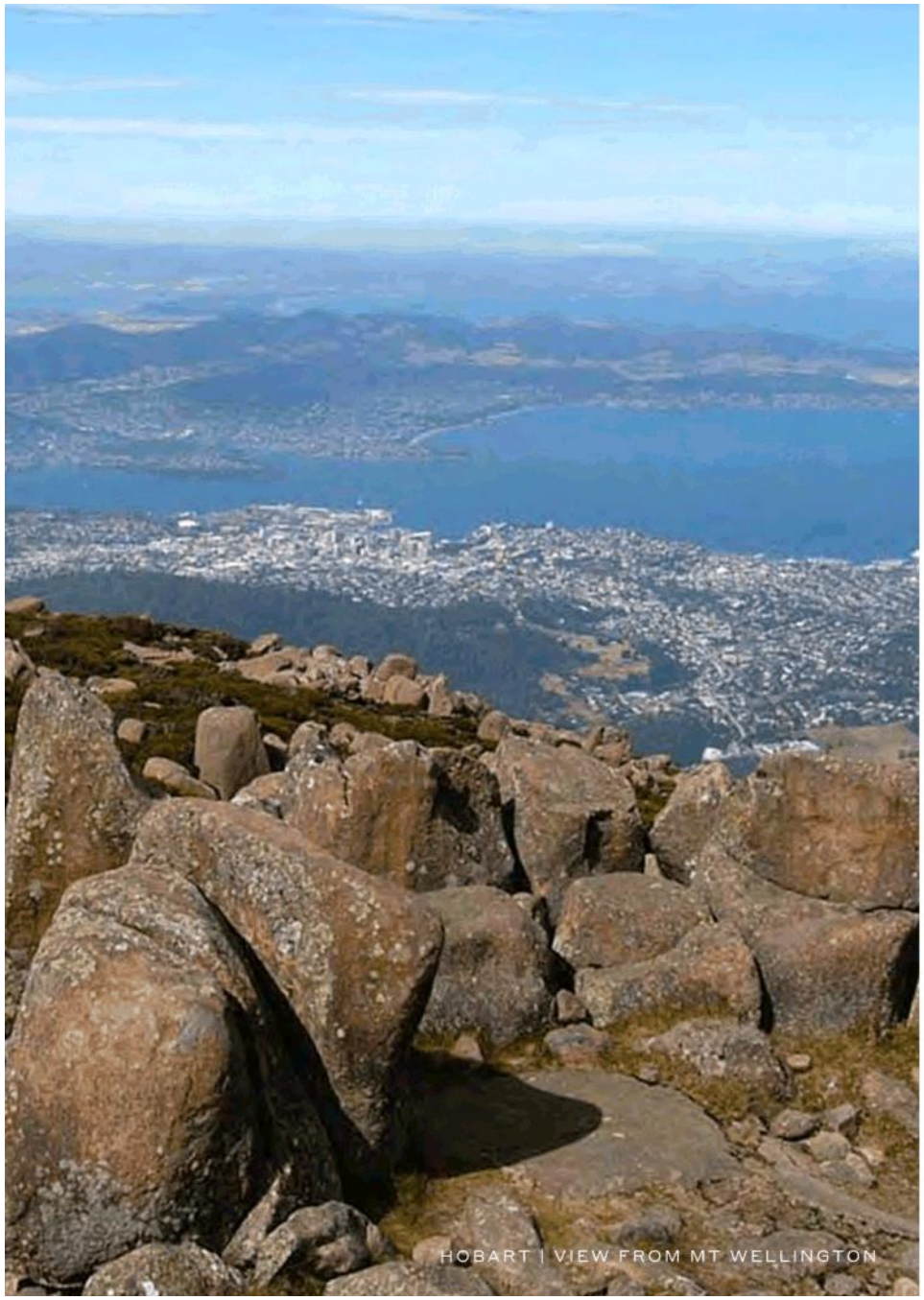
W–B
WOODS BAGOT

DA REPORT FEBRUARY 2025

52 NEW TOWN ROAD HOBART

DESIGN REPORT





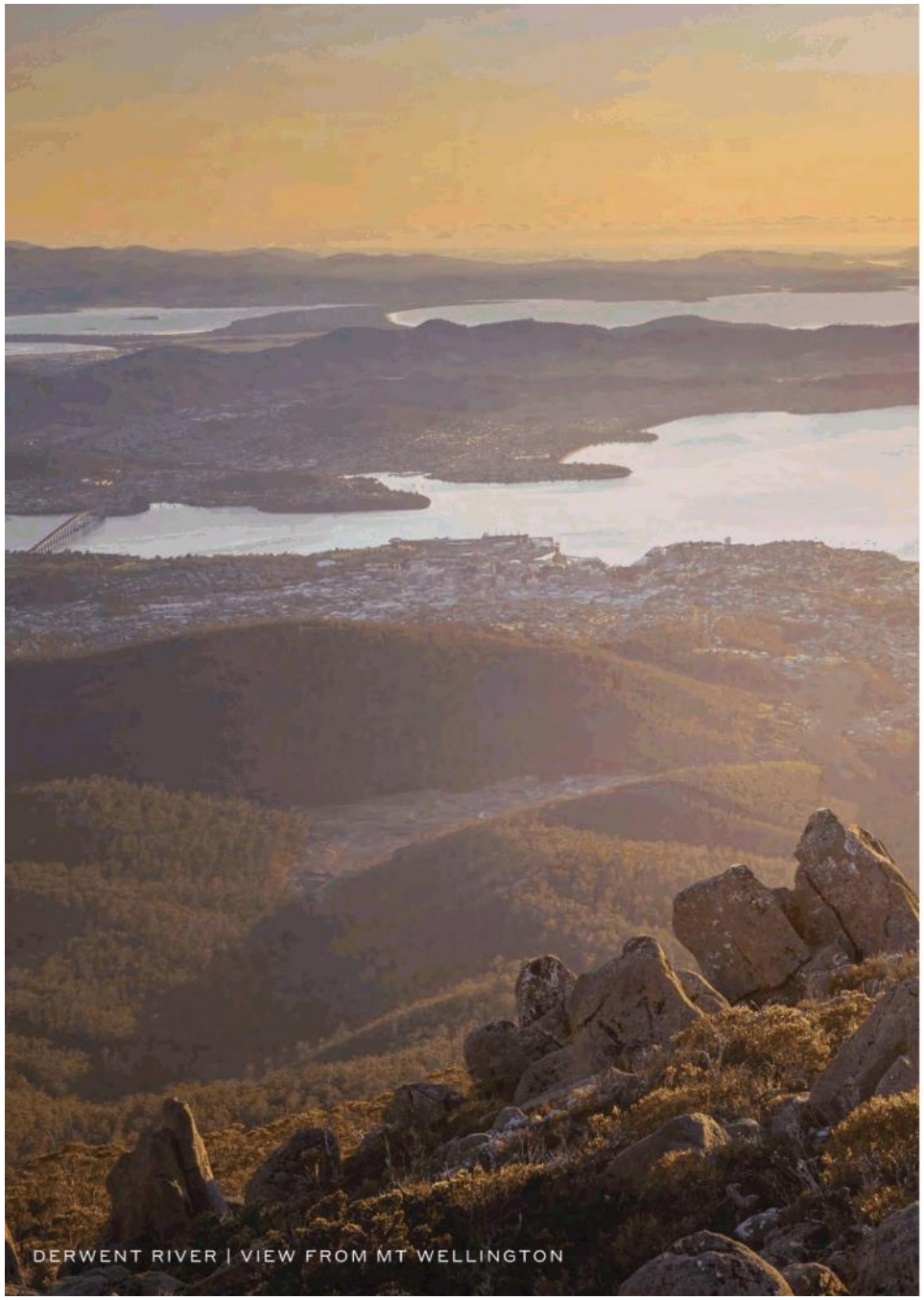
CONTENTS

THE SITE
History
Location
View Analysis
Planning Controls
Building Envelope and Setbacks

CONCEPT AND PROPOSAL
Liveability
Concept
Healing the Site
Proportion
The Dashboard
Design Proposal
Elevations
Materiality

APPENDICES
Shadow Diagrams
Overlooking Diagrams
Previously Approved DA


DESIGNING FOR COUNTRY
For Nipaluna/Hobart, we would like to acknowledge and pay respect to the traditional and original owners of this land the muwinina people, to pay respect to those that have passed before us and to acknowledge today's Tasmanian Aboriginal people who are the custodians of this land.
Each and every project is an opportunity to engage and respond to Aboriginal cultural connections to Country. By respecting and celebrating the value and significance of both Aboriginal heritage and contemporary Aboriginal culture our built environment is enriched and anchored into its specific location, its stories and varied experiences.
SYDNEY TO HOBART - RIVER DERWENT APPROACH

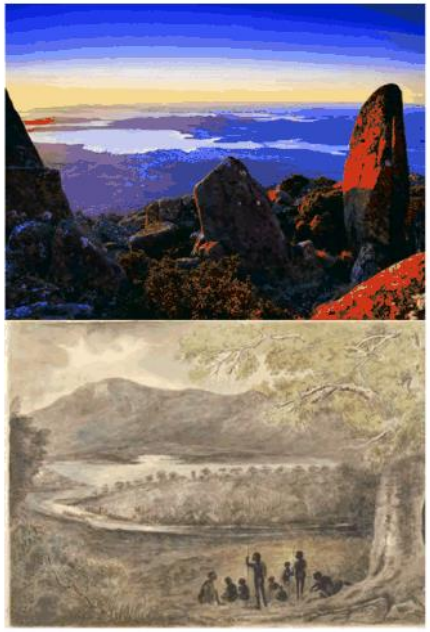


01

THE SITE

History
Location
View Analysis
Planning Controls
Building Envelope and Setbacks

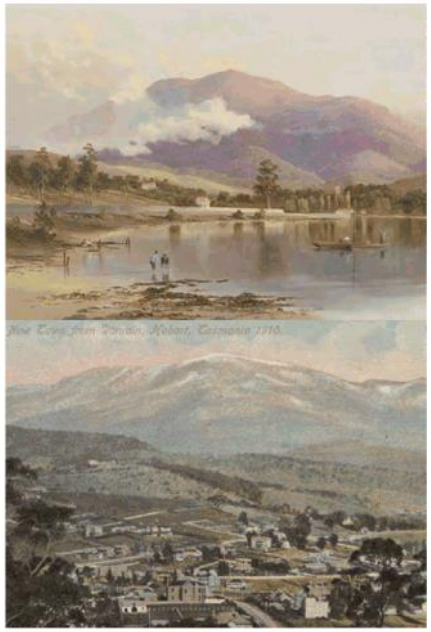
HISTORY
The Nipaluna Country and the First Suburb



Mouheneenner Country

The city of Hobart is located on land once known as Nipaluna occupied for periods of the year by the Mouheneernner people. Mount Wellington, also know as Kunanyi, was a major spiritial place viewed as the centre of connection of Hobart and described in its creation stories.

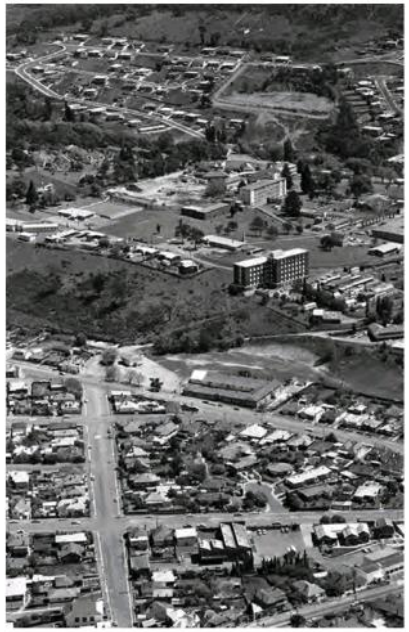
Used for navigation, Kunanyi is the midpoint between Sky Country and the creeks which flows into the larger rivers and the ocean. It is the site where many Aboriginal people watched the first ships arrive and the start of Hobart.



The First Suburb

Arriving in 1804 with Lieutenant Governor Col. David Collins, the first settlers were granted 100 acre lots on the banks of New Town Rivulet. In 1807, the first roads in the new colony were constructed to connect these farm lots with Hobart city, surviving today as New Town Road.

At the time, the homes in New Town were large estates and served the purpose of being a country retreat close to the city.

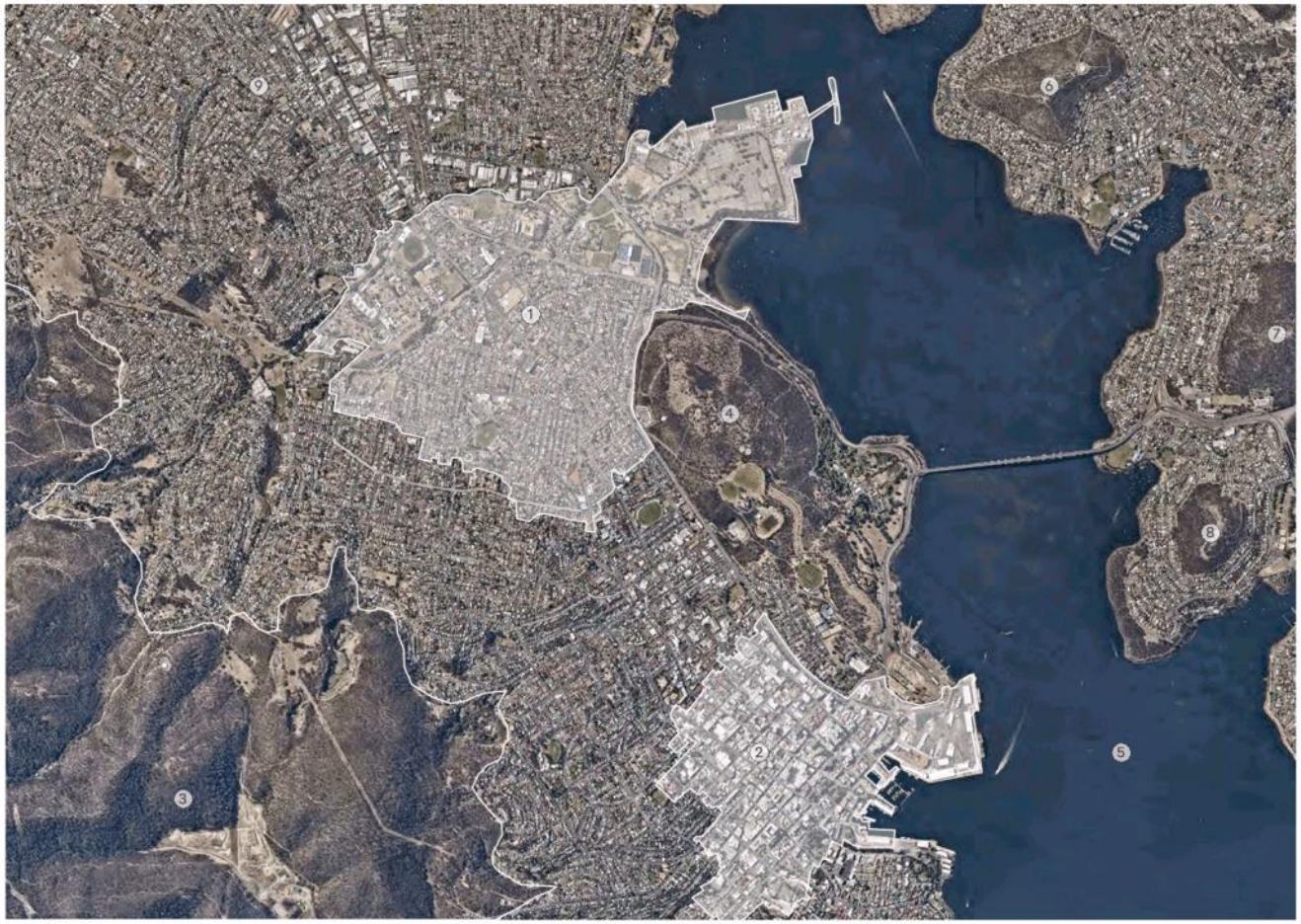


New Town Growth

The patterns of development in New Town reflect various periods of growth in the area due to the availability of public transport, cheap land, housing schemes, post-WW1 development, subdivision and the emergence of local industries. As a result the suburb is a time capsule of different periods and building styles with many significant buildings in the area.

LOCATION
Wide Context

The site (seen in pink) is located in the suburb of New Town to the North-West of the Hobart CBD. Despite the site's proximity to the city, the surrounding lot division patterns and buildings make the area suburban in nature.



Context Aerial Photo

Key:

1. New Town
2. Hobart CBD
3. Mount Wellington
4. Queens Domain
5. River Derwent
6. Natone Hill
7. Gordons Hill
8. Rosny Hill Lookout
9. Moonah

Project Site

LOCATION
Context

The context of the site sits in the many natural features prevalent within Hobart and it's surrounds. Many of these are visible from the site and if not are easily accessible by residents.



Context Aerial Photo

Key:

1. Royal Tasmanian Botanical Gardens
2. River Derwent
3. North Hobart Oval
4. Queens Domain

Project Site

LOCATION
Precinct Plan

The immediate context of the site provides a large amount of amenity to residents. The site is easily accessible by bus, is in close proximity to a variety of health and food services, and is within walking distance of a number of parks and community gathering spaces.



Surrounding Area Analysis

Key:

- Surrounding Facilities
- Nearby Facilities
- Bus stop Locations
- Project Site

LOCATION
Aerial Location



Context Aerial Photo

Key:

1. Surrounding Mountains
2. Site Rear Entry
3. Towards Mount Wellington

LOCATION
Aerial Location



Context Aerial Photo

Key:

1. River Derwent
2. North Hobart Oval
3. Queens Domain
4. Hobart City Centre

LOCATION
Aerial Location



Context Aerial Photo

Key:

1. View to Mount Direction
2. New Town Road Frontage
3. Seymour Street Frontage

CONTEXT
Views Analysis

From the higher levels of the building views open up substantially in a sweeping arc. We think these views are the site's best outlook - their expanse includes natural features all the way to the mountains and coast, and take in:

- The Southern Hobart CBD
- River Derwent
- The Mountain Range, including Mount Wellington, Mount Faulkner, Mount Nelson and the Meehan Range
- Queen's Domain Parkrun
- Tranmere Waterfront and Rosny Hill Lookout

Views in this direction won't be built out, with the heritage conservation context limiting future development, as well as providing a leafy outlook in the foreground.

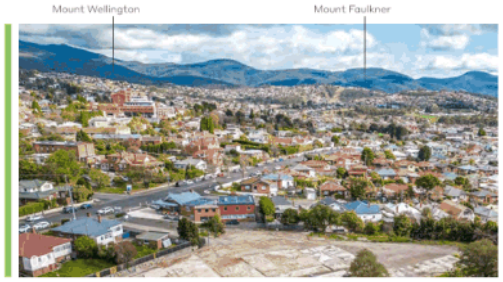
Views to the South towards the Hobart CBD and River Derwent are currently available, but are likely to be partly or completely built out as same CBD develops further. However, the best view in this direction overlooking Tranmere Waterfront, Mount Nelson, Mount Wellington and Mount Faulkner remains unobstructed.

Sunny views to the North-West take in the verdant rolling hills of the Meehan Range and Mount Faulkner - this outlook will be particularly welcoming in the winter months.

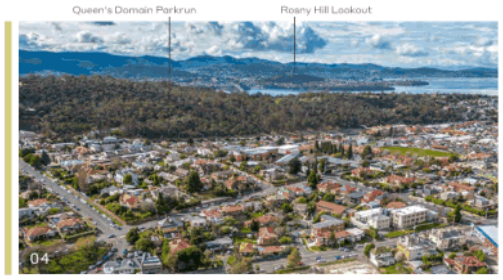
Views to the East encompass the Queen's Domain and Rosny Hill, which will be create a vibrant outlook at night, albeit shorter in extent than the views in the opposite direction.











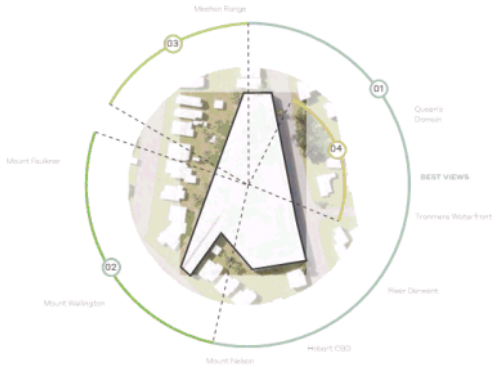
Views from L02 to L03
From RL 66.30 - RL69.70

01 District Views all the way to River Derwent and Mount Nelson with Hobart CBD views / Tranmere Waterfront

02 Views to Mount Wellington and Mount Faulkner

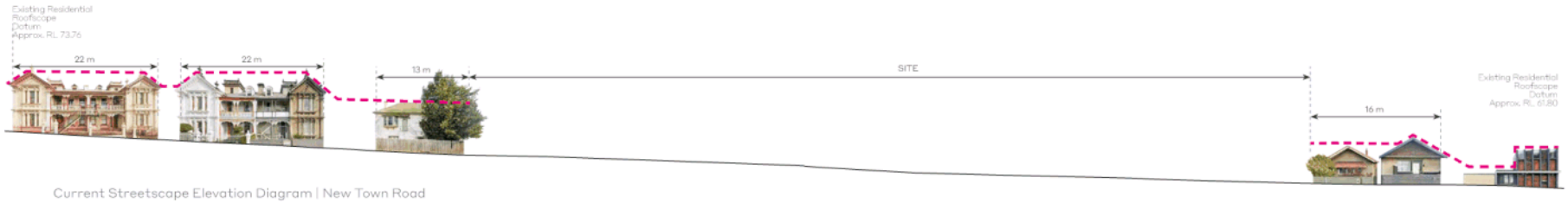
03 North View to River Derwent and Meehan Range

04 Views to Queen's Domain Parkrun with Meehan Range and Rosny Hill Lookout in the background

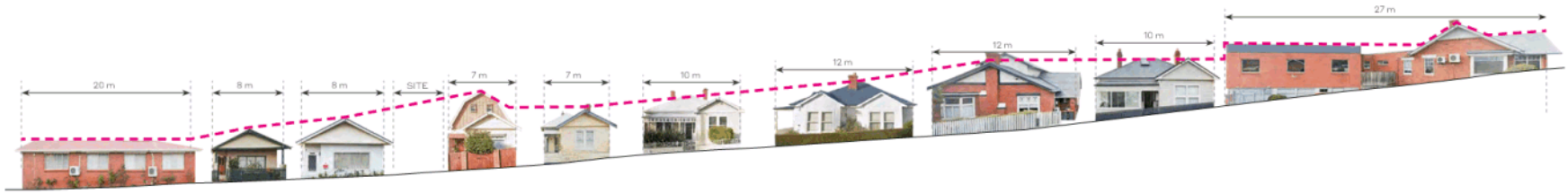


CONTEXT
Surrounding New Town Road Street Character

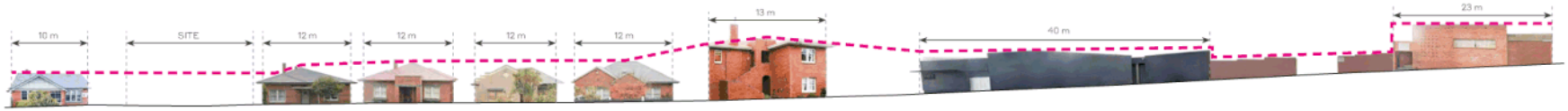
The immediate building context of the site is varied in nature with a variety of architectural styles documenting the key periods of development in New Town. There are a couple of neighbouring buildings with heritage significance but the site itself does not sit within a heritage area. As a result the proposed design draws from the red materials seen in the brick walls and roof tiles of some of its neighbours as a response to context.



Current Streetscape Elevation Diagram | New Town Road



Current Streetscape Elevation Diagram | Seymour Street



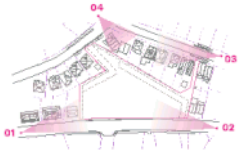
Current Streetscape Elevation Diagram | Clare Street

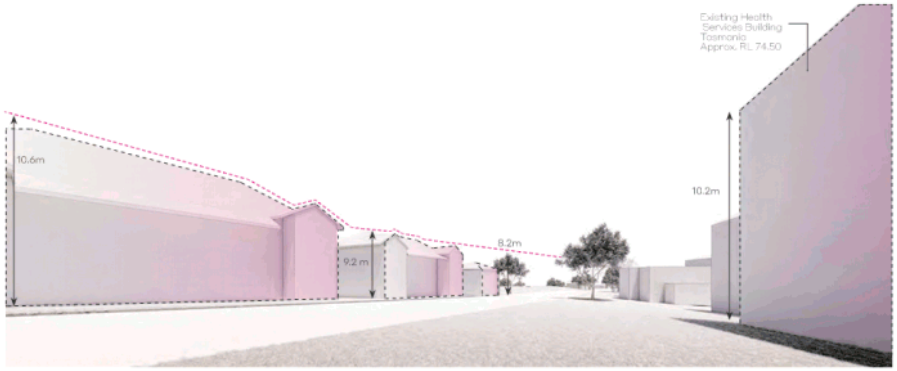
CONTEXT
Existing Streetscape

The site's main frontage interfaces New Town Road, a main road consiting of one and two storey developments. The site also has entry points on Seymour Street and Clare Street which largely consist of one storey residential homes.

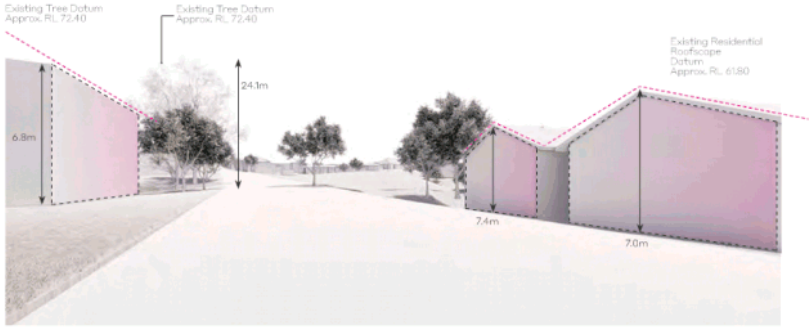
Key:

Existing Roofscape

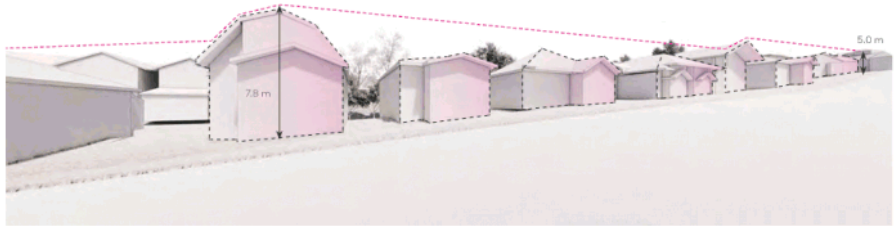




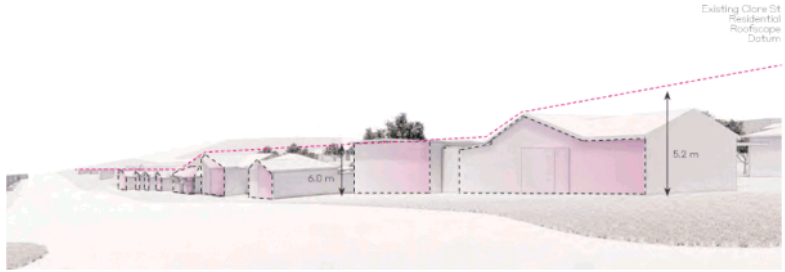
View 01 | New Town Road



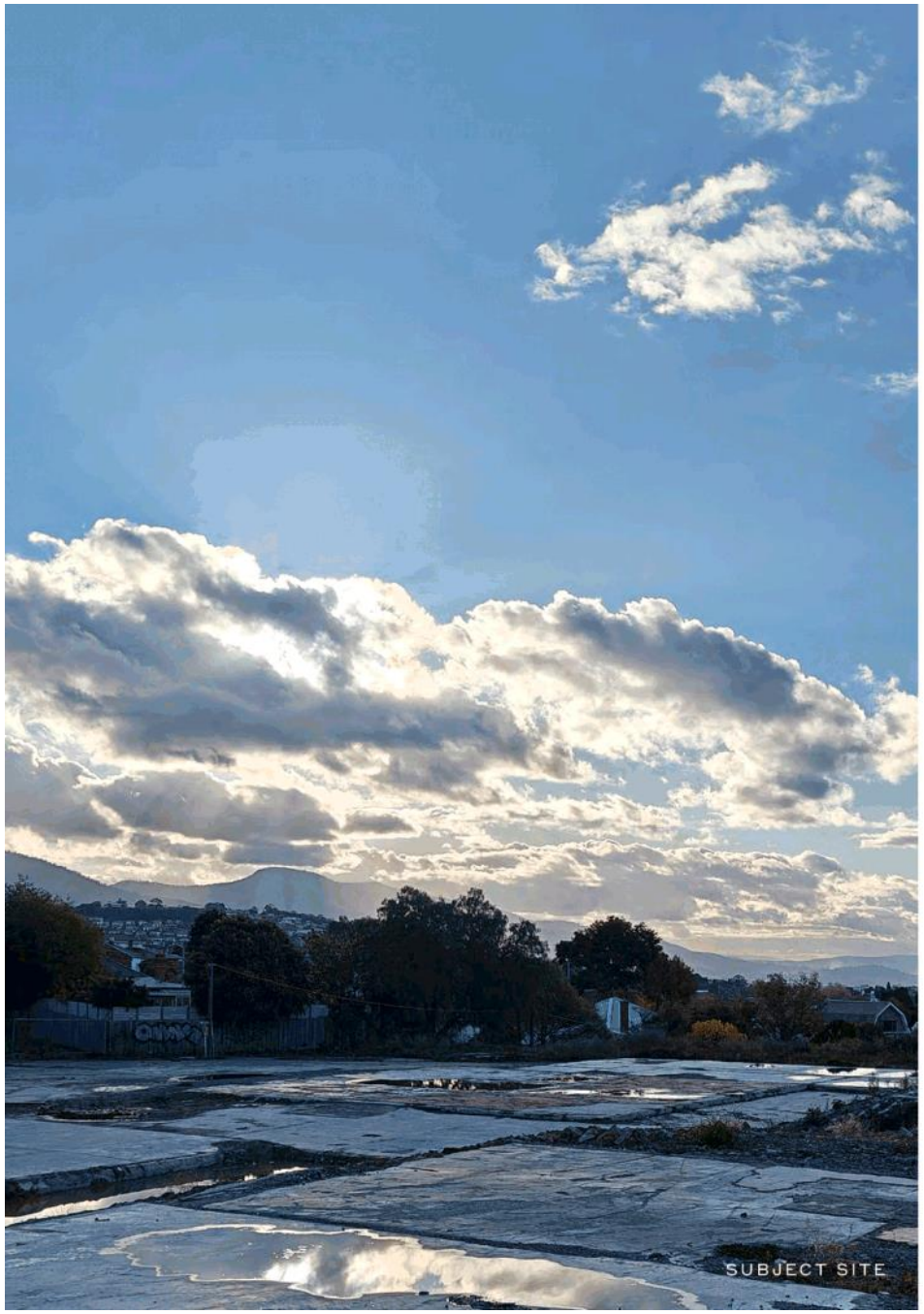
View 02 | New Town Road

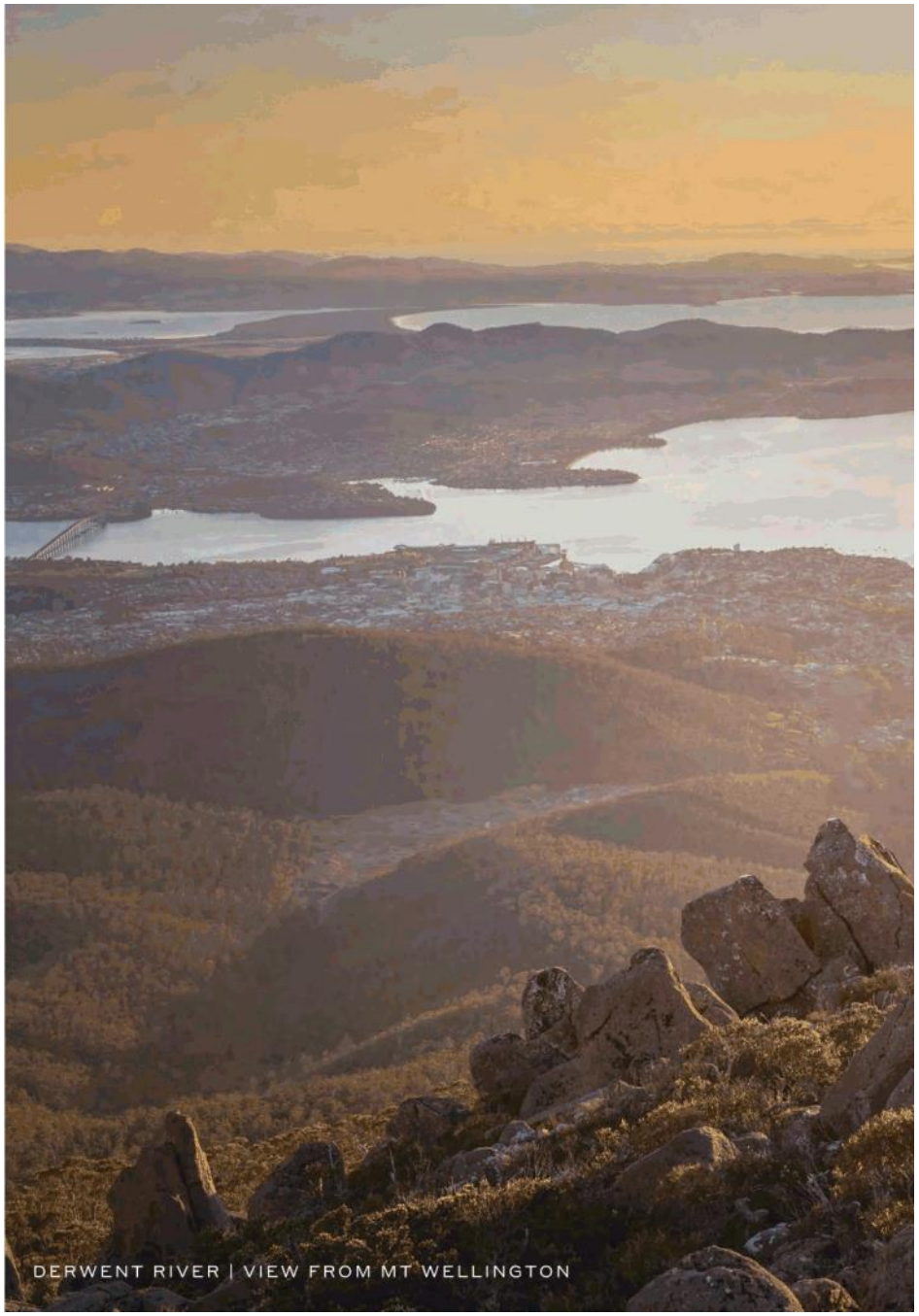


View 03 | Seymour Street



View 04 | Seymour/Clare Street

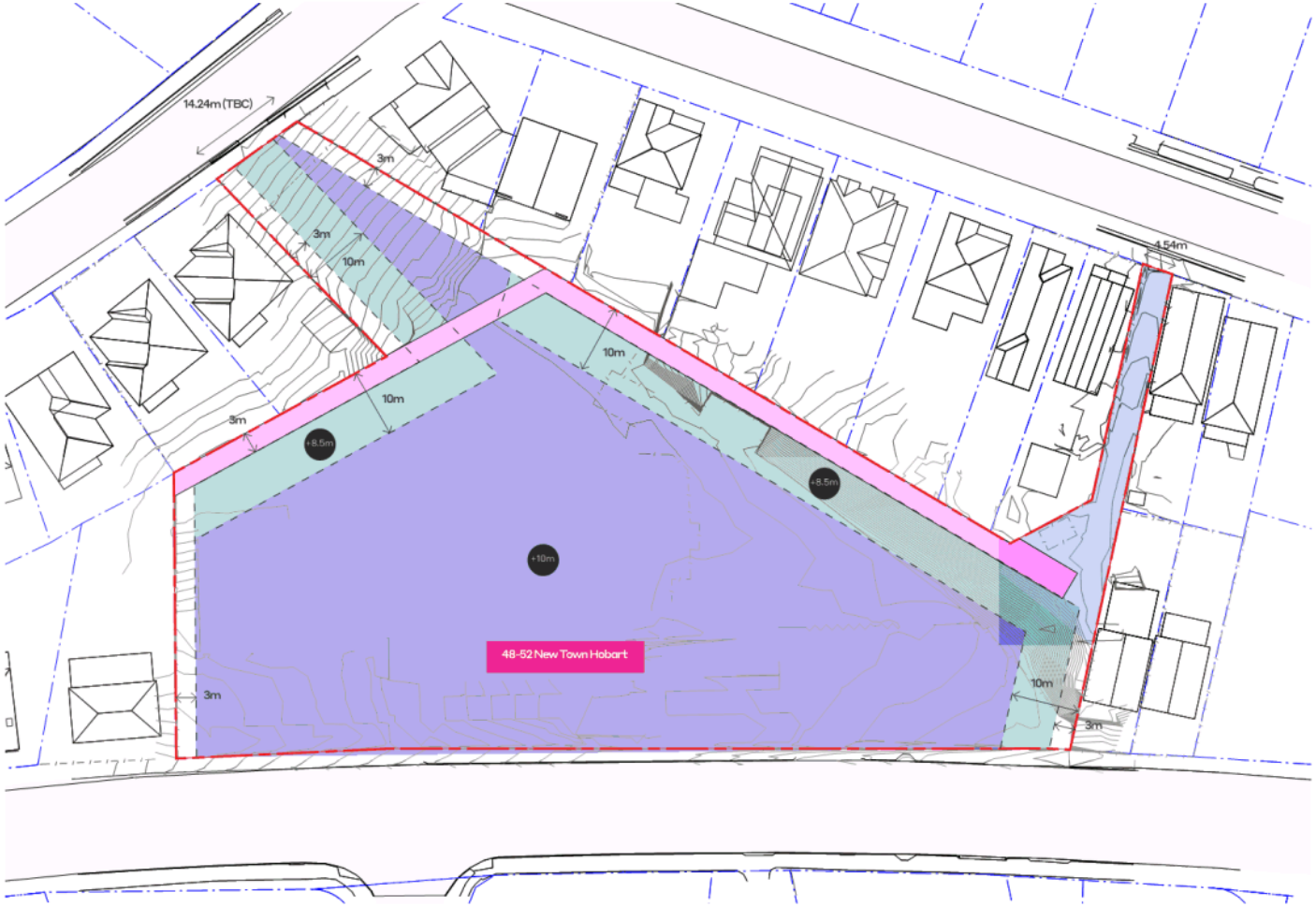

SUBJECT SITE


DERWENT RIVER | VIEW FROM MT WELLINGTON

CONTEXT
Prescribed Site Envelope

Key:

- Envelope Height Limit
- 10m height limit zone
- 8.5m height limit zone
- Drainage easement
- Existing right of way
- Building setbacks

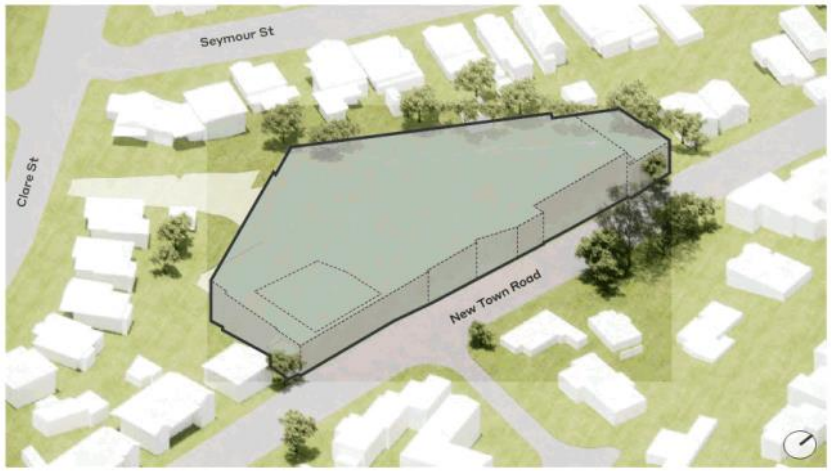


CONTEXT
Prescribed Site Envelope

Analysis has been completed on the site for the maximum building envelope allowed under current controls and the previously approved scheme for the site. Both studies generate a mass unsympathetic to the granular nature of the surrounding residential homes and as a result the built form of this proposal has been broken where possible to replicate the surrounding scale.

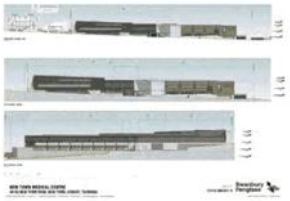


Envelope Massing | Maximum Envelope



Envelope Massing | Previously Approved Hospital DA

Extracted from approved DA application by Swanbury Penglase Architects (DA dated 2020.11.05)



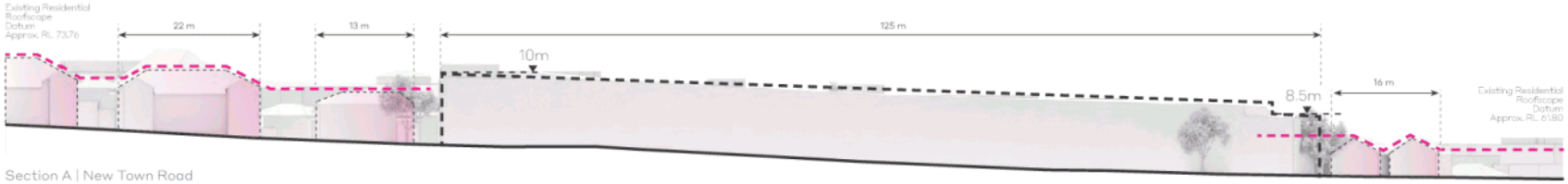
CONTEXT
Prescribed Site Envelope

Elevational studies of the maximum built envelope allowable on the site have been completed to analyse the impact of the 10m maximum envelope on surrounding dwellings. Due to the topography and slope of the site, the allowable 10m envelope sits without too much impact on neighbours.

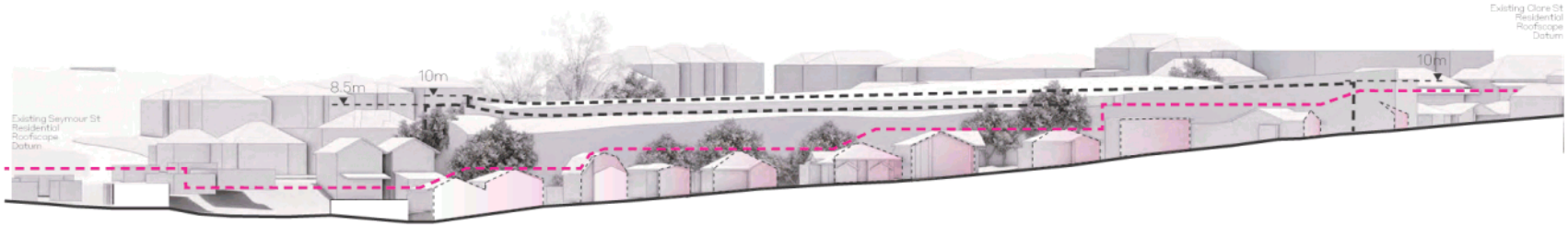
Key:

- Existing Roofscape
- Maximum Envelope
- Envelope Height

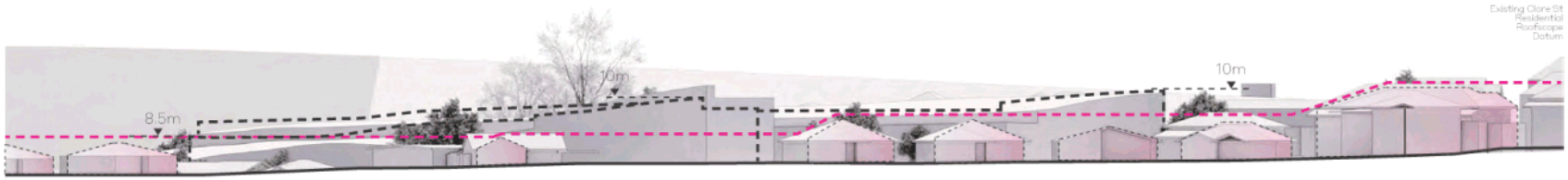




Section A | New Town Road



Section B | Seymour St



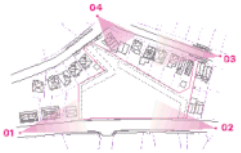
Section C | Clare Street

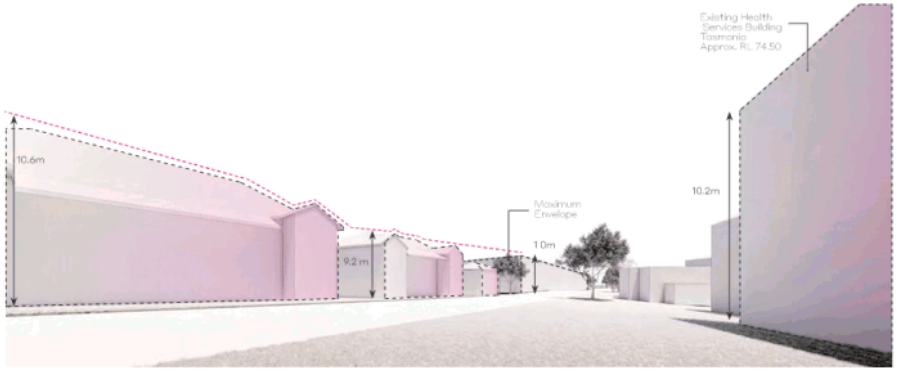
STREETSCAPE
Prescribed Site Envelope

The maximum built envelope was also studied in perspective from the street level to guage where this height would have the most impact. The most visible part of this height plane sits at the corner of Seymour and Clare Streets.

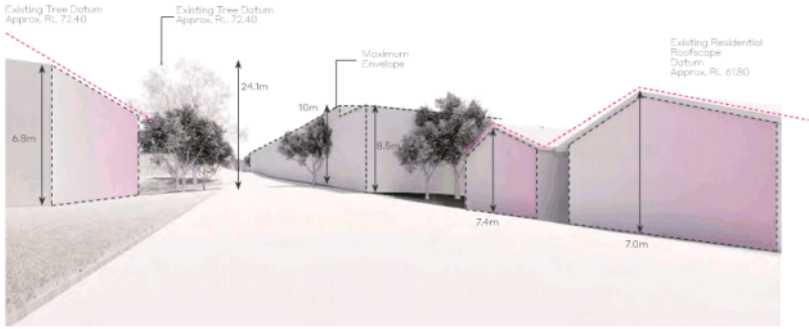
Key:

- Existing Roofscape
- Maximum Envelope
- Envelope Height

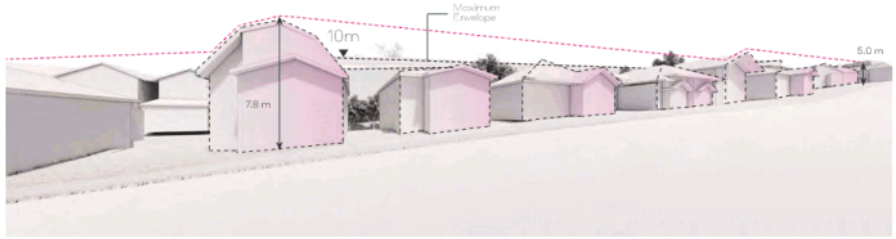




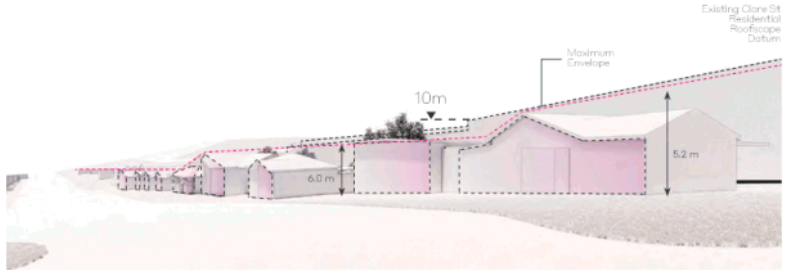
View 01 | New Town Road



View 02 | New Town Road

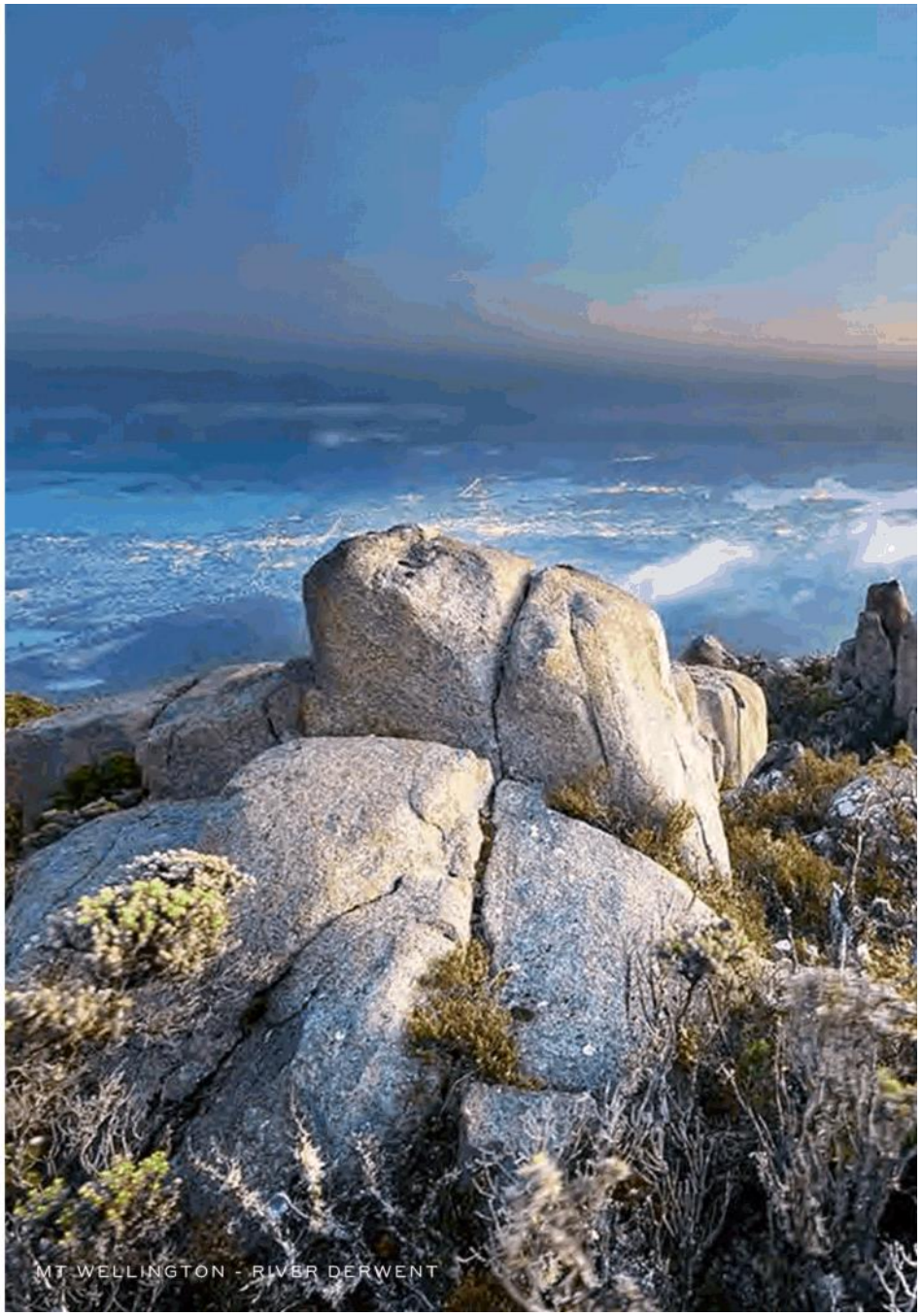


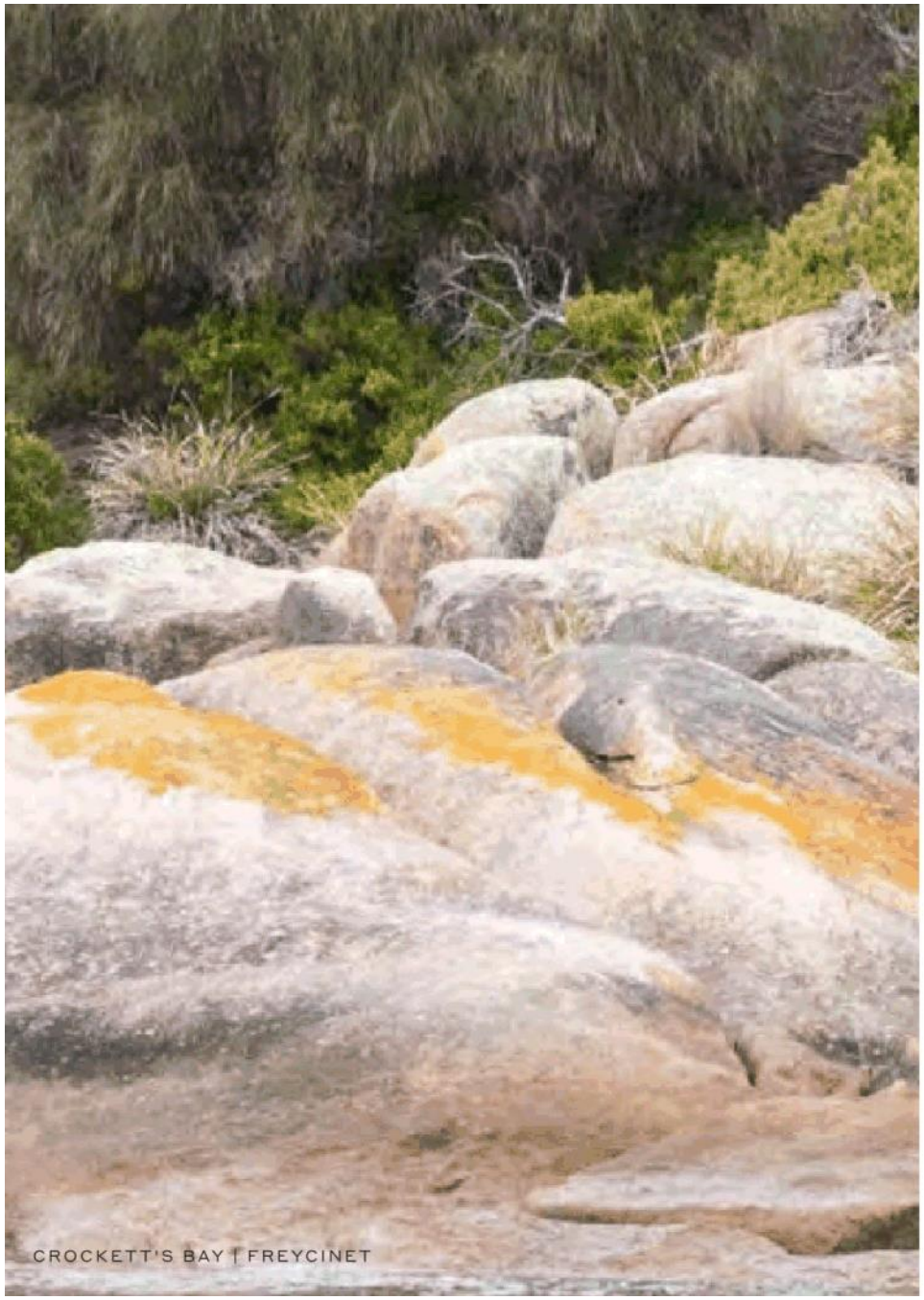
View 03 | Seymour Street



View 04 | Seymour/Clare Street


TASMANIAN ASH - EUCALYPTUS REGNANS


MT WELLINGTON - RIVER DERWENT



02

CONCEPT AND PROPOSAL

Liveability
Concept
Urban Design
The Dashboard
Design Proposal
Elevations
Materiality

DESIGN PRINCIPLES
Exemplary Residential Liveability

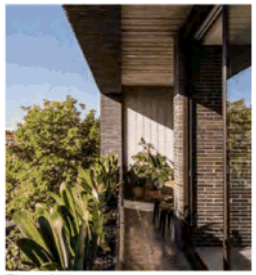
The project will embody the residential liveability principles which is part of what we do as "People Architecture" at Woods Bagot. We want this building to architectually contribute to the neighbourhood while providing high levels of amenity and liveability to residents. These principles are summarised in our previous projects below and on the next couple of pages.

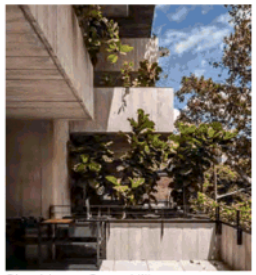
Increase Liveability


537 Elizabeth St


537 Elizabeth St

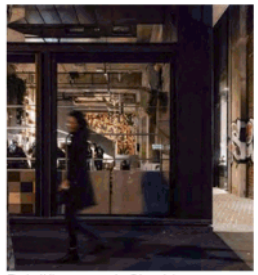
Exemplary Private Outdoor Space


Elwood House

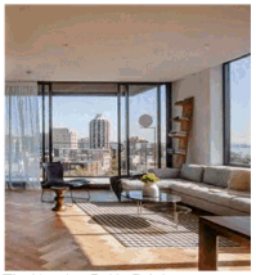

Short Lane, Surry Hills

High Levels of Amenity


Mason and Main, Merrylands


Retail/Laneway in Short Lane, Surry Hills

Natural Light and Air


The Hensley, Potts Point

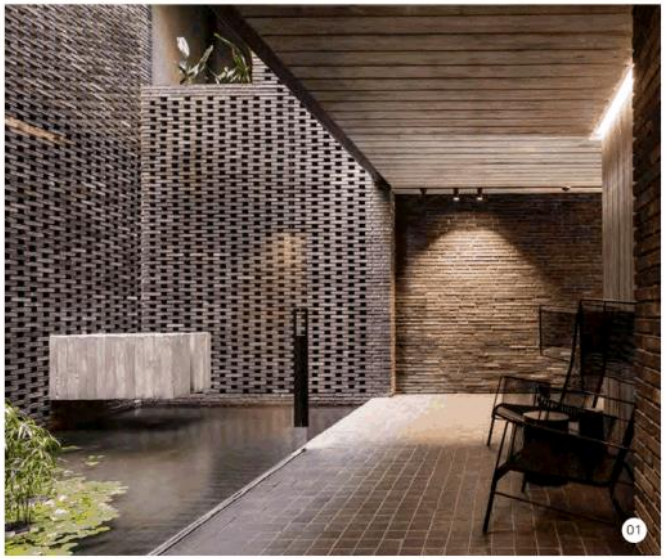

West Village, Parramatta

Craft and Materiality


Elwood House

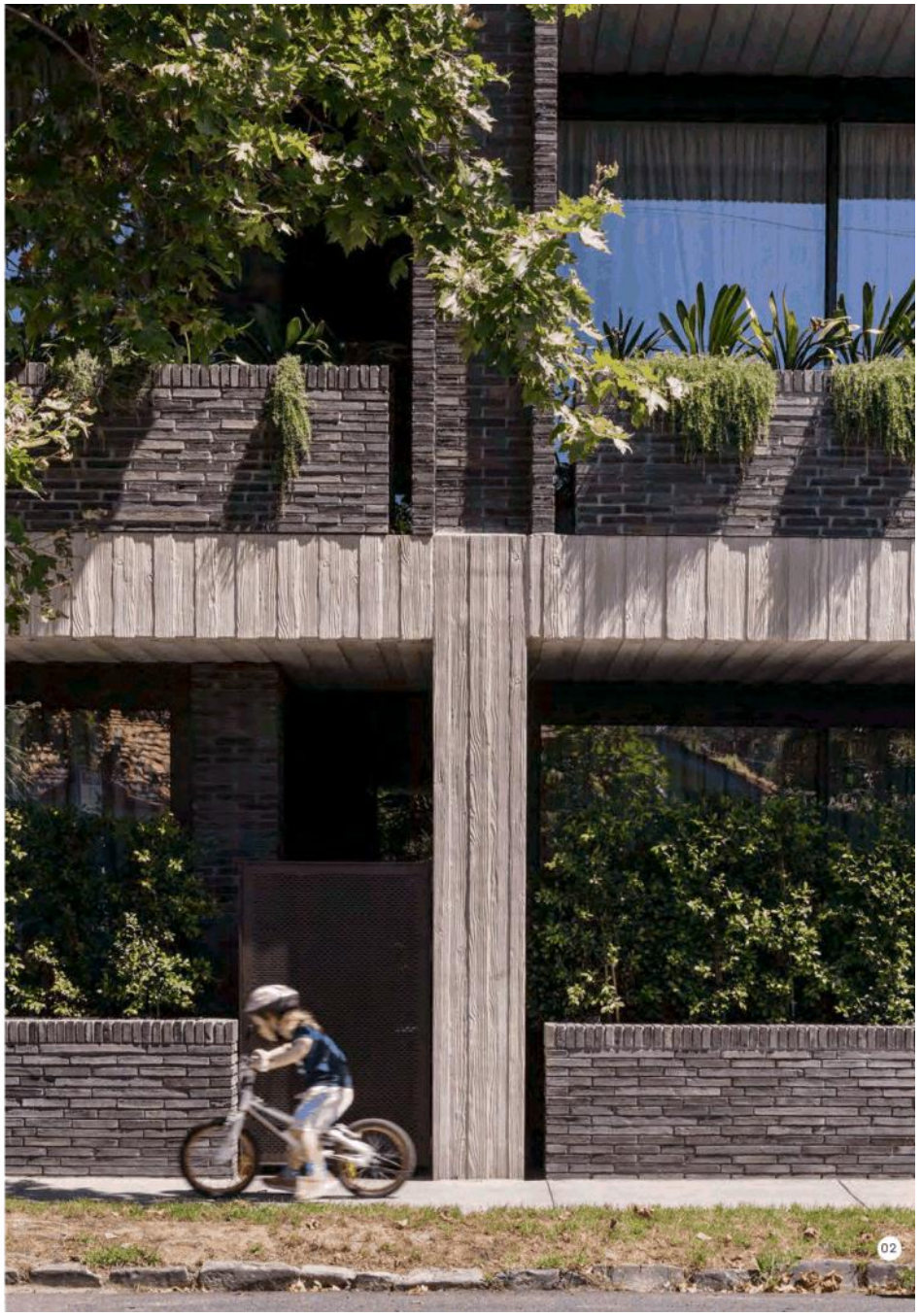

Mason and Main Display Suits

DESIGN PRECEDENTS
Elwood House, Melbourne

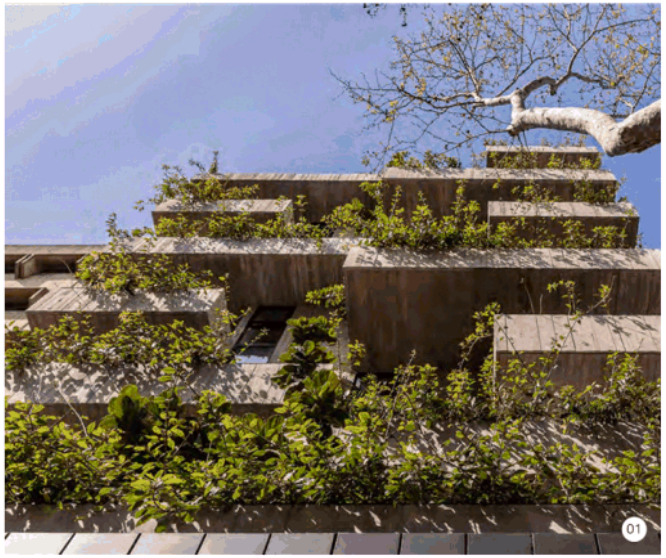


01 Elwood House, WB
Street View

02 Elwood House, WB
Ground Floor Entry

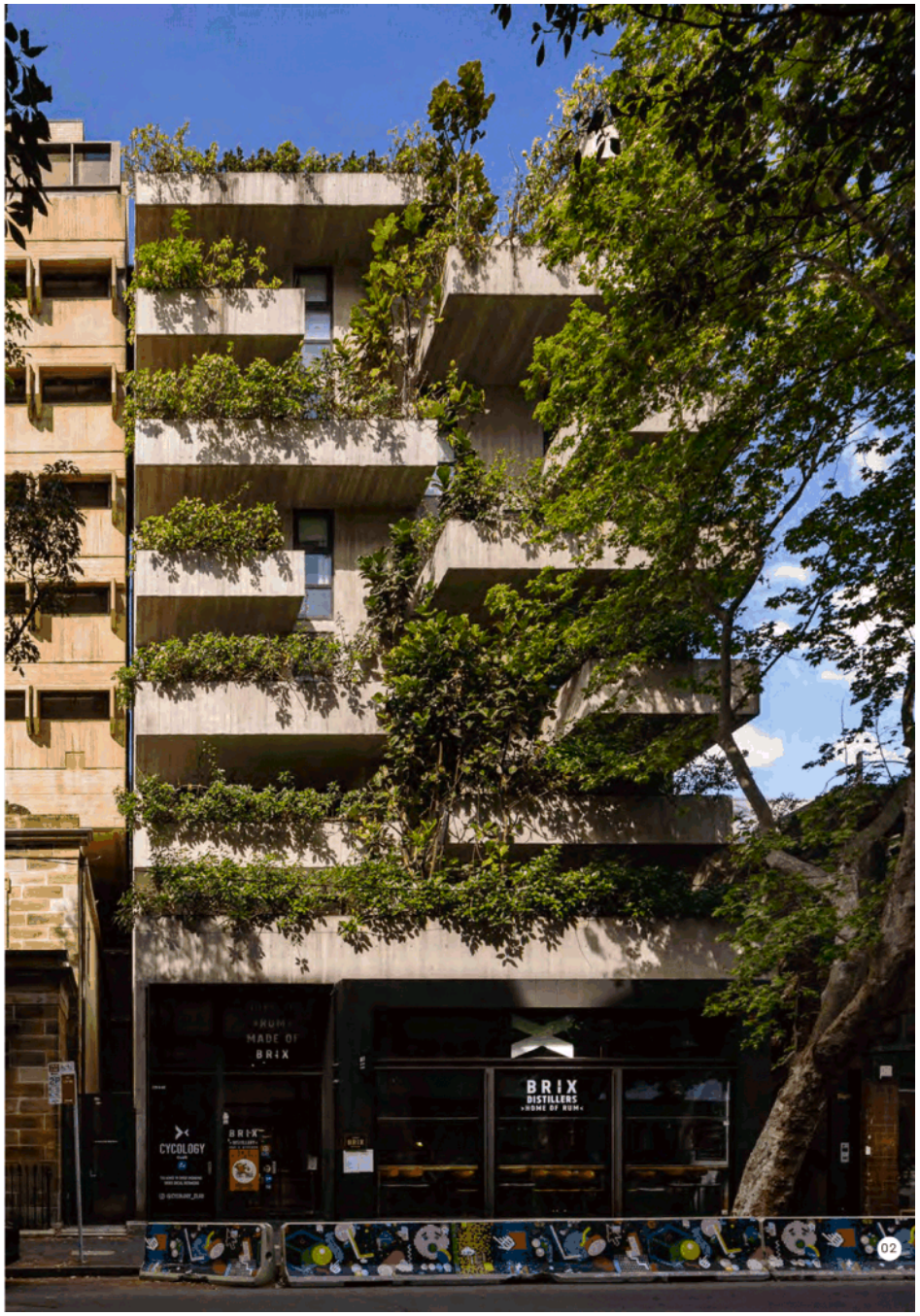


DESIGN PRECEDENTS
Short Lane, Sydney



01 Short Lane, WB
Landscape Terraces

02 Short Lane, WB
A Soft Streetscape



SUSTAINABILITY
Enhanced Wellbeing

As part of healing the site, the proposal contains sustainability and enhanced wellbeing objectives to prioritise healthy living environments for residents and neighbours. While the figures outlined below are very preliminary, the broader goals are embedded at the core of the project.

Waste Reduction

PROJECT TARGETS AND STRATEGIES:

- On-site compost
- Dematerialisation
- Modular construction
- Adaptable apartment layouts

People and Wellness

PROJECT TARGETS AND STRATEGIES:

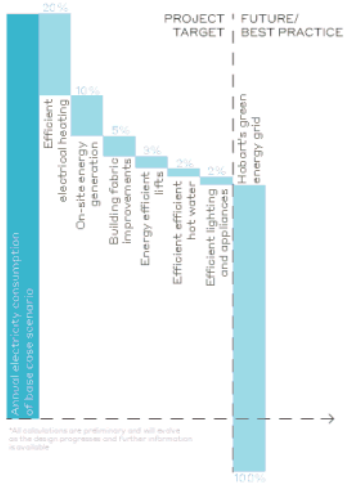
- High level of daylight autonomy
- High level of internal thermal comfort
- Minimal indoor pollutants
- Community and neighbourhood offerings

Biodiversity and Context

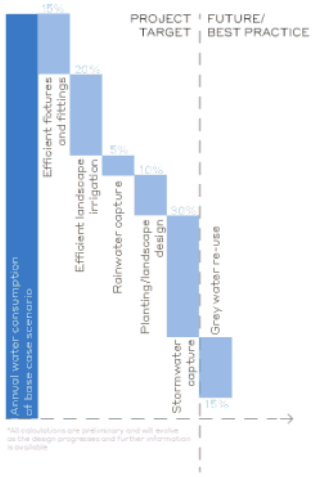
PROJECT TARGETS AND STRATEGIES:

- Transit-oriented development
- 45% of site landscaped
- Operational food strategies
- Stormwater capture and reuse

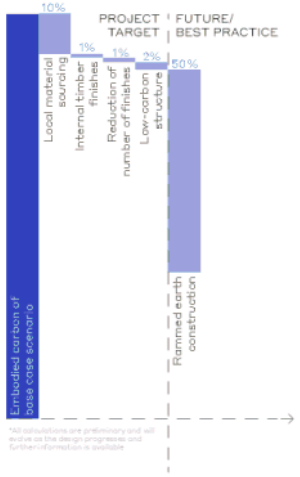
Energy Resources



Water Resources



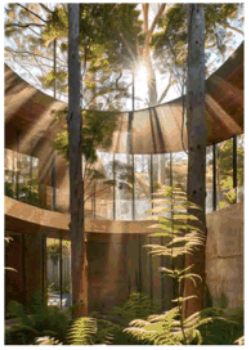
Embodied Carbon





Local Inspiration - Rammed Earth as Sustainable Material



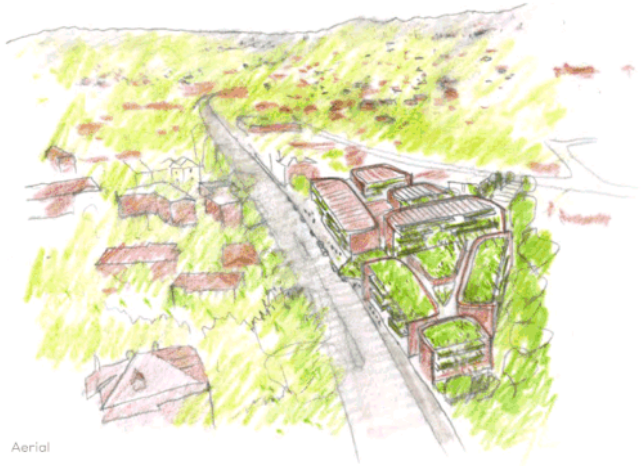


Biophilia and Land Repair - Communal gardens enhancing local wellbeing

CONCEPT
Inspiration

In its current form the site sits bare, in its demolished form at the heart of New Town. It remains unresponsive and unconnected to its residential surrounds, and barren of the leafy green surrounding streetscapes.

The design is at its core of place, it utilises local species, speaks to the local landforms and nature, connects directly with its neighbours and provides newfound amenity to the community as a whole.



Aerial



New Town Road Elevation



Tasmanian bluestone



Devonian granite in Freycinet National Park



Tasmanian botanical gardens



Hobart residential neighbourhood tree canopy

CONCEPT
Healing the Site

Our proposal aims to restore and heal the site, bringing new life and growth the the area and community. To reintroduce nature back to a desolate site by populating it with biodiverse vegetation and all the biophilic benefits of diverse landscaping. To engage with surrounding community in a meaningful way, to provide new facilities to the area and to connect with the existing residents of the suburb.



Existing Site

Approx. Site Area	**7,719 m²**
Approx. Landscaping	**1,600 m²**
% of Landscaping	**20%**



Proposed Greening



Revitalising the Site

Approx. Site Area	**7,719 m²**
Approx. Landscaping	**4,220 m²**
% of Landscaping	**55%**

Note:
Numbers are preliminary and are subjected to design change.

CONCEPT
The Moves



Break down Massing

Maximise Solar Exposure to apartments
Ground plane opened up with new massings



Local Materials

Contextualising the design through timeless and local materials
Articulated form with landscaped terraces
Light and contextual roof respecting its context



Activated Ground Plane

A vibrant and welcoming ground plane
High quality activation & urban connection
A generously landscaped precinct

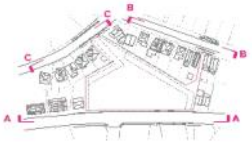
URBAN DESIGN
Proposed Streetscape

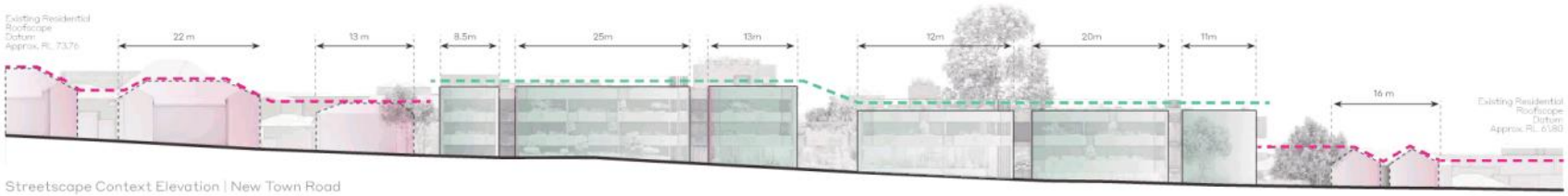
Elevational analysis of the proposed envelope of our design has been conducted to determine the impact of the building on the existing language of the street. The presentation of the design on New Town Road appears to be in keeping with the principles of the existing residential homes with facade proportions matching the cadence of neighbouring frontages. On Clare and Seymour Street this cadence is less obvious but the building itself remains as a backdrop to the homes located in front of it..

Key:

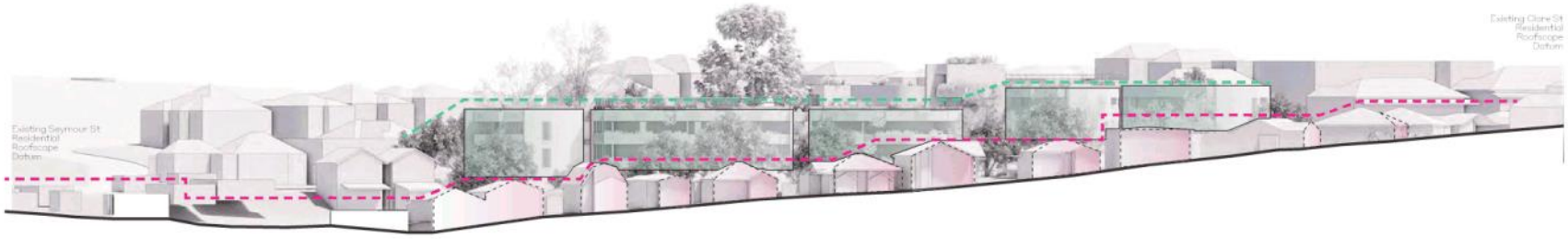
Existing Roofscape

Proposal

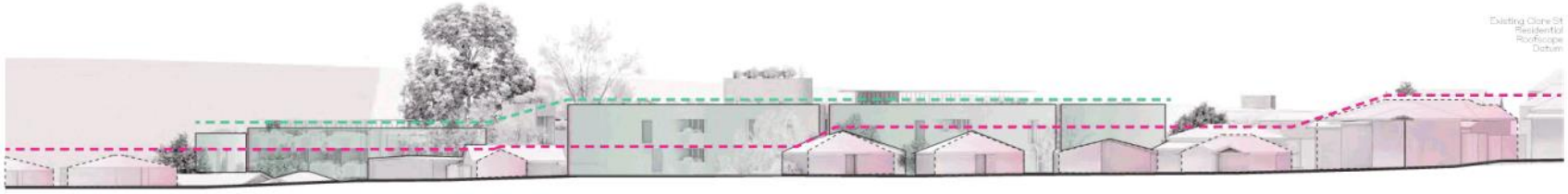




Streetscape Context Elevation | New Town Road



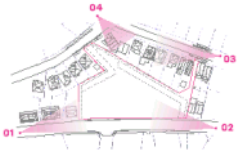
Streetscape Context Elevation | Seymour St

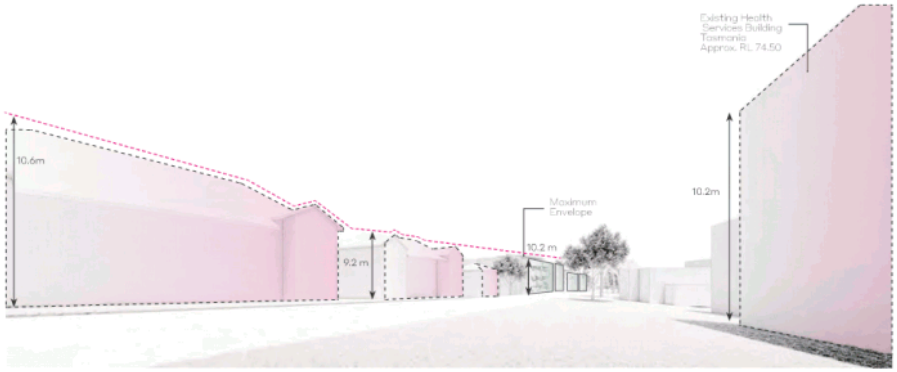


Streetscape Context Elevation | Clare Street

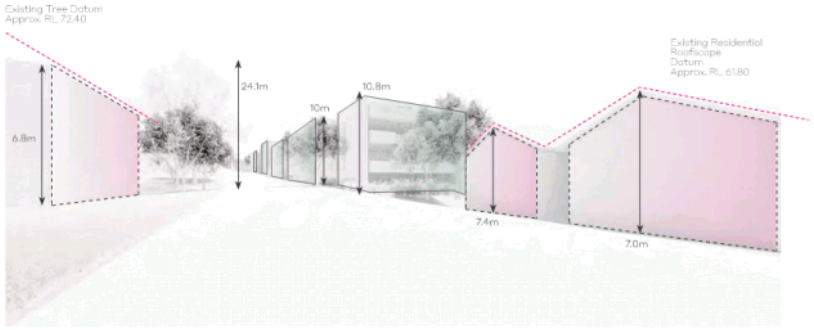
URBAN DESIGN
Proposed Streetscape

The proposed envelope of the design has also been studied in perspectives from the streetscape, in order to minimse the impact of the design on the street and surrounding buildings. The built form is obviously recessive with minimal impact in these views.

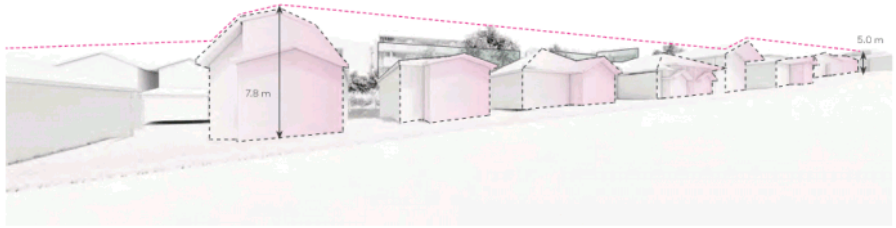




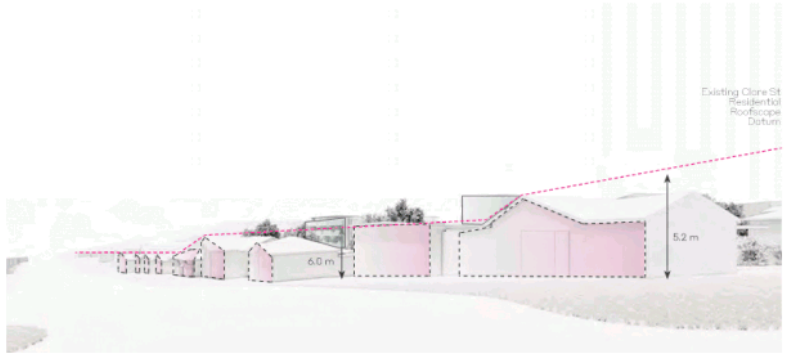
View 01 | New Town Road



View 02 | New Town Road



View 03 | Seymour Street



View 04 | Seymour/Clare Street

An Urban Village



4220m²
Total Available Landscaping
55% of Site Area



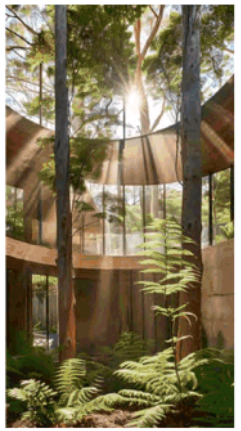
1350m²
Public Spaces
Activate the Ground Plane



Interpreting the Local Character





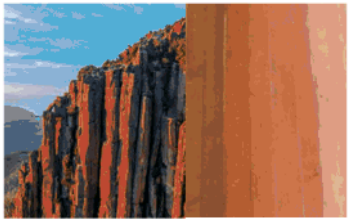






61*
NEW HOMES

Site		
Site Area	7,719m²	
Massing		
Height (storeys)	4 (including penthouse)	South Wings
	3 (including penthouse)	Central and North Wings



Materials of Place



A Generous Entry

Apartments*	Total	Percentage
Total	**61**	**100%**
1 Bed	49	81%
2 Bed	8	14%
3 Bed	3	5%
PH	1	1%

Public Spaces	
Central Space*	1,350m²
Deep Soil*	1,750m²

*Numbers are preliminary and are subjected to changes

48-52 New Town Dashboard

DESIGN CONCEPTS
Healing the Site | Garden Principles

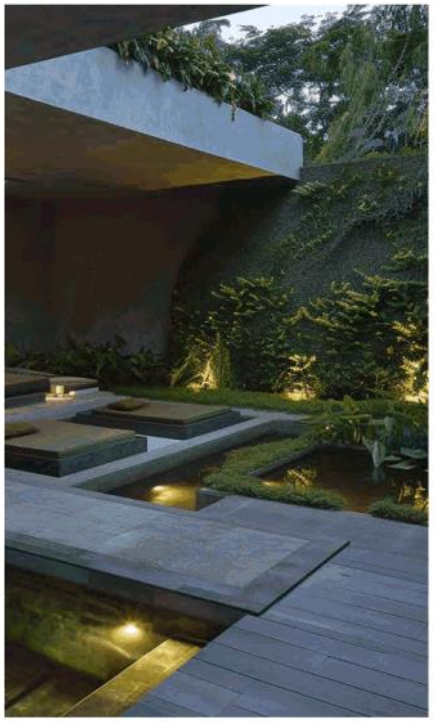
The design aims to return the site from its current demolished state, which is a scar on the neighbourhood, to a lush revitalised area through intensive gardening and planting across the site. The strategies used are varied in nature but focus on outlook, gathering and green edges to built form.



Gathering



Outlook



Green Edges

DESIGN CONCEPTS
Atrium | Landscaped Heart

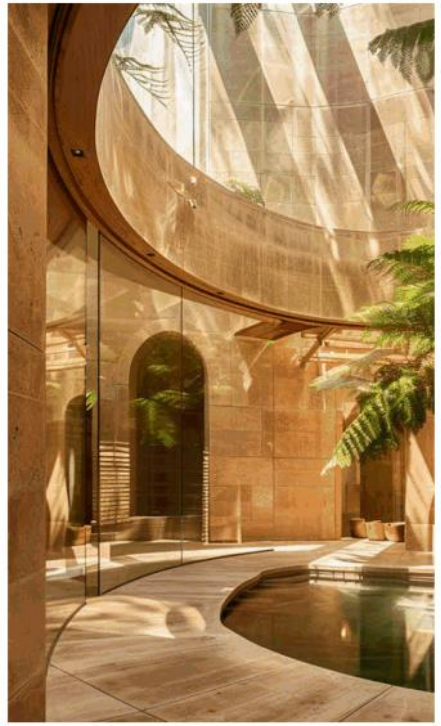
Located in the northern wing of the building, the atrium aims to be the landscaped heart of the proposal. The garden bed of the atrium is located on the lower ground floor amoungst the wellness space and expands all the way to Level 2 above. The space provides a green outlook and natural lighting to all the corridoors in the north wing, connecting with the outdoors without sacrificing thermal comfort.



Verdancy



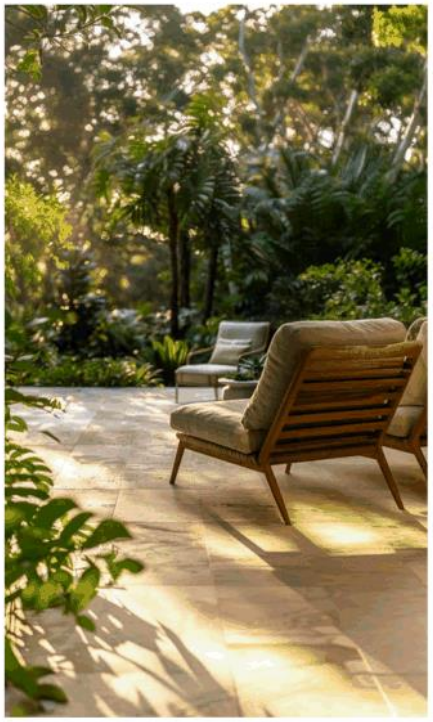
Natural light



Uplift

DESIGN CONCEPTS
Western Landscape Sanctuary

The landscape sactuaries provided to the development consist of two courtyards along the western boundary, one at the center containing a greenhouse, and one at the south between the two north facing arms of the building. These breaks provide moments of respite and relaxation for residents.



Connection to residences



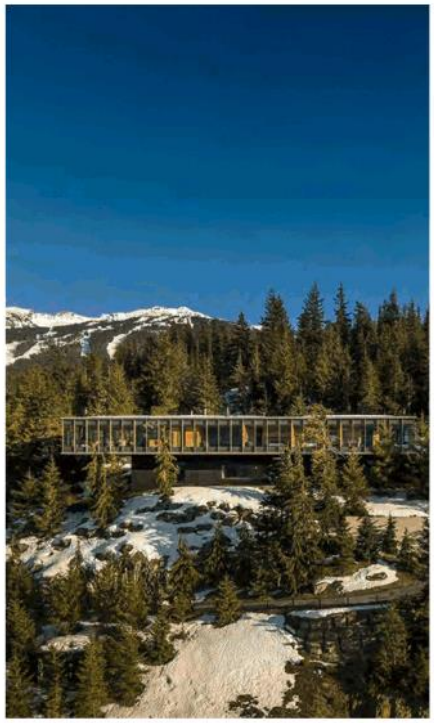
Sanctuary



A green perimeter

DESIGN CONCEPTS
Greenhouse Pavilion

The greenhouse pavillion is located in the main courtyard of the building. The pavillion is visible through the lobby from New Town Road encouraging neighbours to enter the site. The pavillion also provides gathering spaces for residents, sheltered from the Hobart cold.



Surrounded by Nature



Green House



Act of Gardening

DESIGN CONCEPTS
Central Greenhouse | Pavilion





DESIGN CONCEPTS
Lower Ground Amenity

The wellness spaces of the proposal are located as part of the lower ground amenity offering to residents. Maximising the steeply sloping topography at the North-West corner of the site, the surrounding landscape provides a lush outlook, encouraging a connection with nature and providing privacy to neighbouring residents.



Softened by landscaping



Fluid link to natural light



Climate control

DESIGN CONCEPTS
Wellness



Pool



Spa

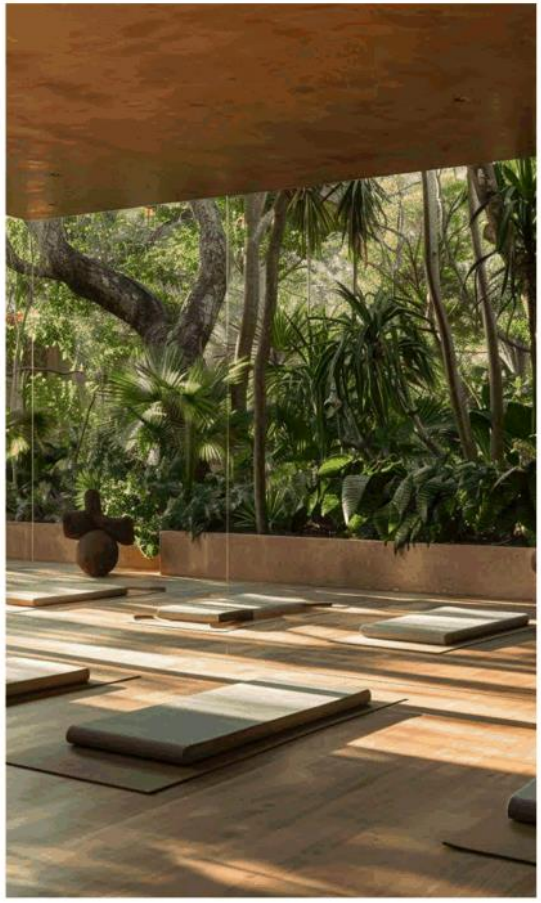


Hydrotherapy

DESIGN CONCEPTS
Wellness



Gym

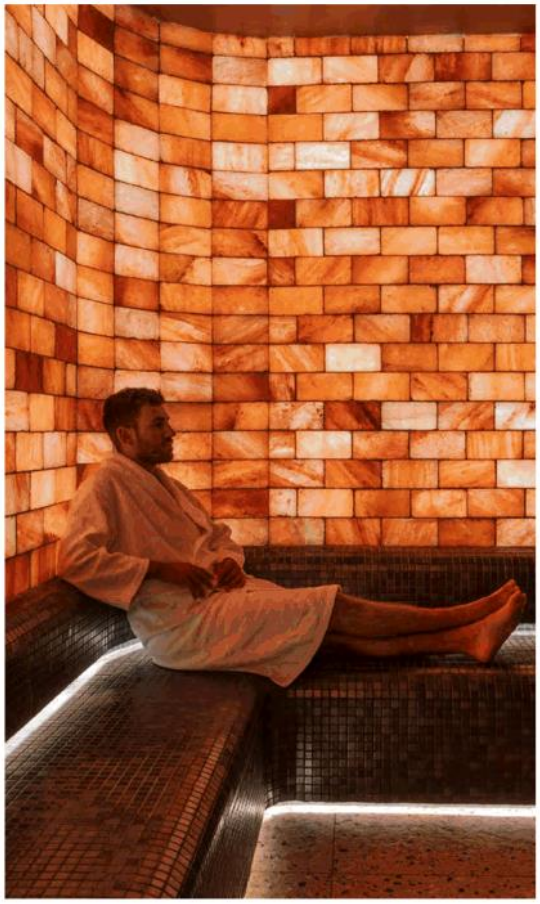


Fitness



Treatment

DESIGN CONCEPTS
Wellness



Sauna



Steam



Chromotherapy

DESIGN CONCEPTS
Pocket Gardens | Verdant Escape



Green corridors



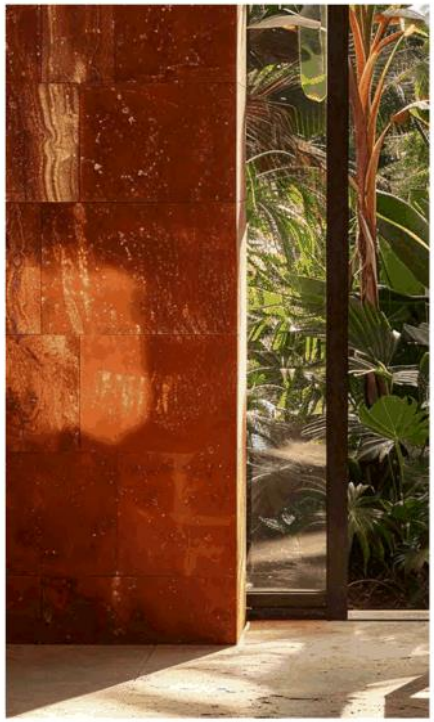
Outlook to nature



Link to amenity

DESIGN CONCEPTS
Materiality

The materials of the project have been chosen for their durability and permanence. They provide an exposed finish that connects to the natural forms and materials of Hobart without paint or cladding.



Stone



Concrete

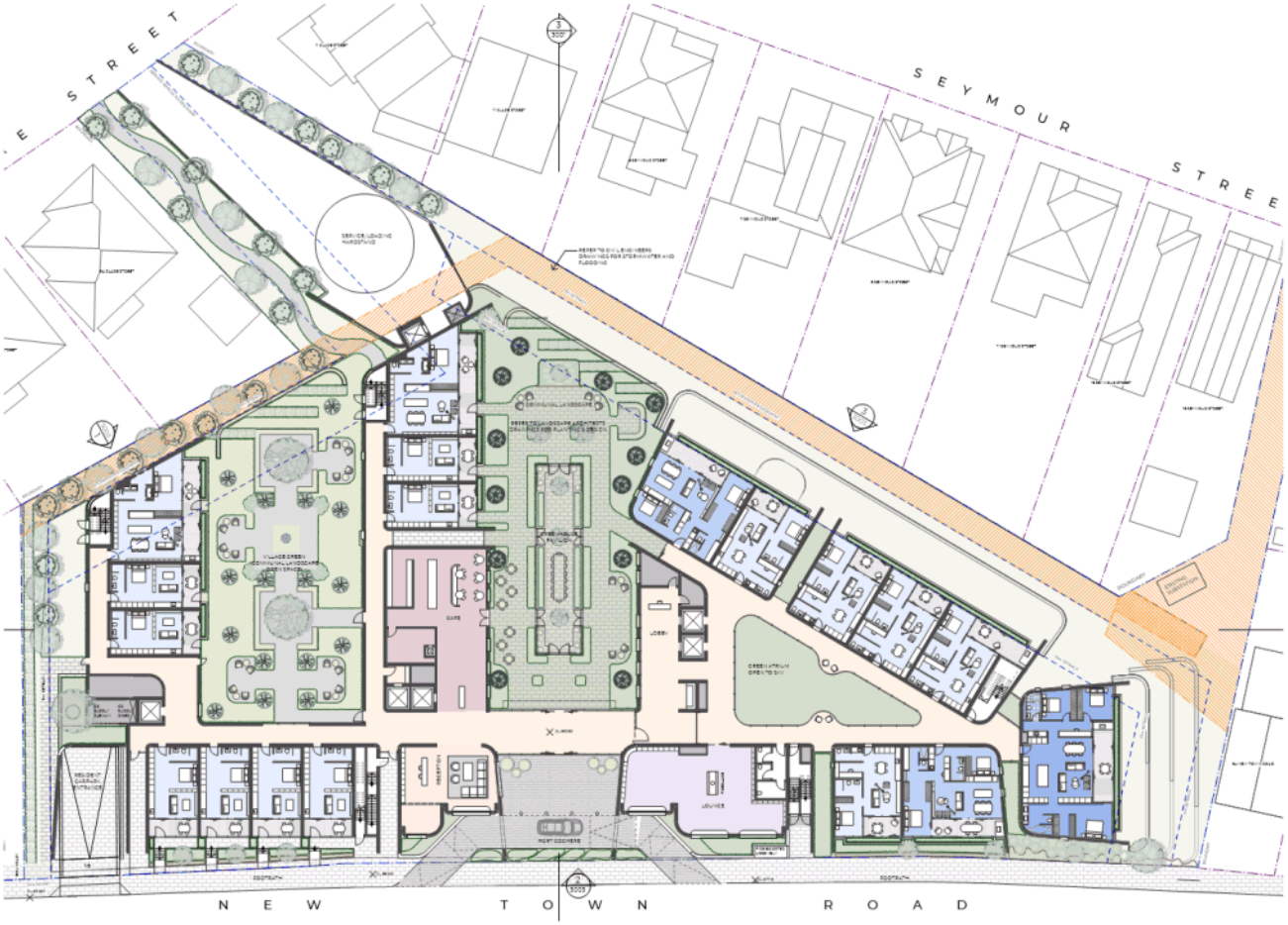


Timber

FLOOR PLAN
Ground Plane

Key:

- 1 Bed adaptable apartment | approx 45-65m²
- 2 Bed adaptable apartment | 86-91m²
- 3 Bed adaptable apartment | 110-135m²
- Penthouse adaptable apartment | 590m²



Revised Scheme | Ground Floor Plan | Scale 1:500 @ A3

FLOOR PLAN
Level 1



Key:

- 1 Bed adaptable apartment | approx 45-65m²
- 2 Bed adaptable apartment | 86-91m²
- 3 Bed adaptable apartment | 110-135m²
- Penthouse adaptable apartment | 590m²

Revised Scheme | Level 1 Plan | Scale 1:500 @ A3

FLOOR PLAN
Level 2

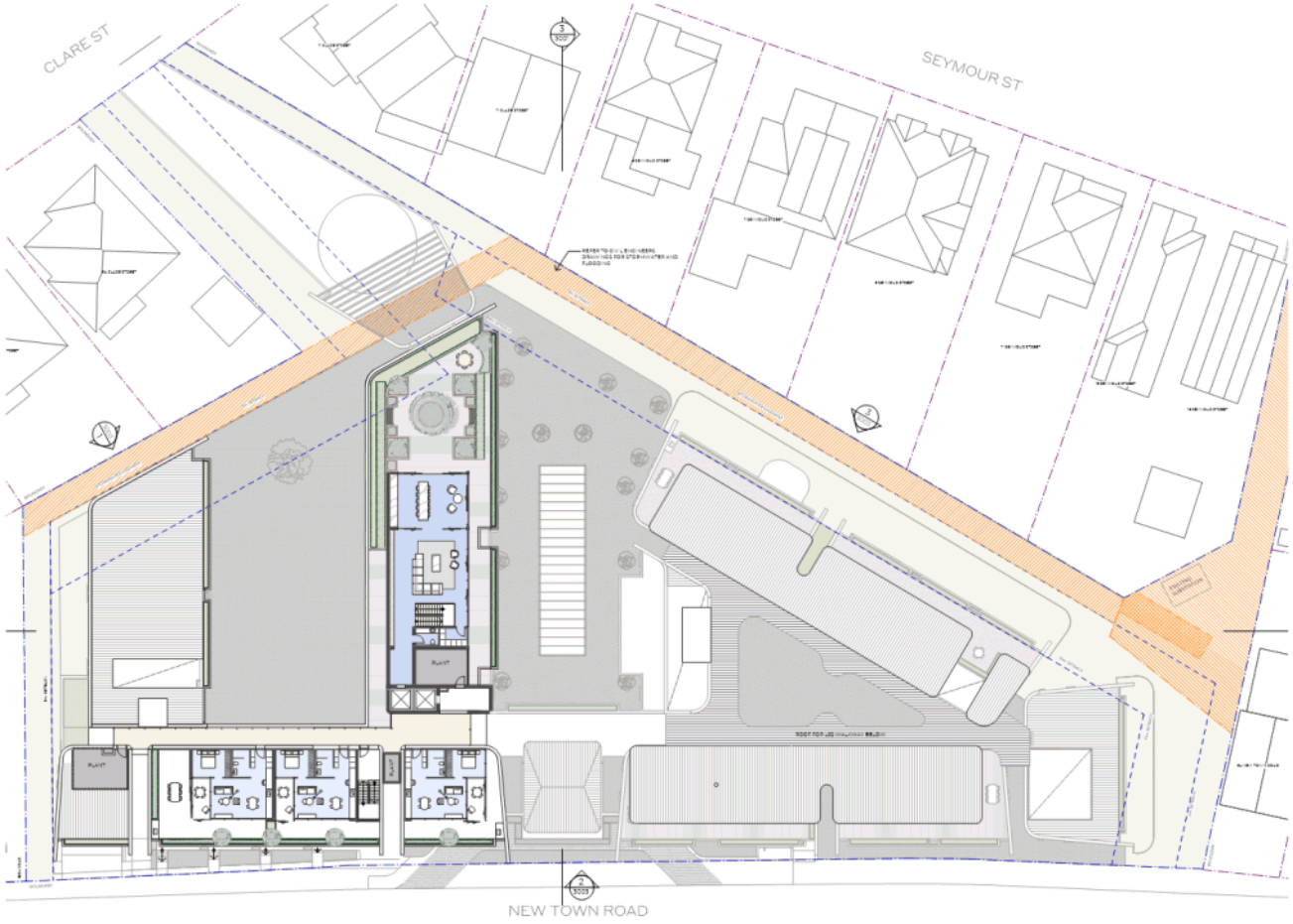


Key:

- 1 Bed adaptable apartment | approx 45-65m²
- 2 Bed adaptable apartment | 86-91m²
- 3 Bed adaptable apartment | 110-135m²
- Penthouse adaptable apartment | 590m²

Revised Scheme | Level 2 Plan | Scale 1:500 @ A3

FLOOR PLAN
Level 3

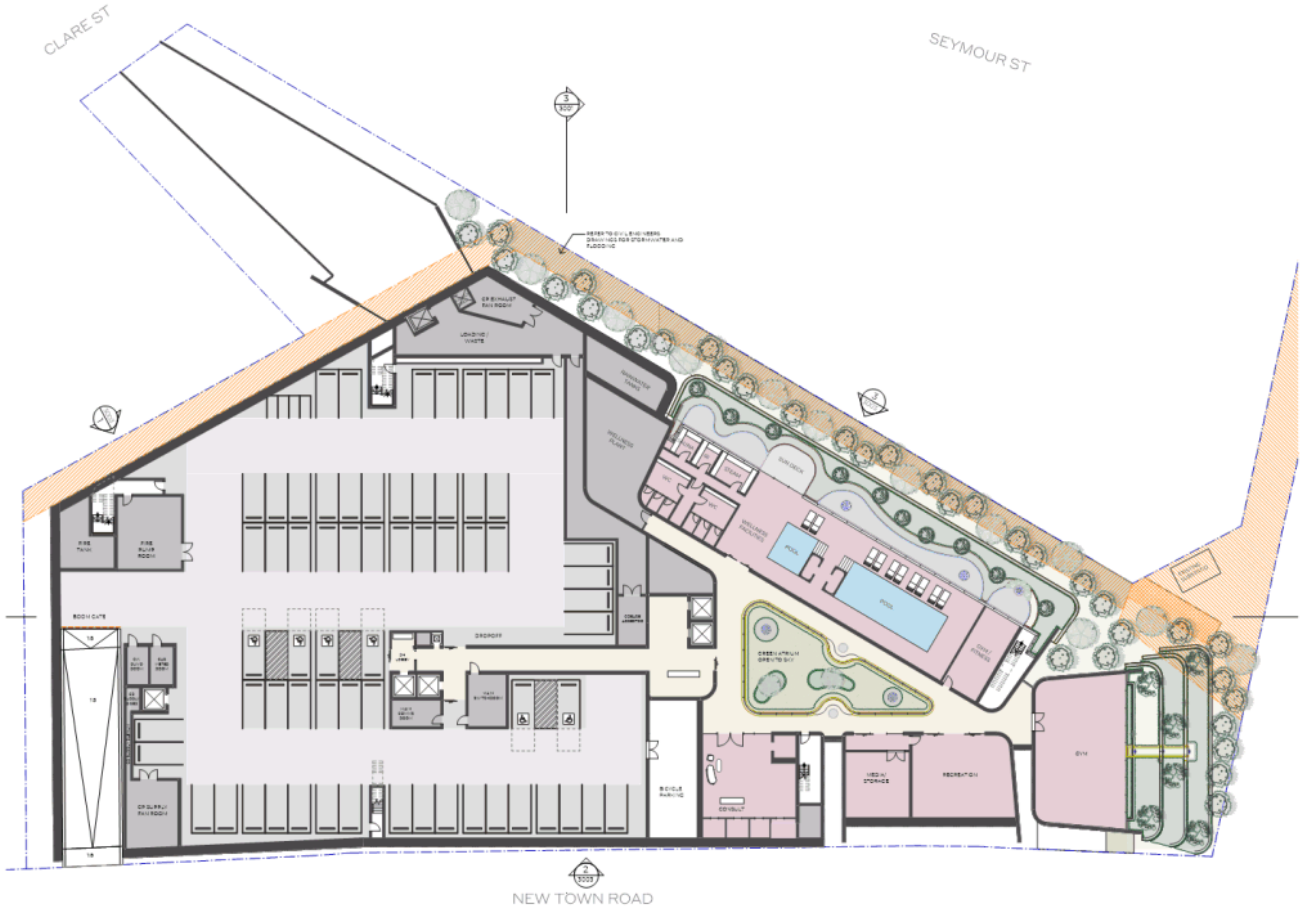


Key:

- 1 Bed adaptable apartment | approx 45-65m²
- 2 Bed adaptable apartment | 86-91m²
- 3 Bed adaptable apartment | 110-135m²
- Penthouse adaptable apartment | 590m²

Revised Scheme | Level 3 Plan | Scale 1:500 @ A3

FLOOR PLAN
Lower Ground



Revised Scheme | Lower Ground Floor Plan | Scale 1:500 @ A3

MATERIALITY
Confident | Timeless | Contextual

The materials of the project have been chosen for their durability and permanence. They provide an exposed finish that connects to the natural forms and materials of Hobart without paint or cladding.

Using the red colour to connect with the brick walls and roof tiles from the building fabric present in the neighbourhood. The colour and materiality of the project aims to be contemporary but still "Of-Place".



Public Realm



External Finishes



Facade Tonal Ambition



Textured Oxide Concrete



Terrazzo



Reclaimed Timber



Copper



Tasmanian Oak



Glazing | Accent Metal

AXONOMETRIC
View From the North-West



AXONOMETRIC
View From the South-East



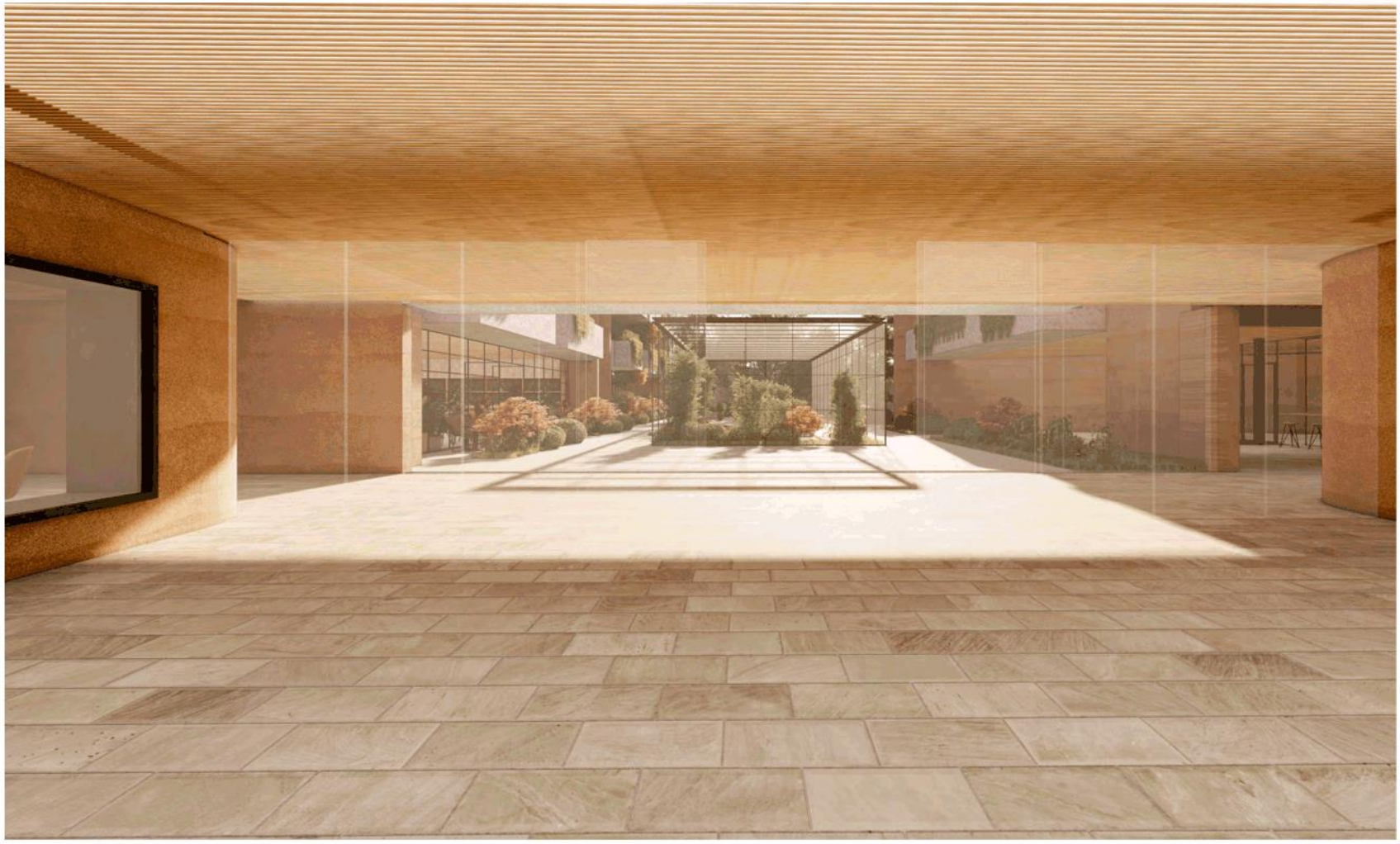
PERSPECTIVE
New Town Road Street Presentation



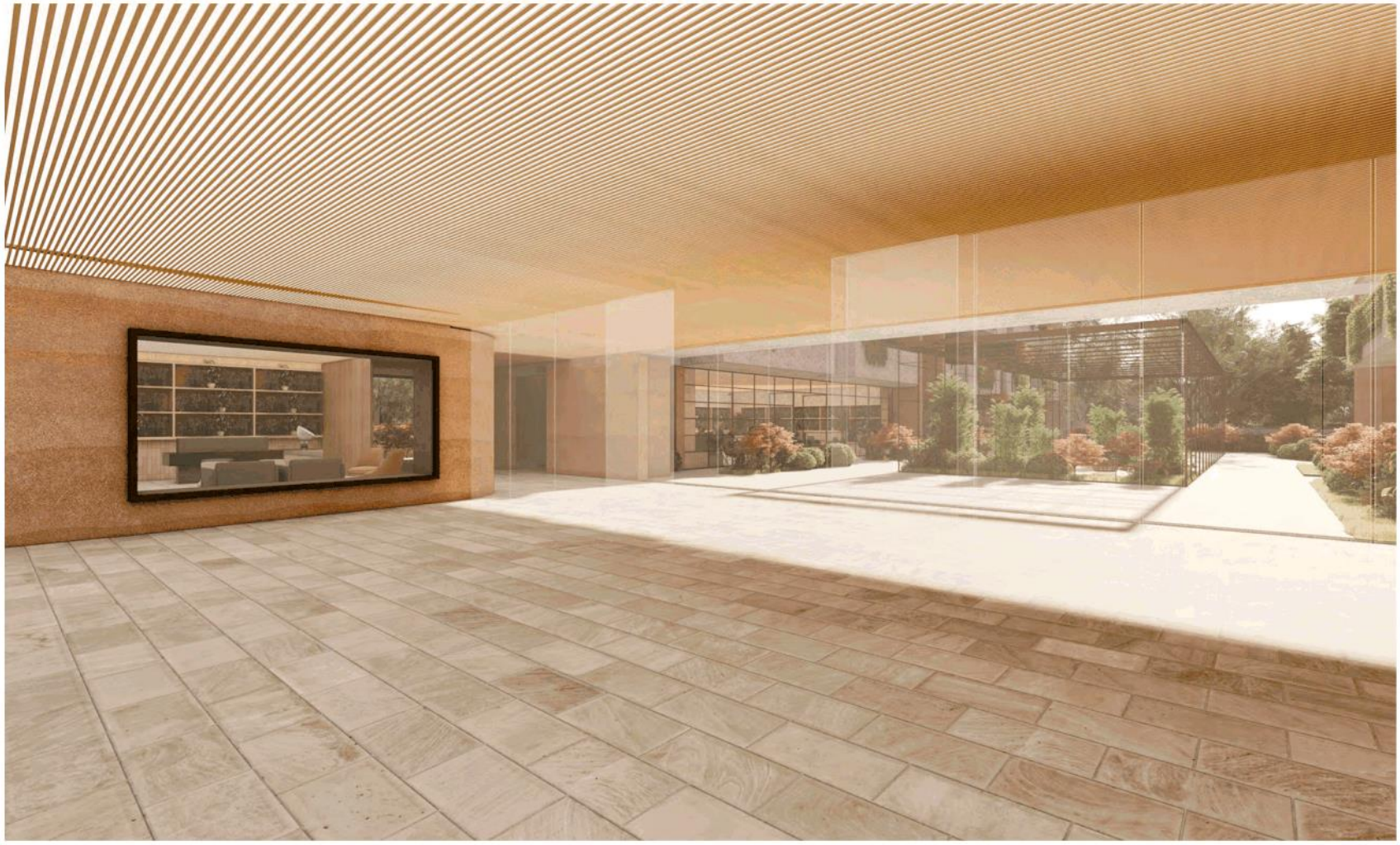
PERSPECTIVE
Main Entry



PERSPECTIVE
Main Entry



PERSPECTIVE
Ground Floor Lobby



PERSPECTIVE
Greenhouse and Central Courtyard



PERSPECTIVE
Greenhouse and Central Courtyard



PERSPECTIVE
First Floor View Over Central Courtyard



PERSPECTIVE
Ground Floor View of Atrium



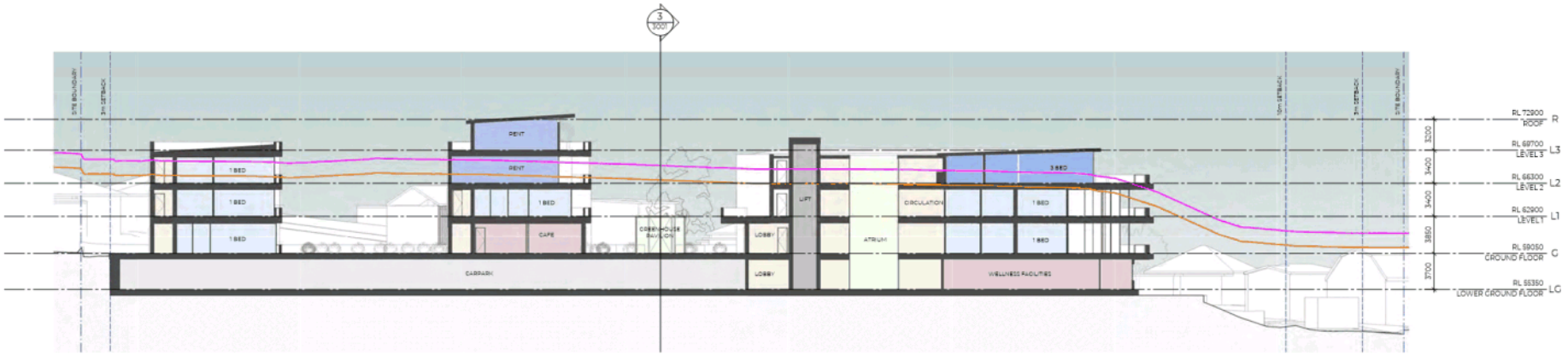
ELEVATIONS
Design



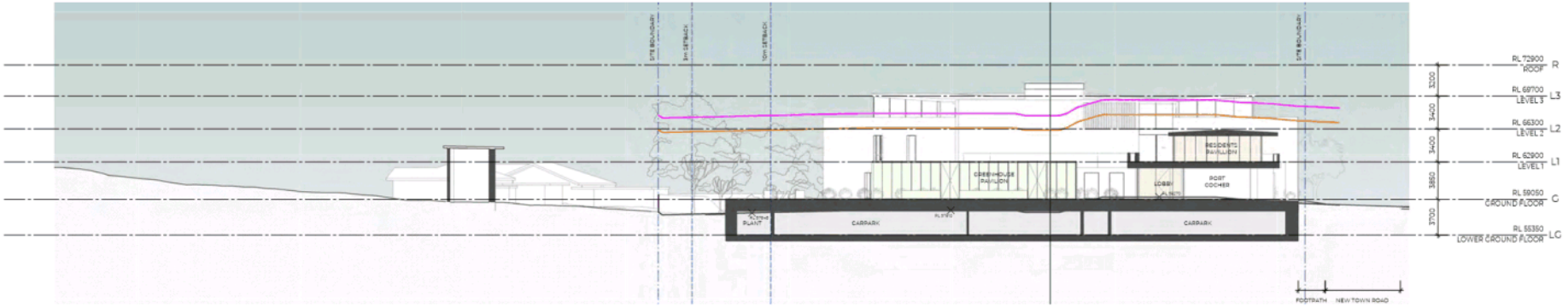


SECTION
Design

The site slopes from South to North by a whole level and from East to West by about half of a level. This means the design appears as 3 storeys at points and as 4 storeys at others. The proposal aims to maximise the amenity opportunities from this level change without badly impacting neighbours.



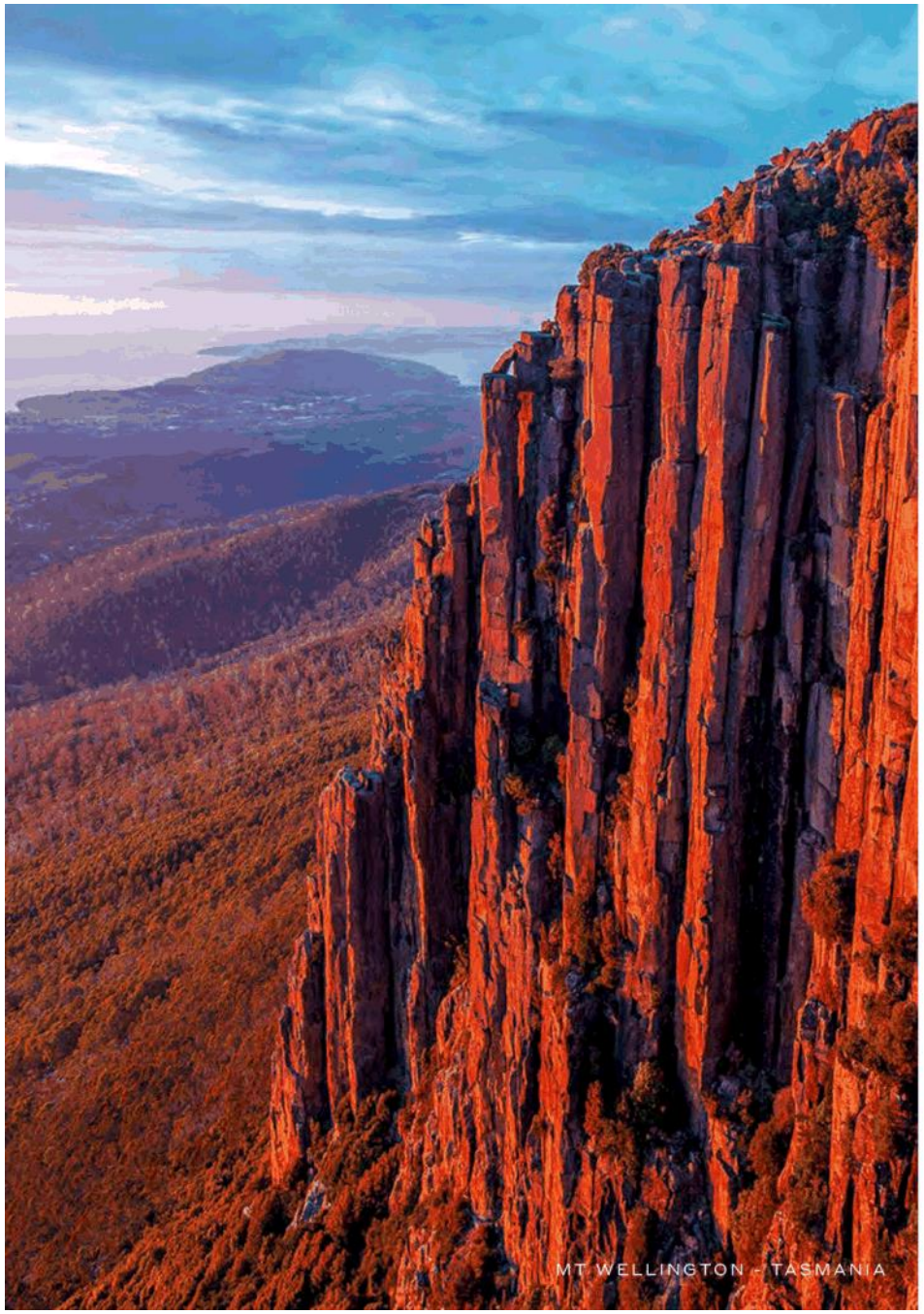
North-South Section | Scale 1:200 @ A3

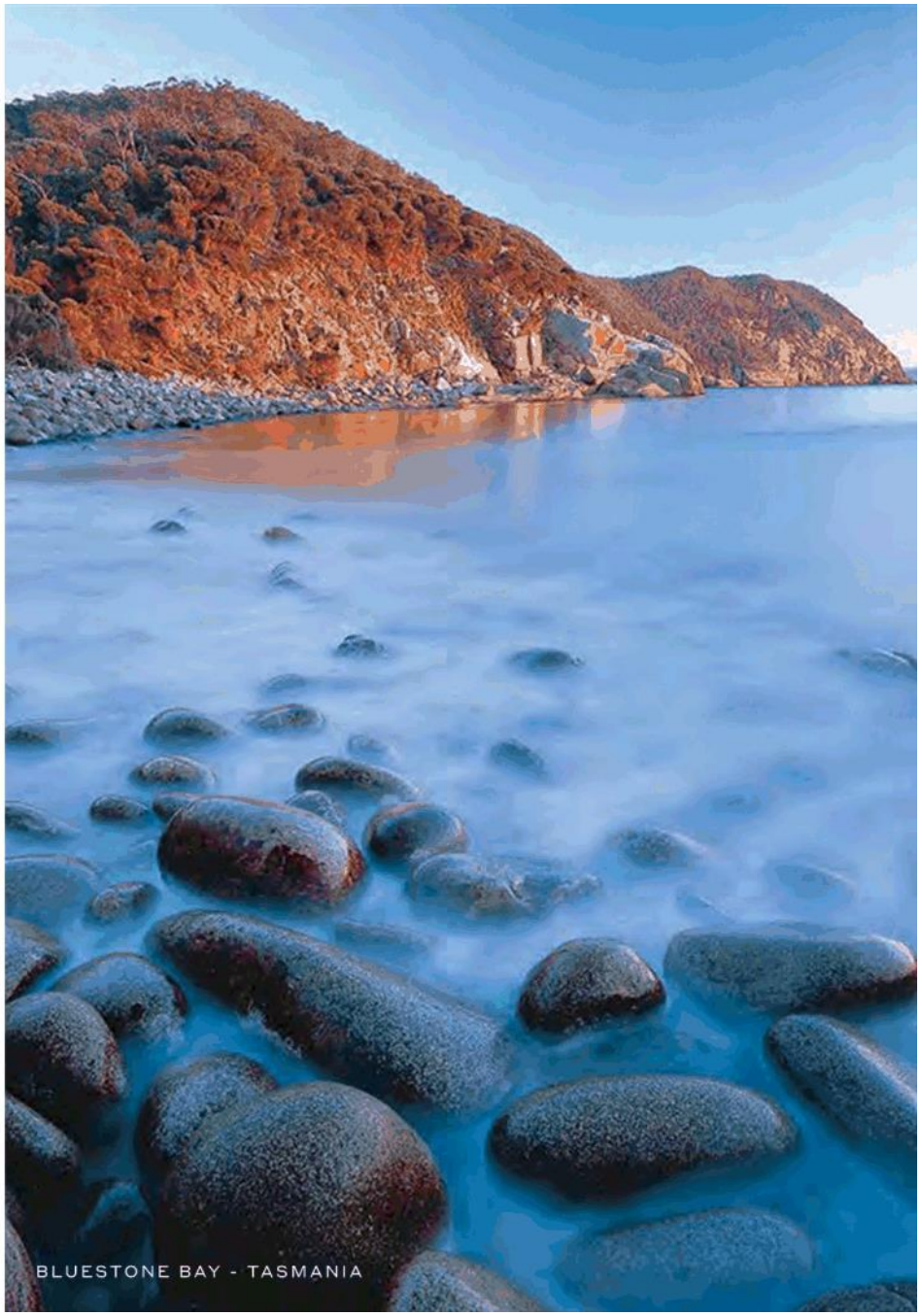


East-West Section | Scale 1:200 @ A3






MT WELLINGTON - TASMANIA


BLUESTONE BAY - TASMANIA

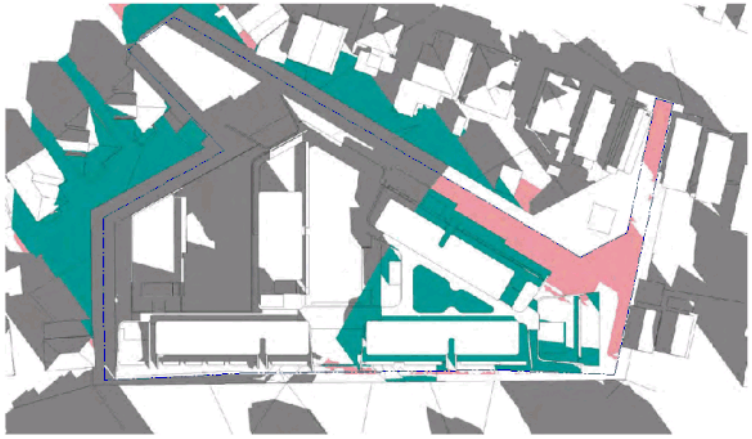
03

APPENDICES

SHADOW IMPACT STUDIES
Winter Solstice

SHADOW LEGEND

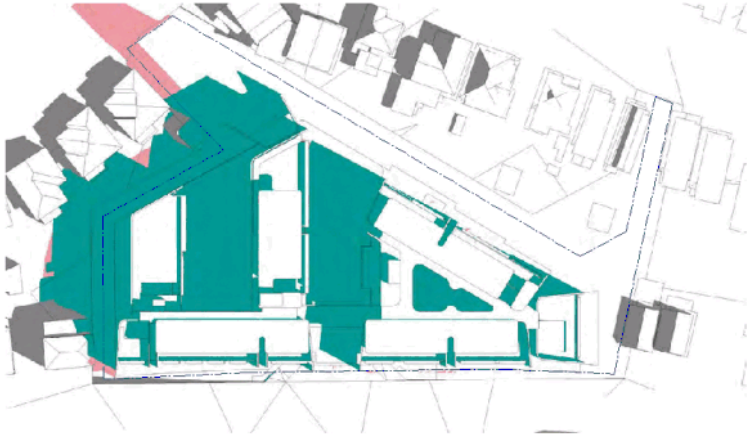
- ADDITIONAL SHADOW IMPACT CAUSED BY POTENTIAL MAXIMUM ENVELOPE
- PROPOSED SHADOW IMPACT
- EXISTING NEIGHBOURING SHADOWS
- SITE BOUNDARY



Winter Solstice - 9:00 am - Shadow Impact Diagram



Winter Solstice - 10:00 am - Shadow Impact Diagram

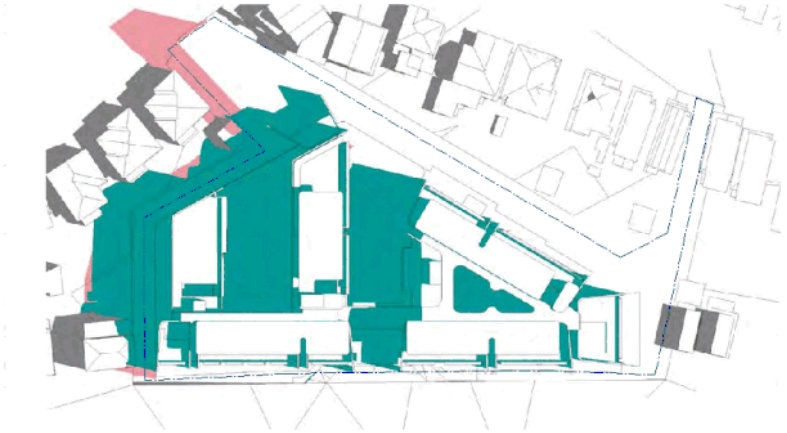


Winter Solstice - 11:00 am - Shadow Impact Diagram

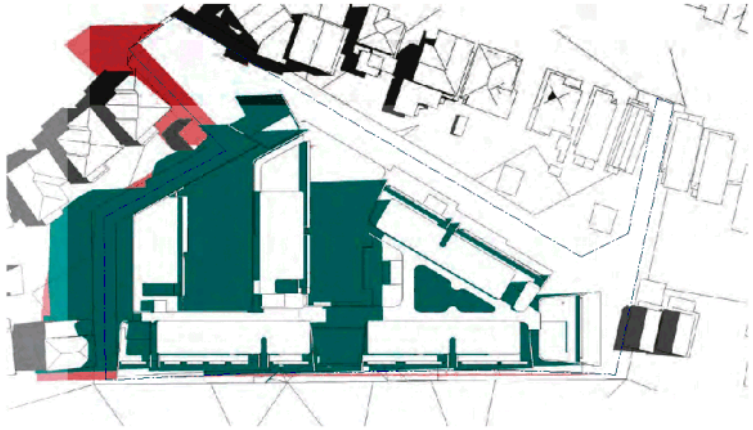
SHADOW IMPACT STUDIES
Winter Solstice

SHADOW LEGEND

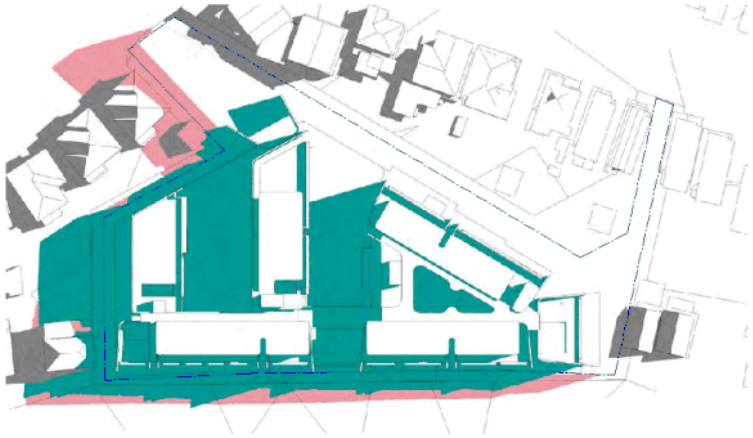
- ADDITIONAL SHADOW IMPACT CAUSED BY POTENTIAL MAXIMUM ENVELOPE
- PROPOSED SHADOW IMPACT
- EXISTING NEIGHBOURING SHADOWS
- SITE BOUNDARY



Winter Solstice - 12:00 pm - Shadow Impact Diagram



Winter Solstice - 1:00 pm - Shadow Impact Diagram

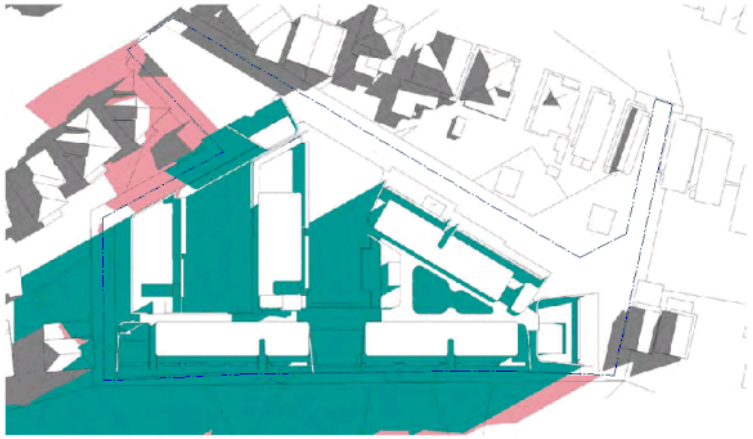


Winter Solstice - 2:00 pm - Shadow Impact Diagram

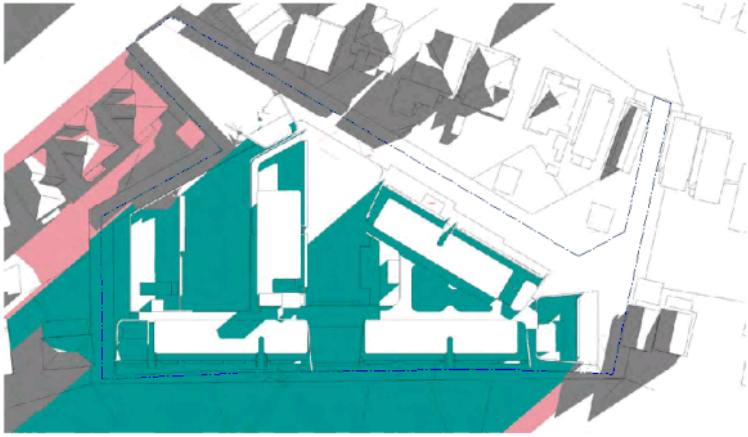
SHADOW IMPACT STUDIES
Winter Solstice

SHADOW LEGEND

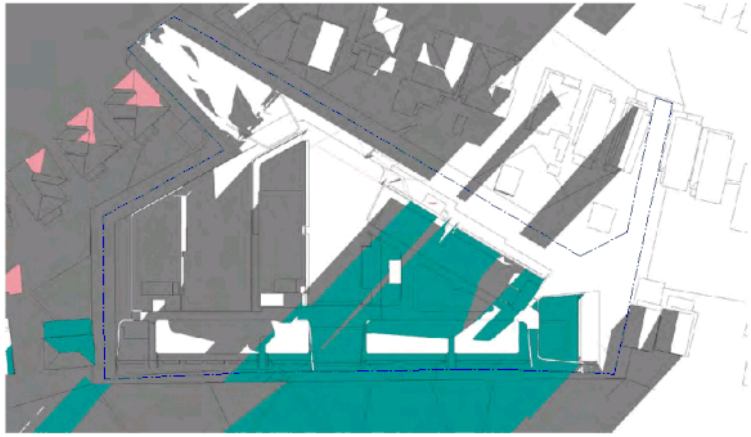
- ADDITIONAL SHADOW IMPACT CAUSED BY POTENTIAL MAXIMUM ENVELOPE
- PROPOSED SHADOW IMPACT
- EXISTING NEIGHBOURING SHADOWS
- SITE BOUNDARY



Winter Solstice - 3:00 pm - Shadow Impact Diagram



Winter Solstice - 4:00 pm - Shadow Impact Diagram

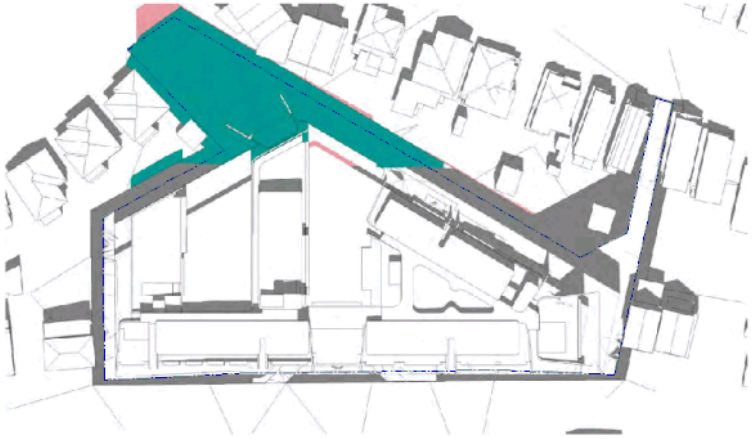


Winter Solstice - 5:00 pm - Shadow Impact Diagram

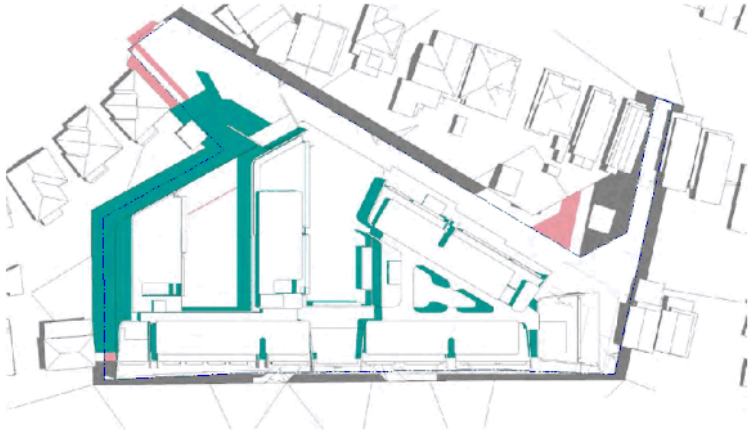
SHADOW IMPACT STUDIES
Summer Solstice

SHADOW LEGEND

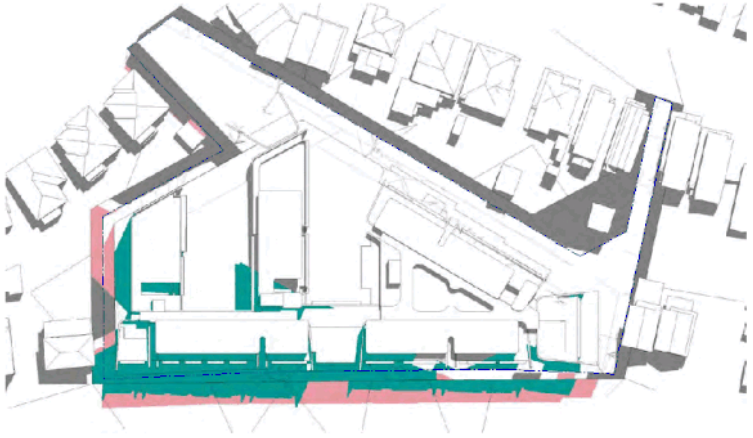
- ADDITIONAL SHADOW IMPACT CAUSED BY POTENTIAL MAXIMUM ENVELOPE
- PROPOSED SHADOW IMPACT
- EXISTING NEIGHBOURING SHADOWS
- SITE BOUNDARY



Summer Solstice - 9:00 am - Shadow Impact Diagram



Summer Solstice - 12:00 pm - Shadow Impact Diagram

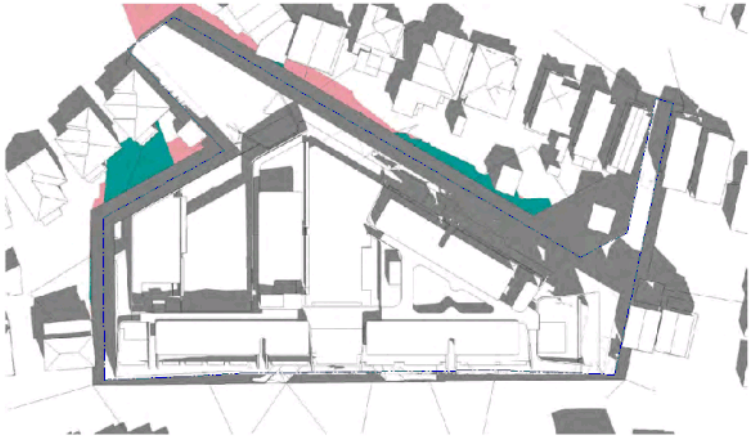


Summer Solstice - 3:00 pm - Shadow Impact Diagram

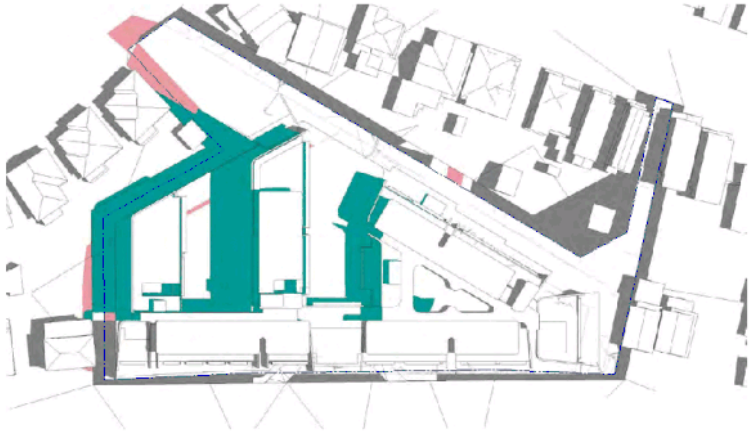
SHADOW IMPACT STUDIES
Equinox

SHADOW LEGEND

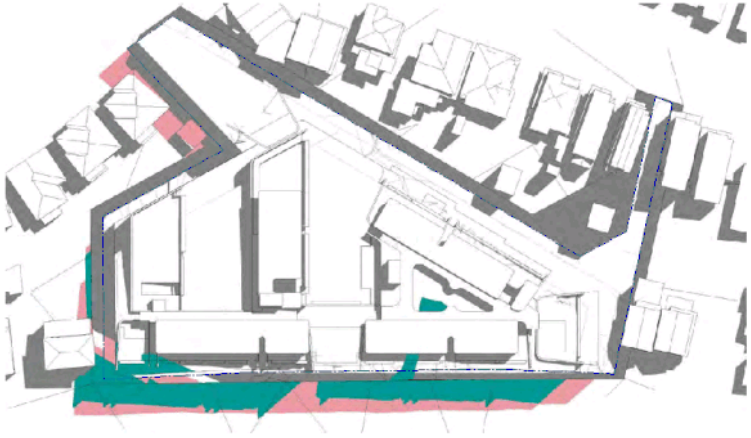
- ADDITIONAL SHADOW IMPACT CAUSED BY POTENTIAL MAXIMUM ENVELOPE
- PROPOSED SHADOW IMPACT
- EXISTING NEIGHBOURING SHADOWS
- SITE BOUNDARY



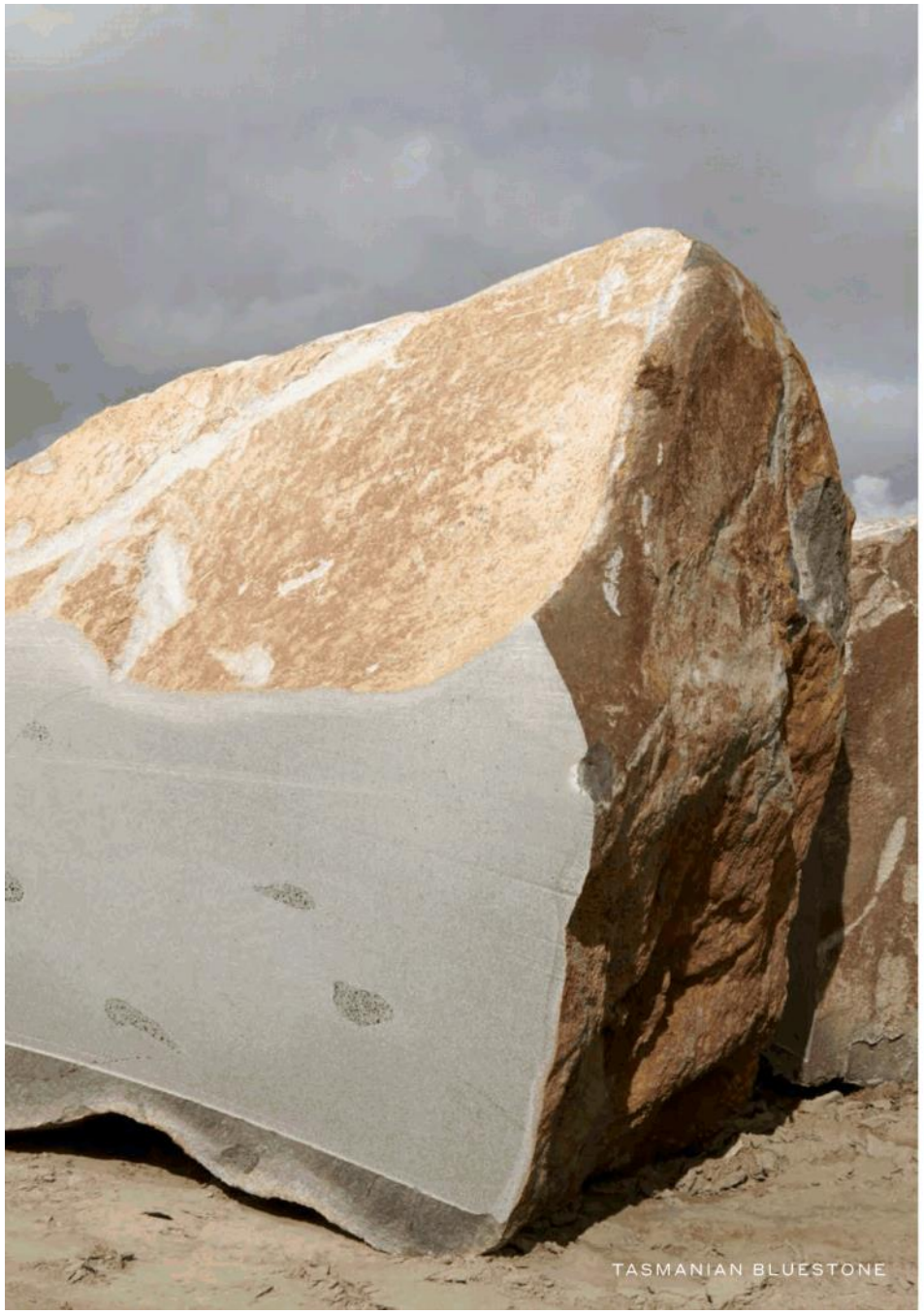
Equinox - 9:00 am - Shadow Impact Diagram



Equinox - 12:00 pm - Shadow Impact Diagram



Equinox - 3:00 pm - Shadow Impact Diagram


TASMANIAN BLUESTONE

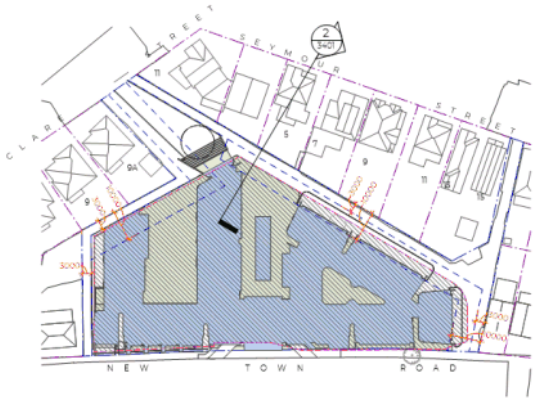

SUMMIT CAIRN - MOUNT DIRECTION

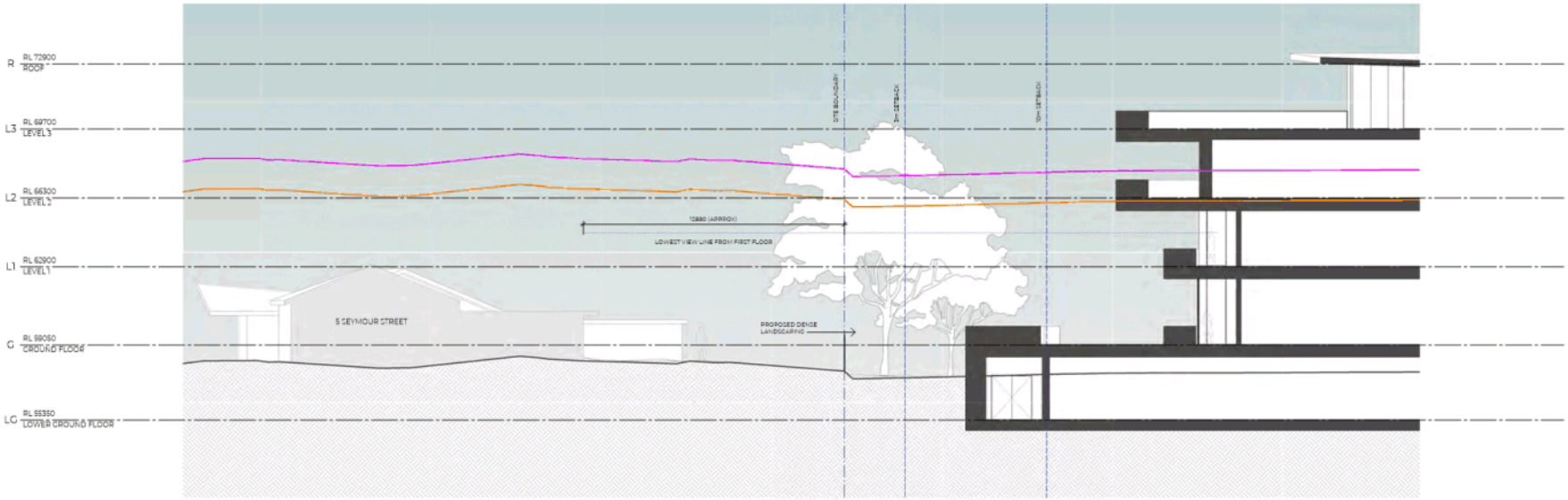
OVERLOOKING DIAGRAMS
5 Seymour Street Section

Sections through the building and it's surrounding neighbours have been completed to analyse the overshadowing and overlooking impact of the design on it's surrounds. The impact has been compared with the 10m and 8.5m height plane constraint to determine the impact on neighbours when the height plane is broken.

LEGEND

- 10M HEIGHT PLANE
- 8.5M HEIGHT PLANE
- EXISTING GROUND PLANE





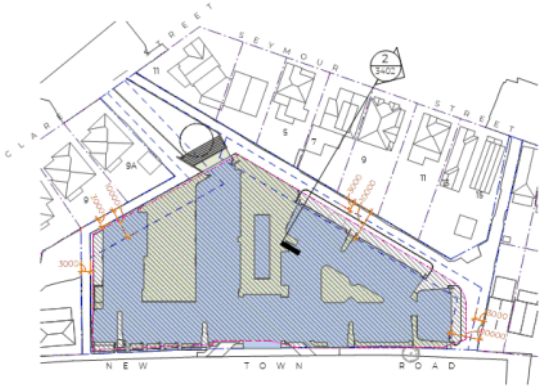
Neighbouring Section | 5 Seymour Street | Scale 1:200 @ A3

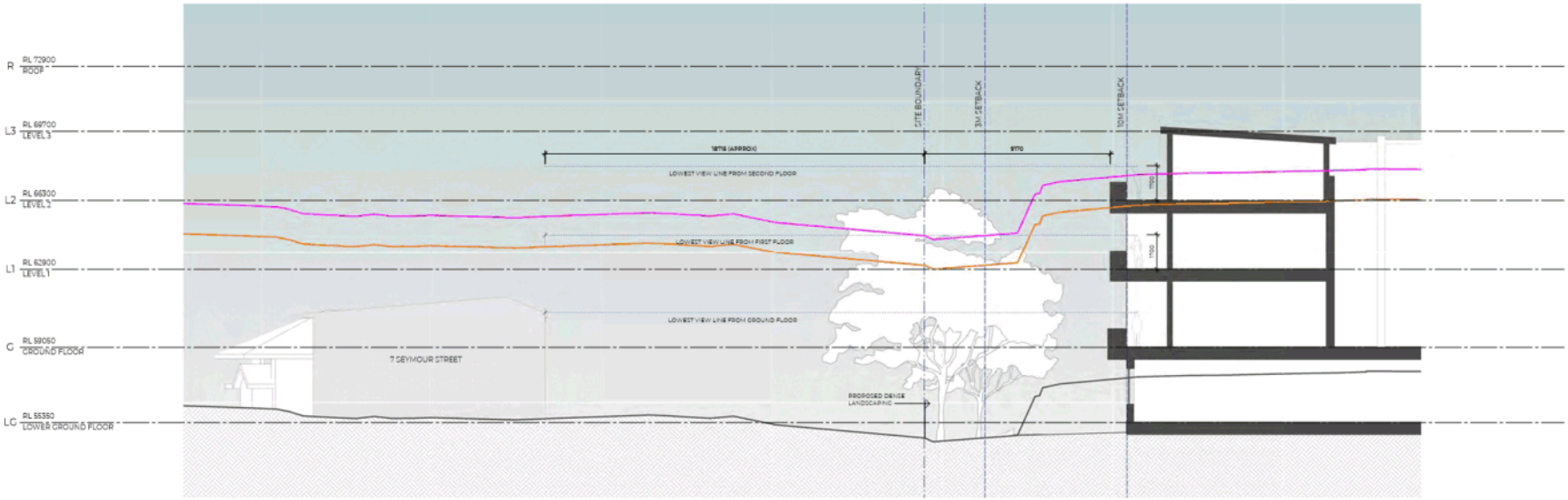
OVERLOOKING DIAGRAMS
7 Seymour Street Section

Sections through the building and it's surrounding neighbours have been completed to analyse the overshadowing and overlooking impact of the design on it's surrounds. The impact has been compared with the 10m and 8.5m height plane constraint to determine the impact on neighbours when the height plane is broken.

LEGEND

- 10M HEIGHT PLANE
- 8.5M HEIGHT PLANE
- EXISTING GROUND PLANE





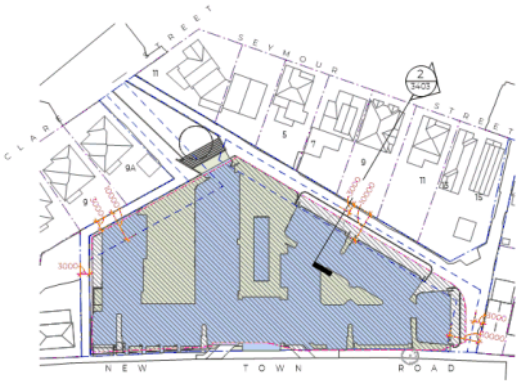
Neighbouring Section | 7 Seymour Street | Scale 1:200 @ A3

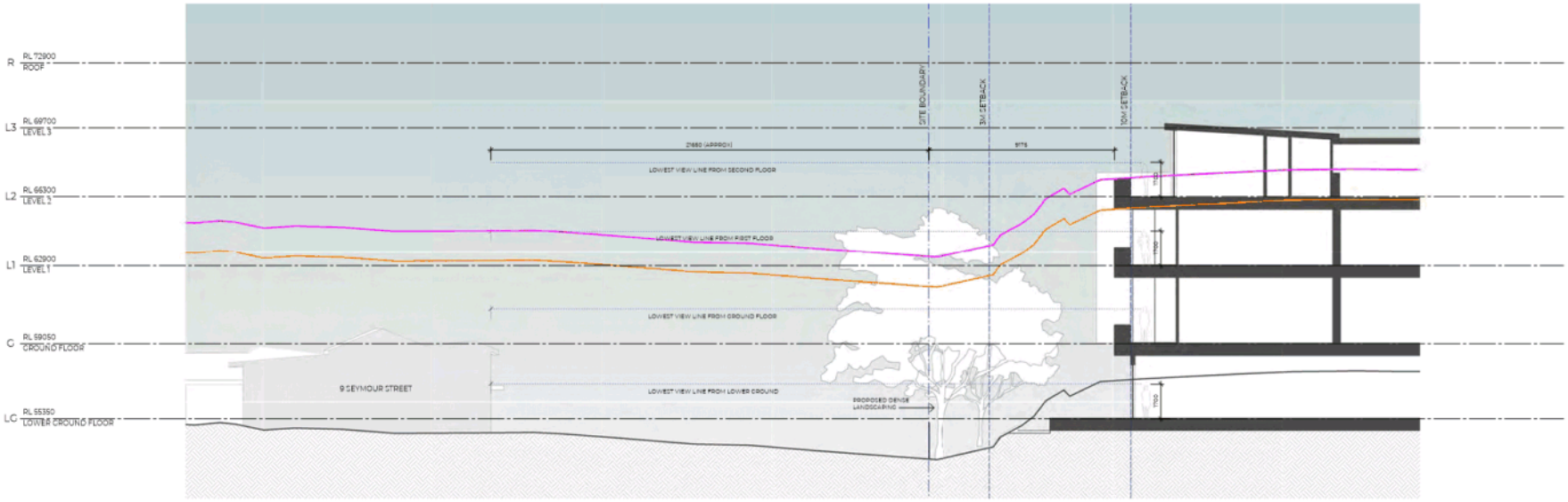
OVERLOOKING DIAGRAMS
9 Seymour Street Section

Sections through the building and it's surrounding neighbours have been completed to analyse the overshadowing and overlooking impact of the design on it's surrounds. The impact has been compared with the 10m and 8.5m height plane constraint to determine the impact on neighbours when the height plane is broken.

LEGEND

- 10M HEIGHT PLANE
- 8.5M HEIGHT PLANE
- EXISTING GROUND PLANE





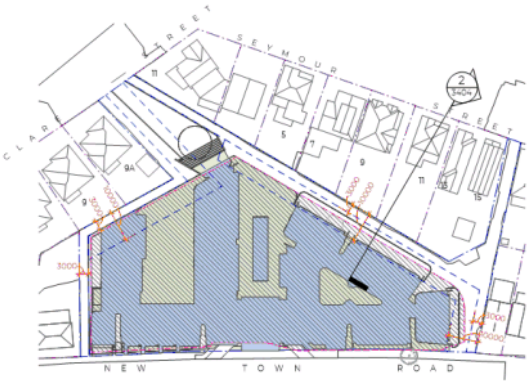
Neighbouring Section | 9 Seymour Street | Scale 1:200 @ A3

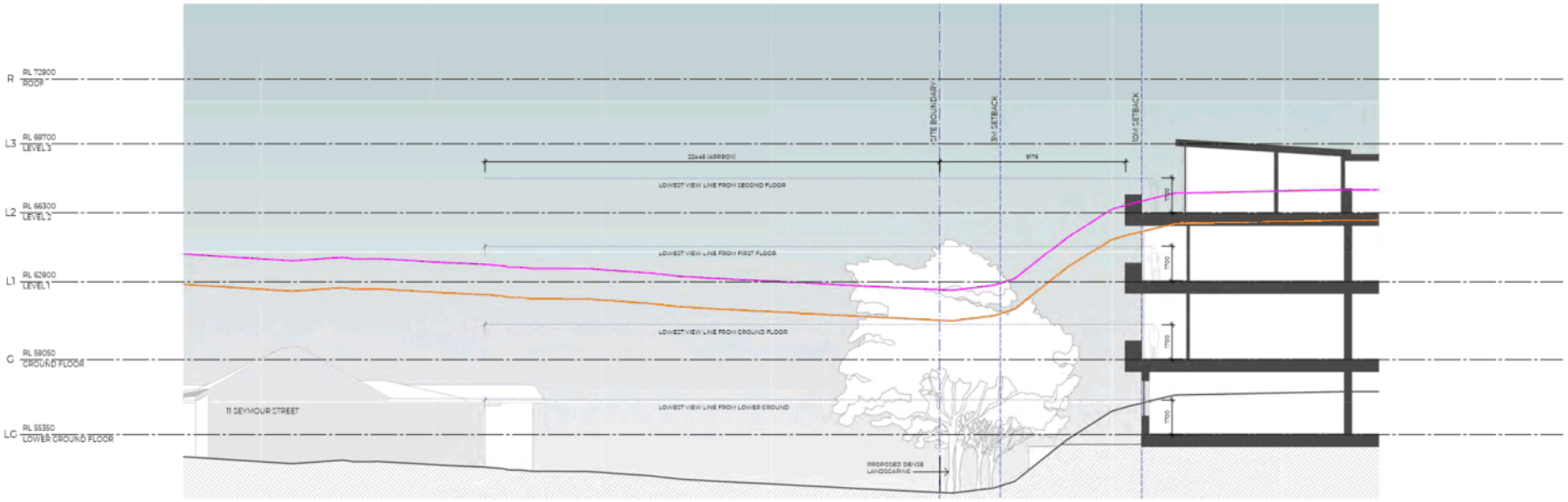
OVERLOOKING DIAGRAMS
11 Seymour Street Section

Sections through the building and it's surrounding neighbours have been completed to analyse the overshadowing and overlooking impact of the design on it's surrounds. The impact has been compared with the 10m and 8.5m height plane constraint to determine the impact on neighbours when the height plane is broken.

LEGEND

- 10M HEIGHT PLANE
- 8.5M HEIGHT PLANE
- EXISTING GROUND PLANE





Neighbouring Section | 9 Seymour Street | Scale 1:200 @ A3

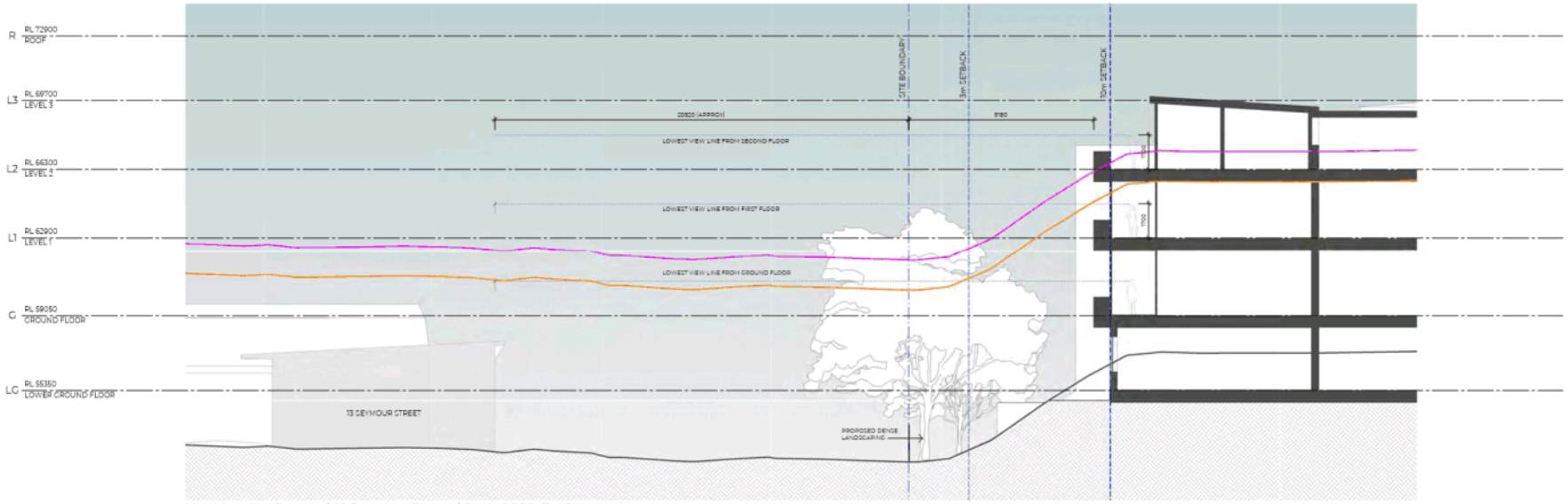
OVERLOOKING DIAGRAMS
13 Seymour Street Section

Sections through the building and it's surrounding neighbours have been completed to analyse the overshadowing and overlooking impact of the design on it's surrounds. The impact has been compared with the 10m and 8.5m height plane constraint to determine the impact on neighbours when the height plane is broken.

LEGEND

- 10M HEIGHT PLANE
- 8.5M HEIGHT PLANE
- EXISTING GROUND PLANE





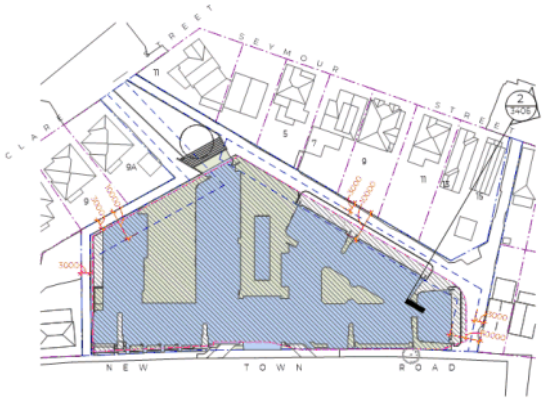
Neighbouring Section | 13 Seymour Street | Scale 1:200 @ A3

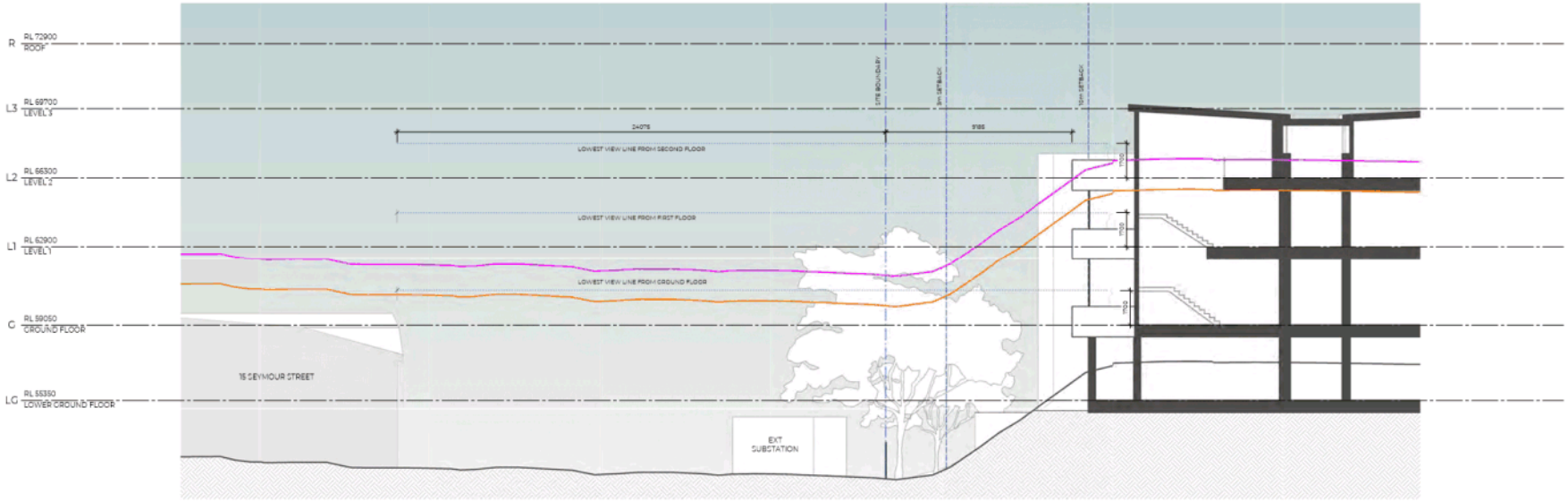
OVERLOOKING DIAGRAMS
15 Seymour Street Section

Sections through the building and it's surrounding neighbours have been completed to analyse the overshadowing and overlooking impact of the design on it's surrounds. The impact has been compared with the 10m and 8.5m height plane constraint to determine the impact on neighbours when the height plane is broken.

LEGEND

- 10M HEIGHT PLANE
- 8.5M HEIGHT PLANE
- EXISTING GROUND PLANE





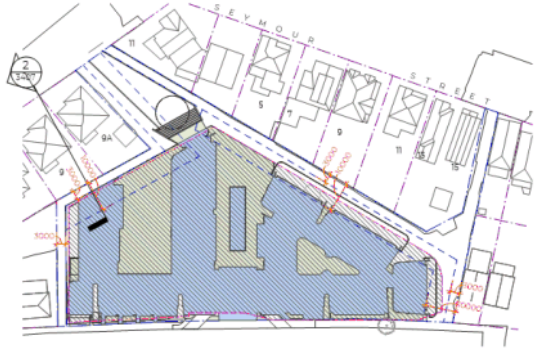
Neighbouring Section | 15 Seymour Street | Scale 1:200 @ A3

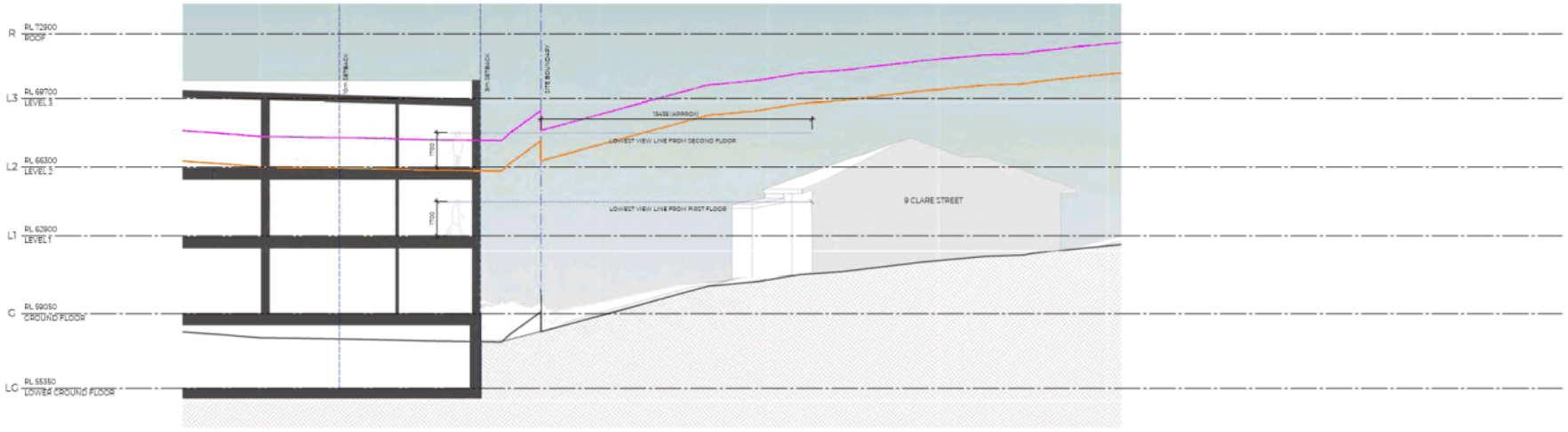
OVERLOOKING DIAGRAMS
9 Clare Street Section

Sections through the building and it's surrounding neighbours have been completed to analyse the overshadowing and overlooking impact of the design on it's surrounds. The impact has been compared with the 10m and 8.5m height plane constraint to determine the impact on neighbours when the height plane is broken.

LEGEND

- 10M HEIGHT PLANE
- 8.5M HEIGHT PLANE
- EXISTING GROUND PLANE





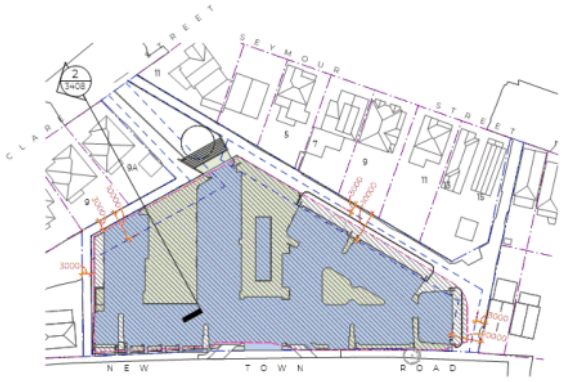
Neighbouring Section | 9 Clare Street | Scale 1:200 @ A3

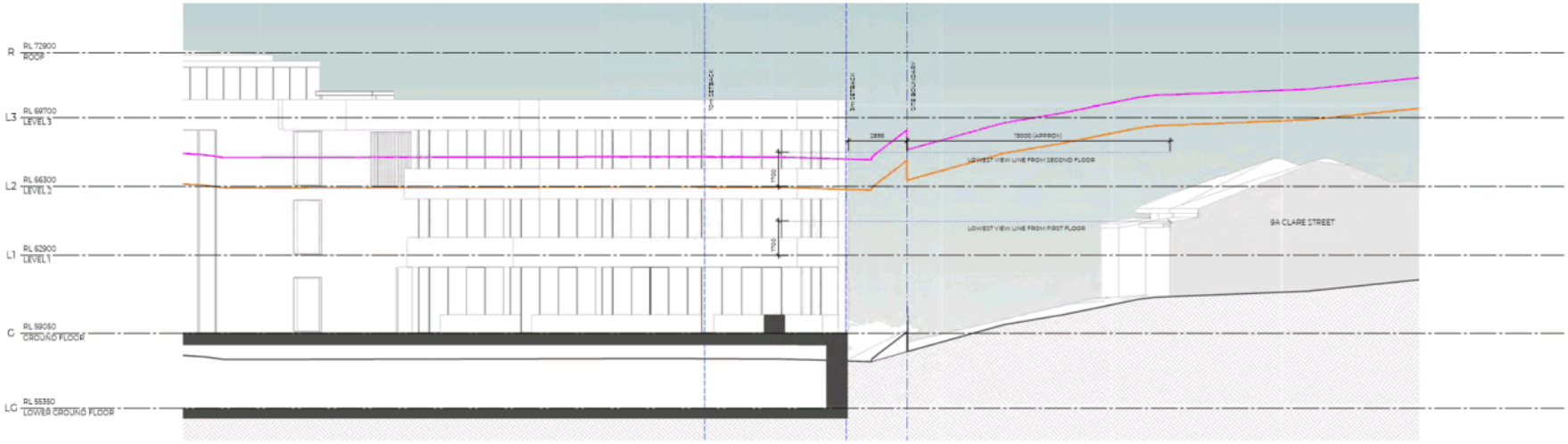
OVERLOOKING DIAGRAMS
9A Clare Street Section

Sections through the building and it's surrounding neighbours have been completed to analyse the overshadowing and overlooking impact of the design on it's surrounds. The impact has been compared with the 10m and 8.5m height plane constraint to determine the impact on neighbours when the height plane is broken.

LEGEND

- 10M HEIGHT PLANE
- 8.5M HEIGHT PLANE
- EXISTING GROUND PLANE





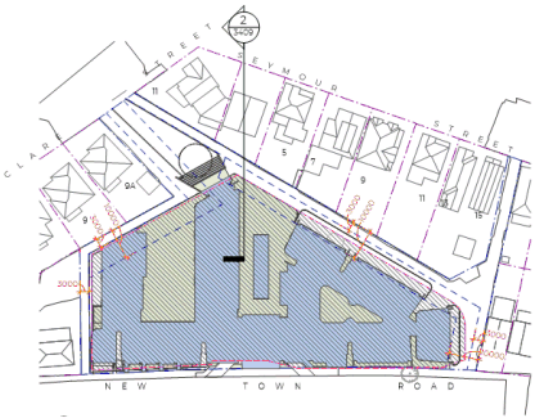
Neighbouring Section | 9A Clare Street | Scale 1:200 @ A3

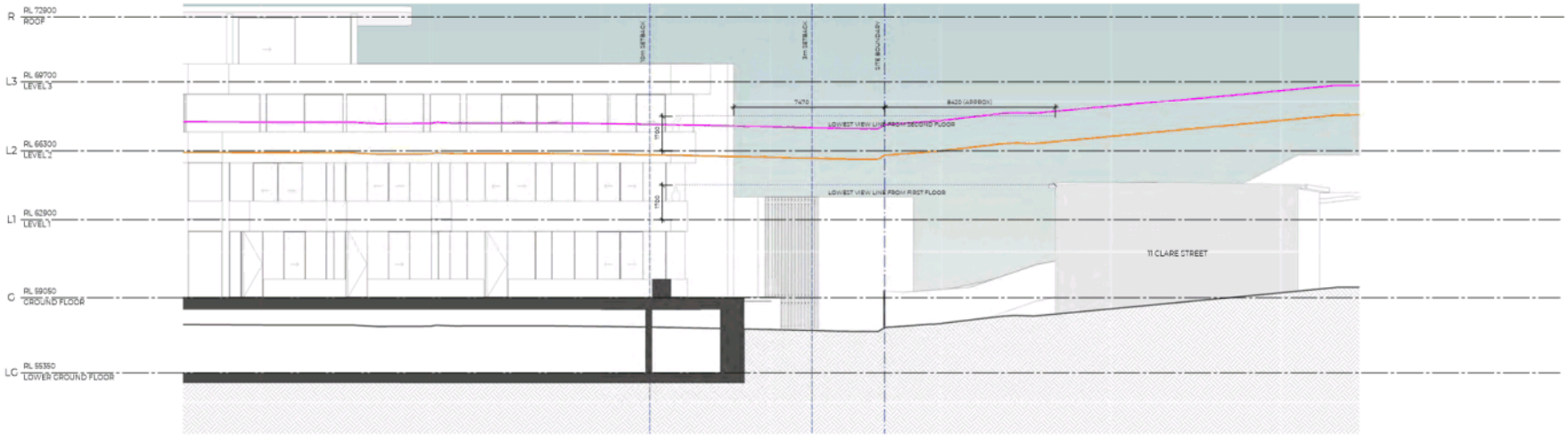
OVERLOOKING DIAGRAMS
11 Clare Street Section

Sections through the building and it's surrounding neighbours have been completed to analyse the overshadowing and overlooking impact of the design on it's surrounds. The impact has been compared with the 10m and 8.5m height plane constraint to determine the impact on neighbours when the height plane is broken.

LEGEND

- 10M HEIGHT PLANE
- 8.5M HEIGHT PLANE
- EXISTING GROUND PLANE





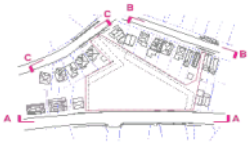
Neighbouring Section | 11 Clare Street | Scale 1:200 @ A3

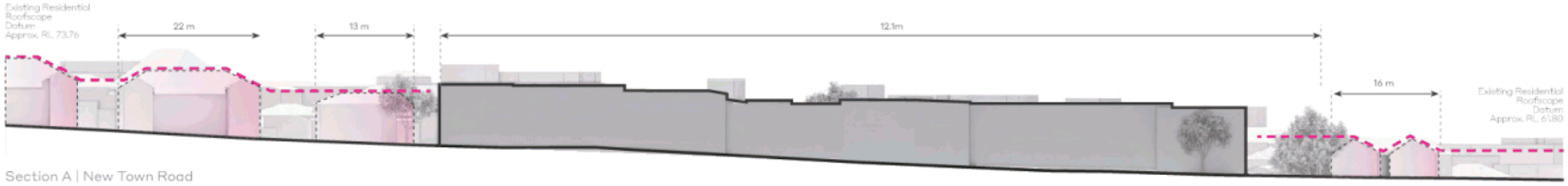
SITE DEVELOPMENT HISTORY
Approved Hospital DA

Elevational analysis has been completed on the previously approved scheme to compare its impact with the proposed design. Where possible the building has been designed to improve-on or retain the impact this scheme had on the streetscape.

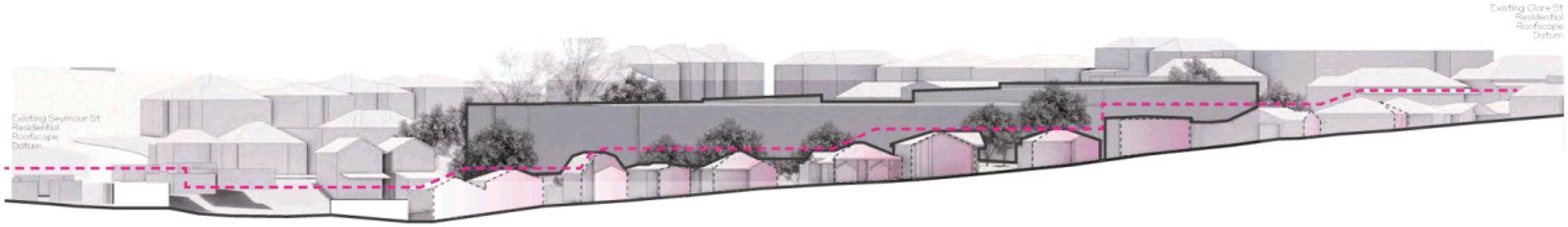
Key:

- Existing Roofscape
- Hospital DA

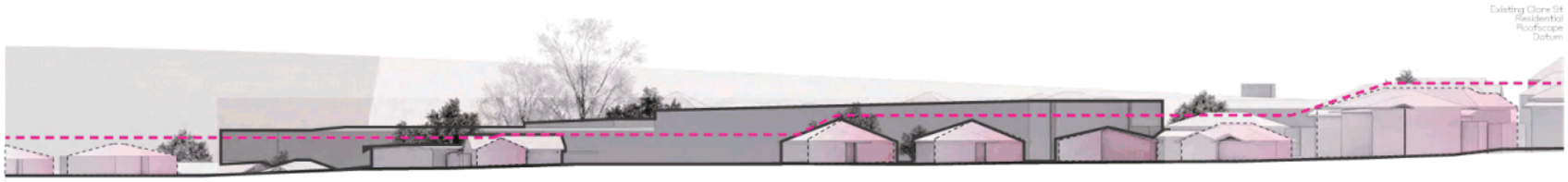




Section A | New Town Road



Section B | Seymour St



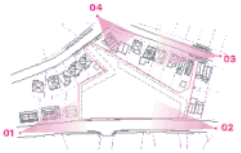
Section C | Clare Street

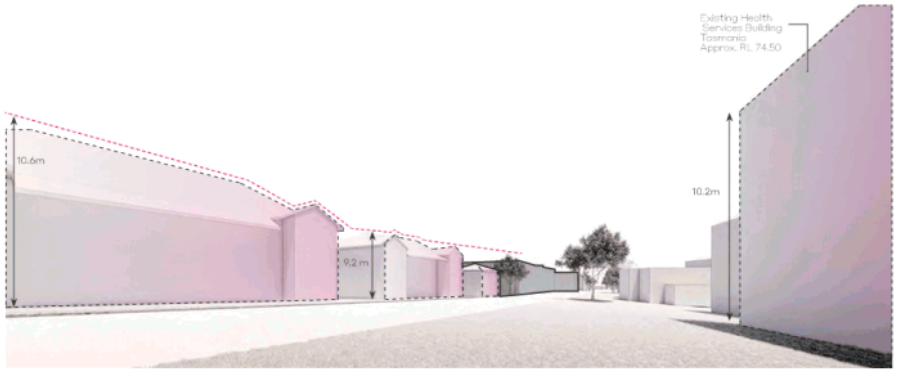
SITE DEVELOPMENT HISTORY
Approved Hospital DA

Further perspective studies have been completed on the previously approved scheme to compare its impact with the proposed design. Where possible the building has been designed to improve-on or retain the impact this scheme had on the streetscape.

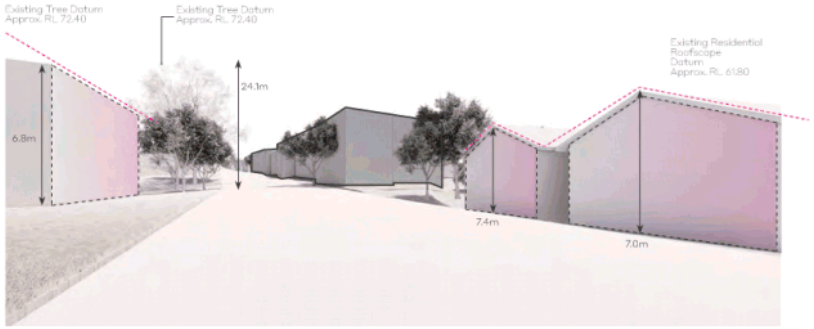
Key:

- Existing Roofscape
- Hospital DA

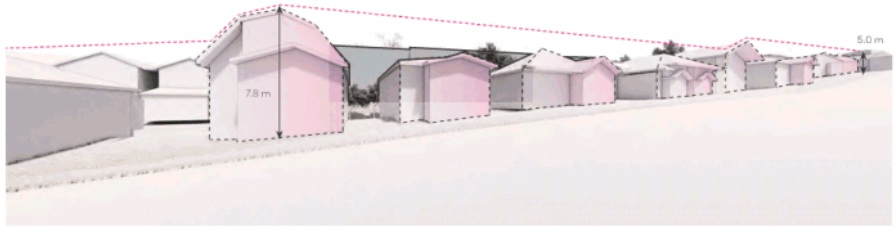




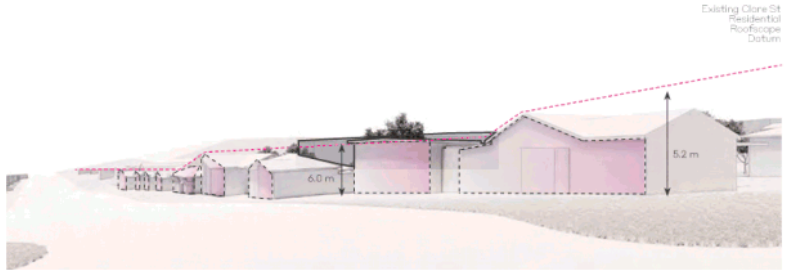
View 01 | New Town Road



View 02 | New Town Road

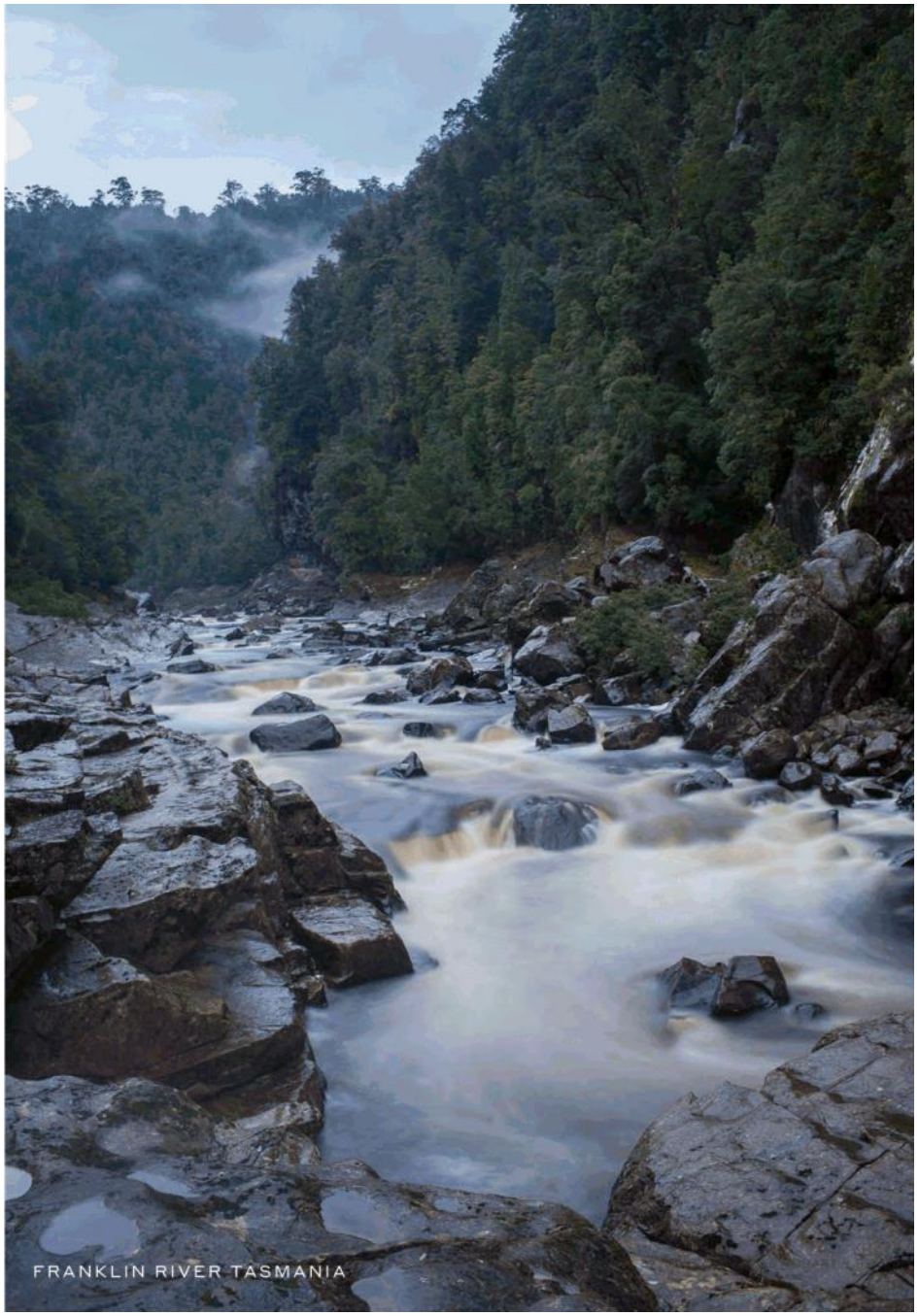


View 03 | Seymour Street



View 04 | Seymour/Clare Street

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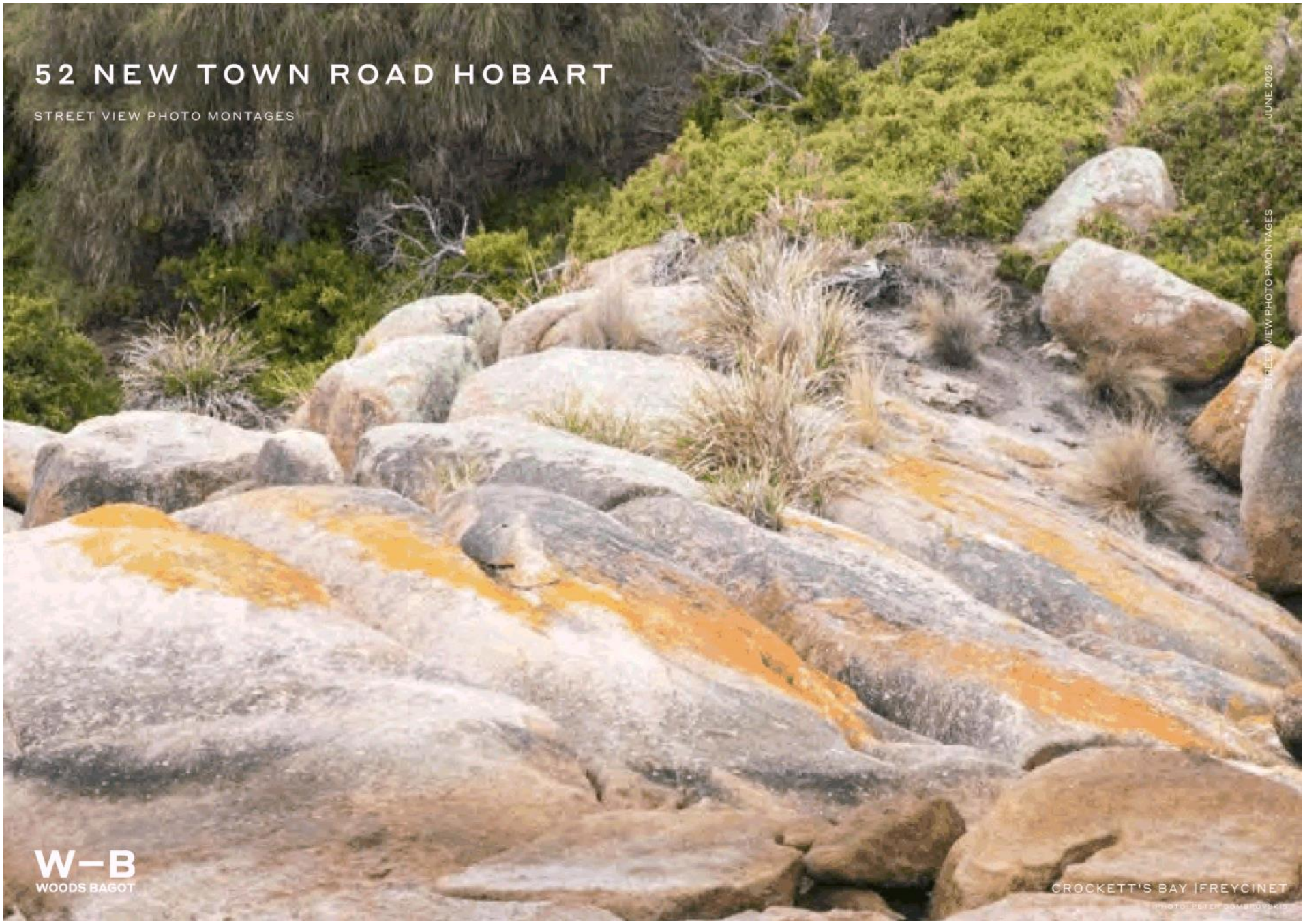
52 NEW TOWN ROAD HOBART
STREET VIEW PHOTO MONTAGES
JUNE 2025
STREET VIEW PHOTO PMONTAGES
W–B
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CROCKETT'S BAY | FREYCINET

VIEW MONTAGE

View 01 - 61 New Town Rd



Qualification for view montage:

View impact montages have been prepared by Woods Bagot to illustrate the likely visual outcome of the proposed development from selected public vantage points.

Modelling of the proposal with relation to existing site and context conditions is based on supplied survey information prepared by PDA (53851MD received at 6th December, 2024) and best available public site information at the time of submission. Woods Bagot makes every effort to accurately locate the proposal depicted with existing conditions, however the accuracy of these montages is dependent on survey data and base information supplied by others. Woods Bagot cannot be held liable for any inaccuracy or incompleteness in supplied third-party information.

Background photographs for these view impact montages supplied to Woods Bagot were taken by a third party using an unspecified camera and lens. Accordingly, while reasonable care has been taken to match scale, perspective, and positioning of the proposal with the photography provided, some variation may occur due to properties of the photograph, camera and lens.

These montages are intended to serve as indicative representations only. They should be viewed as interpretive tools to assist in understanding the visual relationship between the proposed development and its surrounding context, rather than as exact simulations.



VIEW MONTAGE

View 02 - 10 Seymour St



Qualification for view montage:

View impact montages have been prepared by Woods Bagot to illustrate the likely visual outcome of the proposed development from selected public vantage points.

Modelling of the proposal with relation to existing site and context conditions is based on supplied survey information prepared by PDA (53851MD) received at 6th December, 2024) and best available public site information at the time of submission. Woods Bagot makes every effort to accurately locate the proposal depicted with existing conditions, however the accuracy of these montages is dependent on survey data and base information supplied by others. Woods Bagot cannot be held liable for any inaccuracy or incompleteness in supplied third-party information.

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VIEW MONTAGE

View 03 - 2 Seymour St



Qualification for view montage:

View impact montages have been prepared by Woods Bagot to illustrate the likely visual outcome of the proposed development from selected public vantage points.

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VIEW MONTAGE

View 04 - 45 Newtown Rd



Qualification for view montage:

View impact montages have been prepared by Woods Bagot to illustrate the likely visual outcome of the proposed development from selected public vantage points.

Modelling of the proposal with relation to existing site and context conditions is based on supplied survey information prepared by PDA (53851MD) received at 6th December, 2024) and best available public site information at the time of submission. Woods Bagot makes every effort to accurately locate the proposal depicted with existing conditions, however the accuracy of these montages is dependent on survey data and base information supplied by others. Woods Bagot cannot be held liable for any inaccuracy or incompleteness in supplied third-party information.

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VIEW MONTAGE

View 05 - 16 Clare St



Qualification for view montage:
View impact montages have been prepared by Woods Bagot to illustrate the likely visual outcome of the proposed development from selected public vantage points.

Modelling of the proposal with relation to existing site and context conditions is based on supplied survey information prepared by PDA (53851MD received at 6th December, 2024) and best available public site information at the time of submission. Woods Bagot makes every effort to accurately locate the proposal depicted with existing conditions, however the accuracy of these montages is dependent on survey data and base information supplied by others. Woods Bagot cannot be held liable for any inaccuracy or incompleteness in supplied third-party information.

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VIEW MONTAGE

View 06 - Warragul Ave



Qualification for view montage:

View impact montages have been prepared by Woods Bagot to illustrate the likely visual outcome of the proposed development from selected public vantage points.

Modelling of the proposal with relation to existing site and context conditions is based on supplied survey information prepared by PDA (53851MD received at 6th December, 2024) and best available public site information at the time of submission. Woods Bagot makes every effort to accurately locate the proposal depicted with existing conditions, however the accuracy of these montages is dependent on survey data and base information supplied by others. Woods Bagot cannot be held liable for any inaccuracy or incompleteness in supplied third-party information.

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48-52 NEW TOWN ROAD, NEW TOWN

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48-52 NEW TOWN ROAD, NEW TOWN

Planning Report - Multiple Dwellings, Visitor Accommodation, Food Services, Business and Professional Services and Sport and Recreation

Last Updated - 23/09/2025
Author - Kate Heckelmann
Reviewed - Phil Gartrell

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CONTENTS

1. INTRODUCTION 4

1.1 THE SITE 4
1.1.1 INFRASTRUCTURE 7
1.1.2 EXCAVATION 7
1.2 EXISTING USE AND PREVIOUSLY APPROVED DEVELOPMENT 7
1.3 SITE SURROUNDS 7

2. PROPOSAL 9

2.1.1 LOWER GROUND FLOOR 9
2.1.2 GROUND FLOOR 9
2.1.3 LEVEL 1 10
2.1.4 LEVEL 2 10
2.1.5 LEVEL 3 10
2.2 USE CLASSIFICATION 12

3. PLANNING SCHEME PROVISIONS 14

3.1 INNER RESIDENTIAL ZONE 14
3.2 URBAN MIXED USE ZONE 15
3.2.1 ZONE PURPOSE 15
3.2.2 LOCAL AREA OBJECTIVES OR DESIRED FUTURE CHARACTERISTICS 17
3.2.3 USE STANDARDS 17
3.2.4 DEVELOPMENT STANDARDS 20

4. CODES 44

4.1 POTENTIALLY CONTAMINATED LAND CODE 44
4.1.1 USE STANDARDS 44
4.1.2 DEVELOPMENT STANDARDS 45
4.2 ROAD AND RAILWAY ASSETS CODE 46
4.2.1 USE STANDARDS 46
4.2.2 DEVELOPMENT STANDARDS 47
4.3 PARKING AND ACCESS CODE 49
4.3.1 USE STANDARDS 49
4.3.2 DEVELOPMENT STANDARDS 53
4.4 STORMWATER MANAGEMENT CODE 63
4.4.1 DEVELOPMENT STANDARDS 63
4.5 HISTORIC HERITAGE CODE 64
4.6 INUNDATION PRONE AREAS CODE 66
4.6.1 DEVELOPMENT STANDARDS 66

5. SUMMARY 68

1. INTRODUCTION

This report forms part of the planning application for use and development in accordance with the requirements of the *Hobart Interim Planning Scheme 2015* relating to land at 48-52 New Town Road, New Town.

The application seeks approval to redevelop a vacant site to provide for mixed use a residential development that will incorporate multiple dwellings, visitor accommodation, café and a commercial component for a wellbeing centre and consulting rooms.

The following is an assessment of the proposed use in response to the provisions of the *Hobart Interim Planning Scheme (2015)* and has been prepared in accordance with the requirements of the *Land Use Planning Approvals Act 1993*.

The assessment is based on the following documentation, which forms part of the permit application:

- Architectural plans and supporting Design report prepared by Woods Bagot
- Landscaping Concept Plans prepared by Paul Bangay Garden Design
- Traffic Impact Assessment (TIA) prepared by Midson Traffic
- Concept Civil Engineering Design drawings prepared by PDA
- Storm Water Management and Flood Hazard Report prepared by PDA
- Environmental Site Assessment prepared by Geo-Environmental Solutions (GES)
- Contamination Management Plan prepared by GES.

1.1 THE SITE

The subject site is comprised of CT 252465/1 and CT 198029/1 and is addressed as 48-52 New Town Road, New Town, shown in Figure 1 and Figure 2.

Figure 3 illustrates the location of the site and identifies neighbouring sites which are also to be included in the application due to service works, as detailed in the accompanying documentation at:

- 46 New Town Road (CT 76403/1)
- 7A Clare Street (CT 71337/3)
- 9 Clare Street (CT 71337/2)
- 9A Clare Street (CT 71337/1)
- 11 Clare Street (CT 222085/6 and CT 94370/5)
- 5 Seymour Street (CT 94370/4)
- 7 Seymour Street (CT 94370/3)
- 9 Seymour Street (CT 94370/2)
- 11 Seymour Street (CT 94370/1)
- 13 Seymour Street (CT 197174/1)

- 15 Seymour Street (CT 199071/1)



Figure 1: New Town Road site identified in aerial map (source: the State of Tasmania www.theLIST.tas.gov.au)



Figure 2: Topographic map with the site location (purple) and adjoining properties forming part of the application (blue) (source: the State of Tasmania www.theLIST.tas.gov.au)



Figure 3: New Town Road site frontage viewed looking north along New Town Road (source: Ireneinc 2024)

The site is situated between New Town Road and Clare Street and has a total site area of 8,031m^2, and has a slope approximately 3 degrees downhill to the north, with elevation of the site varying between RL 60.3 to the southeast, RL 51.0 to the north-west and RL 56.2 to the north, illustrating a near 10m fall from the south east to the north west corner of the site.

The Geo-Tech Report identifies that these site undulations are a result of fill which occurred during the reconstruction and upgrade of New Town Road.

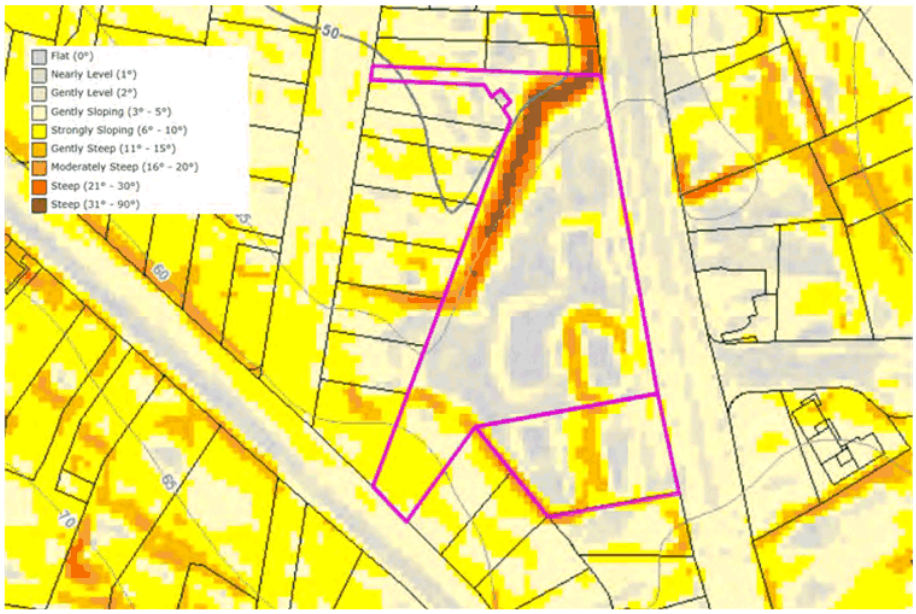


Figure 4: New Town Road site identified in slope in degrees and 5m contour mapping layers (source: www.thelist.tas.gov.au © State Government of Tasmania)

1.1.1 INFRASTRUCTURE

The site is serviced by reticulated sewer and water services. Two sewer pipes cross the site and will require relocation due to excavation works. Gas and electrical conduits within the New Town Road reserve will also require rerouting, together with upgrades to existing stormwater infrastructure.

Detailed information on these works are provided in the accompanying civil documentation supplied for Council Landowner Consent and with this application.

1.1.2 EXCAVATION

The proposal will involve the excavation of large volumes of fill from the site which will remove most of the contaminated material at site.

Schedule 2 of the *Environmental Management & Pollution Control Act 1993* (EMPCA) no longer requires developments exceeding 5000m^3 of excavation to be referred to the EPA. The proposed excavation and site contamination will be assessed by Hobart City Council under the Potentially Contaminated Land Code.

An Environmental Site Assessment and Contamination Management Plan have been prepared and attached.

1.2 EXISTING USE AND PREVIOUSLY APPROVED DEVELOPMENT

The subject site was formerly used as the offices and television studios for WIN Television, and more recently as office, storage, workshop and warehouse for electrical repairs provider, Contact Group.

The site is currently vacant with all previous buildings having been demolished in accordance with an existing development approval for a medical centre (private hospital), which included operating theatres, overnight wards and allied health tenancies (PLN-20-795).

Undercover carparking was to be provided in the basement and on the ground floor, which was also to accommodate a cafe and the primary public entrance. The first level provided for medical related tenancies to support hospital patients and outpatients, with the second level featuring the private hospital with surgery theatres, wards, nurse stations, rehabilitation areas, pre-operation bays and a courtyard. That proposal included a total of just over GFA 20,000m2 (which excludes balconies and courtyards) and included a total of 248 car parking spaces. Several design iterations were considered through the application process, including a notable reduction in height and overall massing to mitigate potential impacts on neighbouring residential properties.

This proposal seeks to replace the existing approval.

1.3 SITE SURROUNDS

The site is adjoining predominately residential single and multiple dwellings to the north-west and south-west. The residential area to the west and south-west is designated a Heritage Precinct, characterised by narrow lots with buildings generally built close to side and front boundaries. The site is located at the end of a grouping of Urban Mixed Use zoned land to the

south, which is largely located along New Town Road, but also includes one property to the north of the existing access to the site from Clare Street, as well as extending along Wilson and Archer Streets, which includes the Oral Health Services Tasmania Southern Campus, a large pharmacy, dental practice, dental imaging, GP practice, radiology and a variety of other health services including Calvary Hospital, located approximately 740m west of the site (by road), along Augusta Road.

The site is also well serviced by nearby retail activities, including the Hill Street grocery, a bottle shop and bakery within 200m. The site is also within 250m of the Friends School, along with a variety of recreational facilities. Being located on New Town Road, the site is well serviced by public transport with a bus stop located to east of the site, providing access to high frequency bus services 7 days a week.

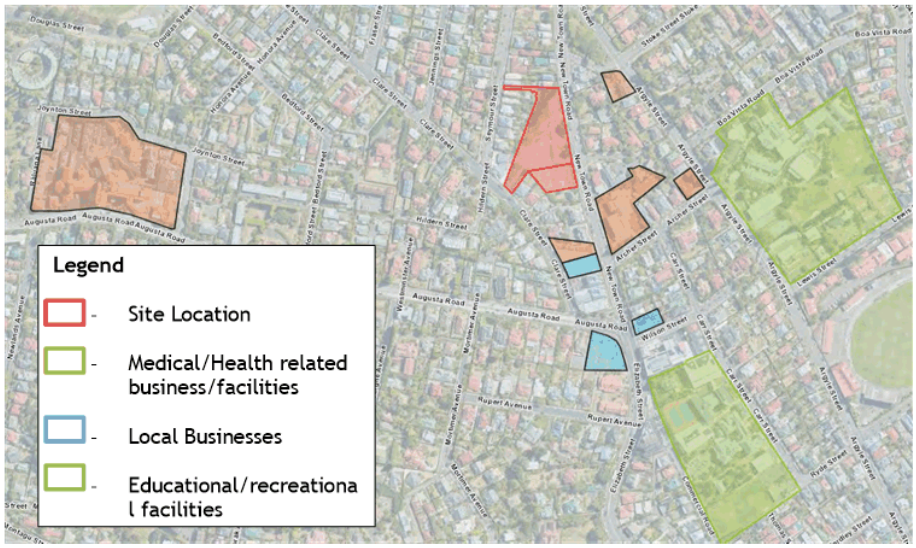


Figure 5: Surrounding commercial and other activities (www.thelist.tas.gov.au © State Government of Tasmania)

2. PROPOSAL

The proposal is for a mixed use development involving 23 multiple dwellings and 38 visitor accommodation units which will be supported by a wide array of communal activities including a variety of recreational areas, green pavilions and gardens for use by the residents and visitors.

The proposal also includes a café on the ground floor and a consulting room area and wellness centre facilities on the lower ground floor which will be accessible to the public and the residents, noting that these activities are intended operate as commercial tenancies. The short-term visitor accommodation is located in the two southernmost wings of the proposal, excluding the penthouse, which is provided as a residential dwelling.

Significant recreational areas are provided including green pavilions and landscaped gardens.

The building extends across three articulated wings, each divided by green elements of the building including the village green, greenhouse pavilion/gardens and green atrium. The proposed built form extends across a total of five (5) levels, with the lower-ground floor sitting predominately below street level.

At the primary frontage along New Town Road, the proposal presents a three to four storey form which steps down in height in response to the change in topography. As a result, a portion of the lower-ground floor level will be visible along the north-eastern corner of the site. This is similarly the case along the rear western elevation and south-western elevations.

A detailed breakdown of the proposal across each level is outlined below.

2.1 LOWER GROUND FLOOR

- The southern end of this level will cater for on-site parking (67 x car parking spaces, including 2 x DDA spaces) 4 x motorcycle parking spaces, at least 30 bicycle parking spaces and services infrastructure, including fire tanks, pumping system and stairwells and lifts to the upper floors as well as ramp access to the basement from New Town Road. It is intended that the lower ground floor parking will be assigned for the residential and short-stay accommodation uses.
- The northern end of this level will include a wellness centre including pool, sauna, steam/infrared rooms, dedicated recreation, gym/fitness areas and a multipurpose room that form the wellness centre and consulting rooms which will operate as commercial tenancies; and
- Atrium (which extends through all floors).

2.2 GROUND FLOOR

This floor provides the primary pedestrian entrance to the building from New Town Road, along with a port cochere (3 x car parking spaces) and building reception, along with the following:

- 8 x residential apartments, comprised of:
  - 5 x standard 1-bedroom apartments
  - 2 x 2-bedroom apartments
  - 2 x 3-bedroom apartments
- 10 x short term accommodation units, comprised of:

- 8 x 1-bedroom studio apartments
- 2 x standard 1-bedroom apartments

- Communal open space and village green
- Café (137m^2) which will be open to the public
- Green pavilion; and
- Atrium

This level will also provide vehicle access via a ramp from New Town Road and Clare St servicing/loading access.

2.3 LEVEL 1

This level provides:

- 10 x residential apartments, comprised of:
  - 6 x standard 1-bedroom apartments
  - 3 x standard 2-bedroom apartments
  - 1 x 3-bedroom apartments
- 15 x short term accommodation units, comprised of:
  - 12 x 1-bedroom studio apartments
  - 3 x standard 1-bedroom apartments
- A communal resident's pavilion area
- 2 hot water plants
- Atrium
- Roof garden.

2.4 LEVEL 2

This level provides:

- 5 x residential apartments, comprised of:
  - 3 x standard 2-bedroom apartments
  - 1 x standard 3-bedroom apartments
  - 2 x 3-bedroom apartments (including the first level of the two-storey penthouse)
- 10 x short term accommodation units, comprised of:
  - 8 x 1-bedroom studio apartments
  - 2 x standard 1-bedroom apartments
- Mechanical and plant rooms
- Atrium.

2.5 LEVEL 3

This level will provide:

- The 2nd level of the penthouse apartment which has its first level on Level 2.
- 3 x short term accommodation units, comprised of:
  - 3 x standard 1-bedroom apartments
- Mechanical plant
- Atrium.

The following provides an overview of the proposed break down of units on each level.

Level	Residential	Short term Accommodation	Total Units
Ground Floor	**8 units** (5x 1 bed; 2x 2bed; 1x3bed)	10 units	18
Level 1	**10 units** (6x 1 bed; 3x 2bed; 1x3bed)	15 units	25
Level 2	**5 units** (3x 2bed; 1x3bed; 1 x penthouse)	10 units	15
Level 3	0	3 units	3
Total	**23**	**38**	**61**

The pedestrian entry and forecourt area has been designed to provide effective pedestrian navigation throughout the site providing for particularly in differentiating elements of the development and their access points including the short stay, the café and the residential uses in the northern portion of the site.

Access throughout the building is provided via 5 lift wells and 4 stairwells. An additional service lift is provided from the Lower Ground Floor level to the ground level service/loading hardstand area on the south-western corner of the proposal.

Primary vehicular access to the site will be from New Town Road via an access driveway on the southeastern corner of the site. The Clare Street frontage will provide service vehicle access to the site with a service/loading area that will provide for vehicle turning.

Landscaping is to be implemented across all elevations to improve streetscape interpretation and visual amenity for adjoining residences when viewed from Clare Street and Seymour Street. Landscaping also forms an integral part of the internal operation and amenity of the building through the communal village gardens/the greenhouse pavilion, rooftop gardens and atrium which extends through all levels of the development.

The proposal also requires works within the New Town Road Reservation and footpath, along with minor modifications to the Clare Street crossover. These works include modifications and upgrades to existing stormwater and sewer infrastructure, as detailed in the accompanying civil documentation, which will also require works within the adjoining properties at 46 and 54 New Town Road and 7A and 9 Clare Street.

Council landowner consent has been obtained and forms part of the accompanying documentation and notification about the application to the above identified adjoining properties will be undertaken at lodgement of the application.



Figure 6: Artists impression of the proposal, when viewed along New Town Road. (Source: Woods Bagot)

2.6 USE CLASSIFICATION

The following use classes and definitions are relevant to the uses proposed within the Urban Mixed Use Zone.

Multiple dwellings

This proposal involves residential uses for which Multiple Dwellings represents the best-fit use for categorisation of this use under the planning scheme.

Multiple dwellings are defined by the planning scheme as *where there are 2 or more dwellings on a site*.

Multiple dwellings are categorised within the Residential Use class within the planning schemes which is defined as:

> *use of land for self-contained or shared living accommodation. Examples include an ancillary dwelling, boarding house, communal residence, home-based business, hostel, residential aged care home, residential college, respite centre, retirement village, single or multiple dwellings, and a display home.*

Under the planning scheme, Residential Use is a permitted use within the Urban Mixed Use Zone.

Visitor accommodation (Short-term accommodation)

The proposal involves visitor accommodation in the southern portion of the proposal for 38 of the proposed units. Under *Planning Directive No. 6 Exemption and Standards for Visitor Accommodation in Planning Schemes* which is applicable in place of the planning schemes definition, visitor accommodation means:

> *use of land for providing short or medium-term accommodation for persons away from their normal place of residence on a commercial basis or otherwise available to the general public*

at no cost. Examples include a backpackers hostel, camping and caravan park, holiday cabin, motel, overnight camping area, residential hotel and serviced apartment complex.

Under the Urban Mixed-Use Zone in the planning scheme, Visitor Accommodation is a discretionary use where self-contained accommodation located on the same site as a dwelling providing long term residential accommodation, only if it has a separate ground level pedestrian access to a road or the site is mixed use. The proposal involves a mixed use development so is considered to be discretionary.

Food services (Café)

The proposal will also include a ground floor café that unlike other facilities on the site will not be limited to servicing the residents and will be accessible by the public.

The café component of the proposal is categorised under the planning scheme within the Food Services Use Class which is defined as:

> *use of land for preparing or selling food or drink for consumption on or off the premises. Examples include a cafe, restaurant and take-away food premises.*

Under the planning scheme Food Services uses (where not involving a drive through facility) are categorised as permitted within the Urban Mixed Use Zone.

Business and Professional Services (Consulting Rooms)

The lower ground floor includes a commercial tenancy for a health-related consulting. This falls under the Business and Professional Services classification (consulting rooms), which are defined as follows:

> *use of land for administration, clerical, technical, professional or similar activities. Examples include a bank, call centre, consulting room, funeral parlour, medical centre, office, post office, real estate agency, travel agency and veterinary centre.*

Consulting room is separately defined as follows:

> *means use of land by a registered practitioner of any therapeutic art or science, other than service provided by a medical centre.*

These uses are permitted within the Urban Mixed Use Zone with no qualification.

Sport and Recreation (Wellness centre)

In addition to the consulting rooms, the lower ground floor includes a wellness centre component, for which exact operating arrangements are yet to be confirmed, however it is acknowledged that predominant elements of this component are best categorised as Sport and Recreation classification (wellness centre) which are defined as follows:

> *use of land for organised or competitive recreation or sporting purposes including associated clubrooms. Examples include a bowling alley, fitness centre, firing range, golf course or driving range, gymnasium, outdoor recreation facility, public swimming pool, race course and sports ground.*

These uses are discretionary within the Urban Mixed Use Zone.

3. PLANNING SCHEME PROVISIONS

The area is within the *Hobart Interim Planning Scheme 2015*, the following provisions are relevant to the site and proposed use and development.

3.1 INNER RESIDENTIAL ZONE

The subject land is primarily zoned Urban Mixed Use (grey), and adjoins Inner Residential land to the north, east and west (dark red), along with the Utilities Zone which covers the road corridor.



Figure 7: New Town Road site identified within the Urban Mixed Use and Inner Residential Zones in Interim Planning Scheme (source: State of Tasmania www.theLIST.tas.gov.au)

As indicated in the figure above, a small portion of the north-western part of the site which provides an access to Seymour Street is zoned Inner Residential consistent with the adjoining land.

This area forms part of an existing vehicle/pedestrian Right of Way for properties along Seymour Street and the rear of 54 New Town Road. No buildings are proposed within this area and the only works required will be minor infrastructure works as outlined in the accompanying civil documentation.

As detailed in section 2 of this report, these works would fall under the provision of utilities, which is a no permit required use within the zone, if for minor utilities.

The use and development standards in the zone are not relevant to infrastructure works.

3.2 URBAN MIXED USE ZONE

The subject land is primarily zoned Urban Mixed Use (grey). The land along New Town Road to the south is similarly zoned. The site is surrounded on the north, eastern and western aspect by the Inner Residential Zoning (dark red). New Town Road itself is zoned Utilities (yellow).



Figure 8: Zoning (Source: www.thelist.tas.gov.au © State Government of Tasmania)

3.2.1 ZONE PURPOSE

The Purpose Statements for the zone are as follows, along with specific responses:

15.1.1.1 To provide for integration of residential, retail, community services and commercial activities in urban locations.

The proposal is for a residential development, short-term accommodation, café and consulting rooms and wellness centre. In the context of the surrounding urban mixed use zoned land, this proposal will integrate residential uses with surrounding retail, commercial and wellbeing service to reinforce the mix of uses and activities within the surrounding area.

15.1.1.2 To encourage use and development at street level that generates activity and pedestrian movement through the area.

The primary frontage and façade of the building faces New Town Road and has been designed to provide a high level of pedestrian amenity. This has been achieved by incorporating a clearly identifiable public access point to the site, landscaping and articulation of the facade ensuring safe and efficient access along the footpath to and beyond the building.

15.1.1.3 To provide for design that maximises the amenity at street level including considerations of microclimate, lighting, safety, and pedestrian connectivity.

The primary frontage and façade of the building faces New Town Road and has been designed to provide a high level of pedestrian amenity. This has been achieved by incorporating a clearly identifiable public access point to the site, landscaping and articulation of the facade ensuring safe and efficient access along the footpath to and beyond the building.

15.1.1.4 To ensure that commercial use are consistent with the activity centre hierarchy.

The proposal involves predominantly residential uses, short term accommodation uses with a café and commercial component, the proposal does not compete with the CBD functions of centralised regional services.

15.1.1.5 To ensure development is accessible by public transport, walking and cycling.

The site fronts New Town Road which provides direct access to existing high frequency public transport services. The location of the site and topography ensures the building is readily accessible by other forms of transport such as walking and bicycles. The development will present residents with walkable access to a wide variety of services and retail activities which exist within a 500m radius of the site.

15.1.1.6 To provide for a diversity of uses at densities responsive to the character of streetscapes, historic areas and buildings and which do not compromise the amenity of surrounding residential areas.

The proposal is intentionally located in an area of New Town which will provide residents with close access to services and shopping as well as active transport opportunities - direct connections to CBD, ensuring ease of access to various medical treatments and associated services.

the proposed building has been designed to ensure the bulk and scale of the building is well articulated in relation to height and setbacks to ensure minimal impact on surrounding residential areas together with an improvement in pedestrian and public amenity.

15.1.1.7 To encourage the retention of existing residential uses and the greater use of underutilised sites as well as the reuse and adaptation of existing buildings for uses with a scale appropriate to the site and area.

This proposal represents a significant opportunity to provide greater use of a currently underutilised site for residential uses which will complement the surrounding mix of uses and activities occurring within the vicinity of the site.

15.1.1.8 To ensure that the proportions, materials, openings and decoration of building facades contribute positively to the streetscape and reinforce the built environment of the area in which the site is situated.

The design of the building and materials have been selected to provide a contemporary building which responds to both the operational and functional needs of the site as well as providing an attractive building form that respects the nature of the surrounding area, being a mix of commercial and residential use. The proposal incorporates building facades which have designed to positively contribute to the streetscape through its incorporation of significant landscaping features.

15.1.1.9 To maintain an appropriate level of amenity for residential uses without unreasonable restriction or constraint on the nature and hours of commercial activities.

The food services and commercial components of this proposal will be well integrated with the residential uses and will positively contribute to the amenity of the residential uses on site.

15.1.1.10 To ensure that retail shopping strips do not develop along major arterial roads within the zone.

The proposal does not incorporate any retail shopping strips.

The proposal is considered to be consistent with and positively contribute to furthering the Purpose Statements for the Zone.

3.2.2 Local Area Objectives or Desired Future Characteristics

There are no Local Area Objectives or Desired Future Characteristics for this zone.

3.2.3 Use Standards

15.3.1 Non-Residential Use
Objective: *To ensure that non-residential use does not unreasonably impact residential amenity.*
SCHEME REQUIREMENTS
A1 *Hours of operation must be within:* • *7.00 am to 9.00 pm Mondays to Fridays inclusive;* • *8.00 am to 6.00 pm Saturdays;* • *9.00 am to 5.00 pm Sundays and Public Holidays;* *except for office and administrative tasks or visitor accommodation.* *P1* *Hours of operation must not have an unreasonable impact upon the residential amenity through commercial vehicle movements, noise or other emissions that are unreasonable in their timing, duration or extent.*

RESPONSE
A1 - Complies The proposed food services use (café), business and professional service use (consulting rooms) and sport and recreation use (wellness centre) will not operate commercially beyond: • *7.00 am to 9.00 pm Mondays to Fridays inclusive;* • *8.00 am to 6.00 pm Saturdays;* • *9.00 am to 5.00 pm Sundays and Public Holidays.*
A2 *Noise emissions measured at the boundary of a residential zone must not exceed the following:* *(a) 55dB(A) (LAeq) between the hours of 8.00 am to 6.00 pm;* *(b) 5dB(A) above the background (LA90) level or 40dB(A) (LAeq), whichever is the lower, between the hours of 6.00 pm to 8.00 am;* *(c) 65dB(A) (LAmax) at any time.* *Measurement of noise levels must be in accordance with the methods in the Tasmanian Noise Measurement Procedures Manual, issued by the Director of Environmental Management, including adjustment of noise levels for tonality and impulsiveness.* *Noise levels are to be averaged over a 15 minute time interval.* *P2* *Noise emissions measured at the boundary of the site must not cause environmental harm.*
RESPONSE
A2 - Complies A noise impact assessment prepared by NVC demonstrates that, subject to adoption of the recommendations relating to acoustic noise controls identified in section 7 of the NVC report, the proposal satisfies the outcomes sought by A2.
A3 *External lighting must comply with all of the following:* *(a) be turned off between 10:00 pm and 6:00 am, except for security lighting;* *(b) security lighting must be baffled to ensure they do not cause emission of light into adjoining private land.* *P3* *External lighting must not adversely affect existing or future residential amenity, having regard to all of the following:* *(a) level of illumination and duration of lighting;*

(b) distance to habitable rooms in an adjacent dwelling.
RESPONSE
A3 - will comply The proposed food services use (café), business and professional service use (consulting rooms) and sport and recreation use (wellness centre) will ensure that lights are turned off between 10:00 pm and 6:00 am and that any security lighting would not emit light into adjoining private land.
A4 *Commercial vehicle movements, (including loading and unloading and garbage removal) to or from a site must be limited to within the hours of:* *(a) 7.00 am to 5.00 pm Mondays to Fridays inclusive;* *(b) 8.00 am to 5.00 pm Saturdays;* *(c) 9.00 am to 12 noon Sundays and Public Holidays.* *P4* *Commercial vehicle movements, (including loading and unloading and garbage removal) must not result in unreasonable adverse impact upon residential amenity having regard to all of the following:* *(a) the time and duration of commercial vehicle movements;* *(b) the number and frequency of commercial vehicle movements;* *(c) the size of commercial vehicles involved;* *(d) the ability of the site to accommodate commercial vehicle turning movements, including the amount of reversing (including associated warning noise);* *(e) noise reducing structures between vehicle movement areas and dwellings;* *(f) the level of traffic on the road;* *(g) the potential for conflicts with other traffic.*
RESPONSE
A4 - will comply The proposed food services use (café), business and professional service use (consulting rooms) and sport and recreation use (wellness centre) component will ensure commercial vehicle movements, (including loading and unloading and garbage removal) to or from a site must be limited to within the hours of: • *7.00 am to 5.00 pm Mondays to Fridays inclusive;* • *8.00 am to 5.00 pm Saturdays;* • *9.00 am to 12 noon Sundays and Public Holidays.*

3.2.4 DEVELOPMENT STANDARDS

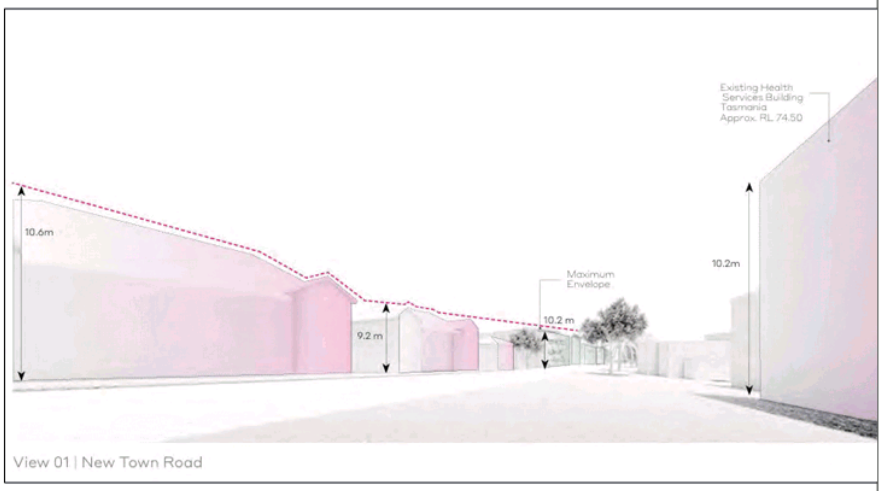
15.4.1 Building Height
Objective: *To ensure that building height contributes positively to the streetscape and does not result in unreasonable impact on residential amenity of land in the General Residential Zone or Inner Residential Zone.*
SCHEME REQUIREMENTS
A1 *Building height must be no more than: 10m* ***P1*** *Building height must satisfy all of the following:* *(a) be consistent with any Desired Future Character Statements provided for the area;* *(b) be compatible with the scale of nearby buildings;* *(c) not unreasonably overshadow adjacent public space;* *(d) allow for a transition in height between adjoining buildings, where appropriate;*
RESPONSE
P1 - Complies The proposal will result in a development which has a maximum building height ranging from 11m to 14m above natural ground level. The proposal does not comply with the acceptable solution and must be considered against the performance criteria. P1 (a) is not applicable as there are no relevant Desired Future Character Statements relating to this site. Regarding P1 (c), public space is defined in the scheme as follows: *means land for public recreation or public gardens or for similar purposes.* The site and proposed development do not directly adjoin or sit adjacent to any public space, other than the road reservation along New Town Road that may otherwise be considered a 'public space'. The accompanying shadow diagrams demonstrate that during the winter solstice (June 21st) there will be additional shadowing of the road reserve, however this is to be expected and would be the case with any new development on the site. During the summer solstice and march equinox, the extent of shadowing across New Town Road and Clare Street will be minimal and not to an extent that may be considered unreasonable. Given the above, the proposal is considered to satisfy P1(c). The following assesses the proposal against the considerations under P1(b) and (d). ***P1 (b) - Compatibility with the scale of nearby buildings*** ***P1 (d) - Transition in height between adjoining buildings***

Compatible/compatibility is not a term defined in the planning scheme, however recent case law has defined the term to mean *in harmony with or in broad correspondence*; Palmese v Hobart City Council and J Connolly [2022] TASCAT 137

New Town Road

The proposed built form ranges in height from 11m to 14m, with the highest section centred toward the middle of the site. As outlined in the architectural design report, the surrounding building context is varied, illustrating a variety of architectural styles and several neighbouring buildings with heritage significance.

Along New Town Road, the scale of nearby/adjoining buildings range between two and three storeys, with several examples of three storey buildings presenting greater scales due to changes in topography. The streetscape view below is taken approximately 45m south of the site looking north-west and includes the properties at 38-40, 42-44 and 46 New Town Road (on the same side of the street) and the existing Health Services Tasmania building (on the opposite side of the street).



View 01 | New Town Road

The following view is taken approximately 40m north-east of the site at the junction between New Town Road and Stoke Street, looking south back along New Town Road.

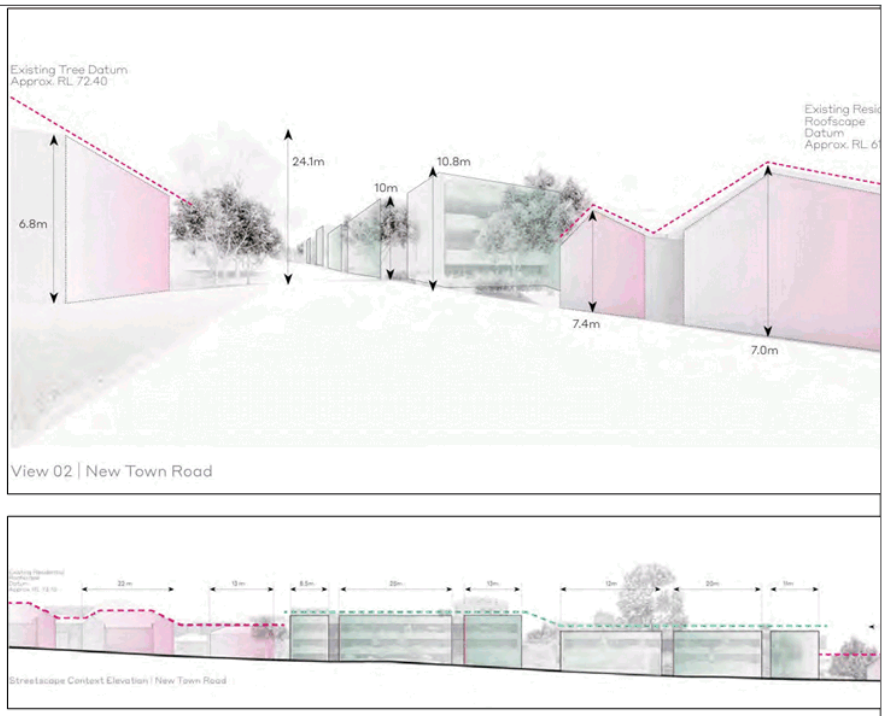


Figure 9: Existing built form along New Town Road, looking north-west toward the site and existing long-section (source: Architectural Design Report, Woods Bagot)

In response to the topography along New Town Road, a similar design approach to that approved under the previous development has been adopted. This approach incorporates a progressive reduction in height through a series of 'steps', thereby responding to the topography whilst also reducing the bulk and scale of the building.

Additional design measures have also been adopted to further reduce the horizontal massing, including breaking down the building form into smaller, more distinct rectangular forms separated by a vertical wall element. Whilst each section is connected via walkways and communal areas, this approach alleviates the horizontal bulk and mass of the building.

The following 3D axonometric impression illustrates the effect these measures have in reducing the perceived bulk, scale and massing of the proposal.

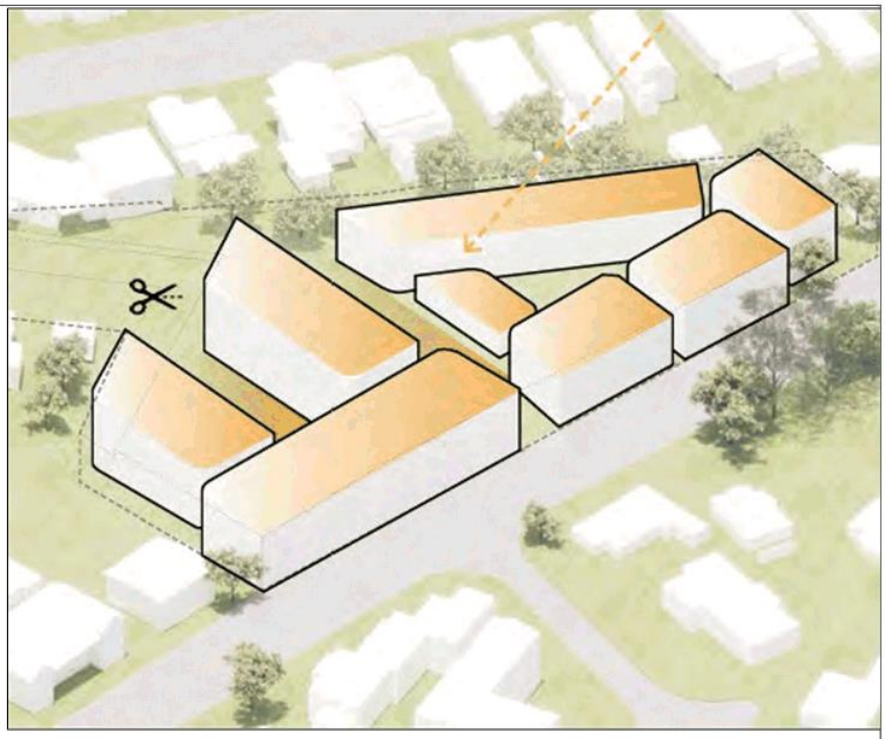


Figure 10: Bulk and massing diagram (source: Woods Bagot)

Further design measures such as recessed balconies, changes in materiality and ground floor activation (via the port cochere, resident lounge and public access to the café) also provide greater façade articulation, depth and character - as illustrated in the figure below.



Figure 11: Axonometric impression, looking north-west (source: Woods Bagot)

As a result, the building presents a height, bulk and scale that is broadly compatible with that found along both sides of New Town Road.

Seymour / Clare Street

The built form along Seymour Street and Clare Street is relatively uniform, ranging from one to two-storey residential dwellings, as illustrated in the views below.

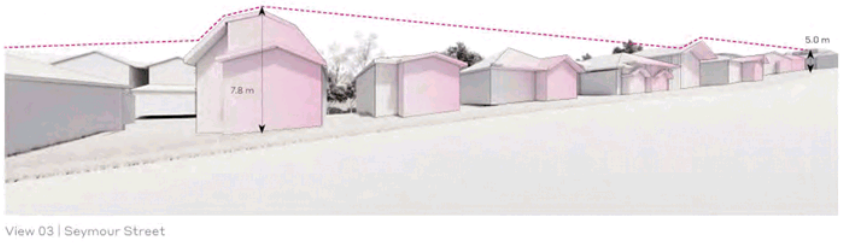


Figure 12: View 03 Seymour Street existing height plane (Source: Woods Bagot Design Report)

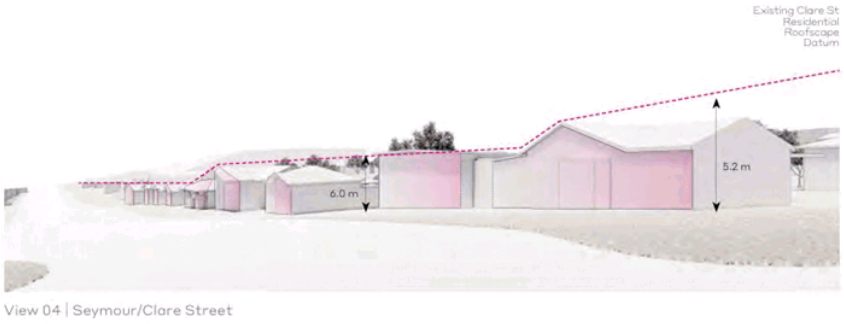


Figure 13: View 04 Seymour/Clare Street existing height plane (Source: Woods Bagot Design Report)

View 03 looks south-east along Seymour Street, whilst View 04 looks north-east along Seymour Street from the junction with Clare Street. Both demonstrate the significant topographical fall along both streets, with building heights stepping down in response.

The proposed building is setback a minimum of approximately 10m from Seymour Street boundary and is further separated by existing dwellings. As such, only a small portion of the proposed building(s) will be visible from the street.

The design presents a building form that is in broad correspondence with the height of surrounding buildings and provides setbacks of the building, particularly from the northern elevation which allow for a suitable and considered height transition to the residential properties to the west and north.

A2

Building height within 10 m of a residential zone must be no more than 8.5 m.

P2

Building height within 10 m of a residential zone must be compatible with the building height of existing buildings on adjoining lots in the residential zone.

RESPONSE

P2 - Complies

This provision applies to the north, north-western and south-western elevations which directly adjoin residential properties within the Inner Residential Zone, along Clare Street and Seymour Street. These properties support predominately one-storey dwellings.

The provision also applies to the interface with 54 New Town Road, along the northern boundary of the site.

The proposed building form generally complies with the acceptable solution, with heights less than 8.5m within 10m of the residential zone. However, there are six instances along the north-western elevation where Level 2 balconies and planters protrude above 8.5m from natural ground level within 10m of the boundary.

A further two sections along the south-western elevation to Clare Street also exceed 8.5m height, within 10m of the residential zone.

A response to the performance criteria is required.

North / north-western elevation - Seymour Street

The following section illustrates the maximum extent of the discretion along the north/north-western elevation.

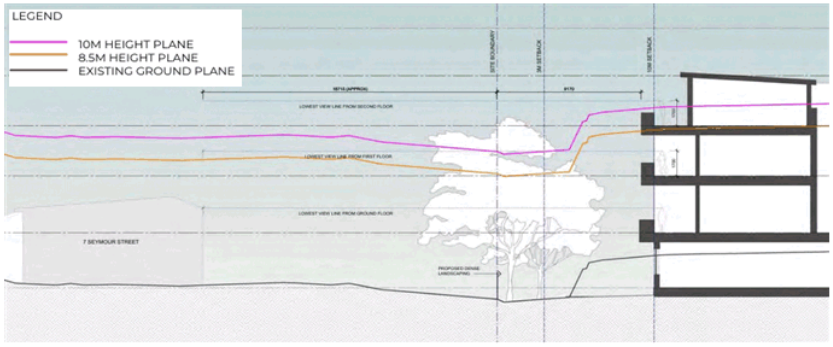


Figure 14: Section through 7 Seymour Street and the proposed north-western elevation, showing a portion of the planter boxes at Level 2 extending above 8.5m, within 10m of the boundary (Source: Woods Bagot)

Whilst the balcony planter box to Level 2 does extend above the permitted 8.5m (by just over 1m), the section diagram demonstrates the bulk of Level 2 is appropriately setback and would otherwise be compliant with A2.

When viewed from the rear of Seymour Street properties, the proposal will appear as four-storey building. This is partially due to the significant change in ground level between the rear of these properties and the proposed development site, which is evident in the section diagram below.

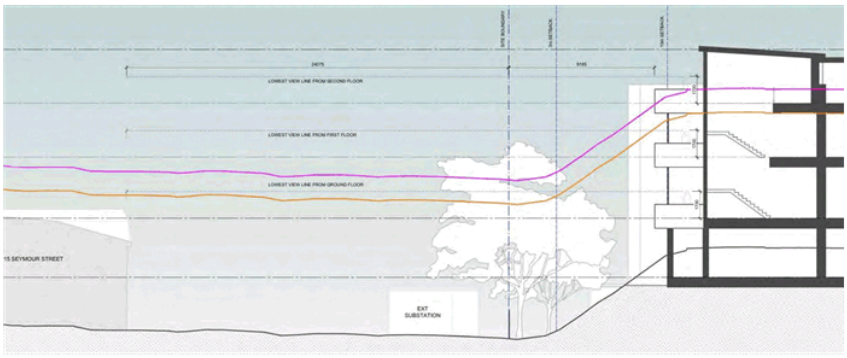


Figure 15: Section through 13 Seymour Street and the north-western corner of the proposed building, illustrating the significant change in ground level between Seymour Street and the development site (Source: Woods Bagot)

To address this, significant landscaping is proposed along the north-western boundary which will assist in screening the lower levels, whilst the upper second/third floors are setback well over 10m from the boundary. Given the above and the total separation distance between the building and adjoining properties along Seymour Street, the height of the proposal is considered compatible with the height of buildings in the residential zone (along Seymour Street).

South-western elevation - Clare Street

Along the south-western elevation to Clare Street, two of the proposed building forms are within 10m of the boundary and exceed 8.5m in height. The following section diagrams illustrate the difference in height between the proposed building and 9 and 11 Clare Street.

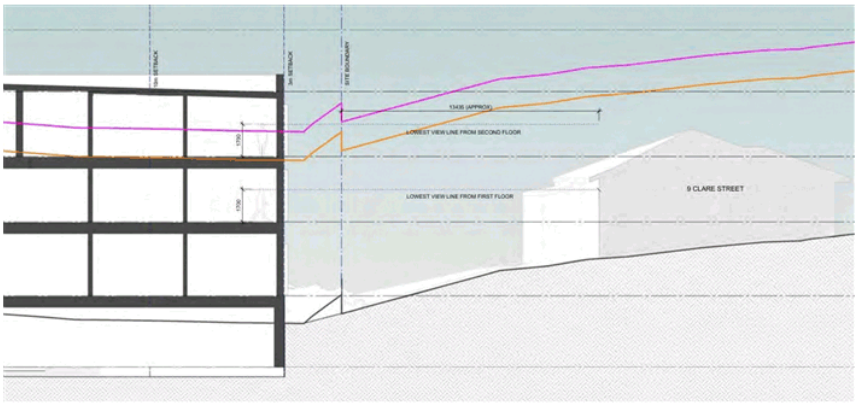


Figure 16: Section diagrams illustrating the height and setback of the proposed building along the south-western elevation, adjoining properties at 9 Clare Street (Source: Woods Bagot)

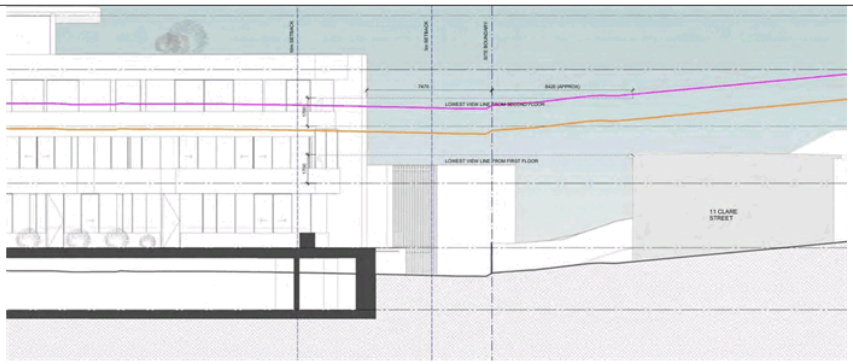


Figure 17: Section diagrams illustrating the height and setback of the proposed building along the south-western elevation, adjoining properties at 11 Clare Street (Source: Woods Bagot)

The separation distance between the proposed building and the rear building line of 9 Clare Street is approximately 16.3m and due to the change in ground level, the proposed building will appear as a 2-3 storey building when viewed from 9 Clare Street.

The difference in levels between the eaves of 9 Clare Street and the roof to Level 2 of proposed building is approximately 1 and half storeys. Given the separation distance and increase of just one and half storeys over the eave height of the adjoining dwelling, the proposed height is considered compatible with the height of adjoining properties in the residential zone.

15.4.2 Setback
***Objective:** To ensure that building setback contributes positively to the streetscape and does not result in unreasonable impact on residential amenity of land in a residential zone.*
SCHEME REQUIREMENTS
A1 *Building setback from frontage must be parallel to the frontage and must be no more than:* *1m from the median street setback of all existing buildings on the same side of the street within 100m of the site.* *P1* *Building setback from frontage must satisfy all of the following:* *(a) be consistent with any Desired Future Character Statements provided for the area;* *(b) be compatible with the setback of adjoining buildings, generally maintaining a continuous building line if evident in the streetscape;* *(c) enhance the characteristics of the site, adjoining lots and the streetscape;* *(d) provide for small variations in building alignment only where appropriate to break up long building facades, provided that no potential concealment or entrapment opportunity is created;*

(e) provide for large variations in building alignment only where appropriate to provide for a forecourt for space for public use, such as outdoor dining or landscaping, provided the that no potential concealment or entrapment opportunity is created and the forecourt is afforded very good passive surveillance.
RESPONSE
P1 - Complies A1 specifies that the permitted frontage setback is 1m from the median setback of all existing buildings on the same side of the street within 100m. As shown in the figures below, the titles within 100m of the site to the north and south vary in setback from a maximum of 5.4m (54 New Town Road) to a minimum of 0m (60 and 62 New Town Road - taking into consideration garages which invariably modify the way in which dwellings appear within the streetscape). The following measurements are approximate only and have been taken from minimum setback points for each building within 100m to the north and south of the site. **North of the site** • 70 New Town Road - minimum 1.2m setback. • 68 New Town Road - minimum 0.5m setback • 66 New Town Road - minimum 2.2m setback • 62 New Town Road - 0m setback • 60 New Town Road - 0m setback (garage) • 56 New Town Road - 2.4m minimum setback • 54 New Town Road - 5.3m minimum setback



Figure 18: Setback of adjoining dwellings within 100m to the north (red area - denotes maximum permitted setback of 2.6m, which is 1m from the median as per setback calculations) (source: www.listmap.tas.gov.au © State Government of Tasmania)

South of the site

- 46 New Town Road - 2m minimum setback
- 44 New Town Road - 1m minimum setback
- 42 New Town Road - 1m minimum setback
- 38-40 New Town Road - 0m setback
- 30-36 New Town Road - 1m setback



Figure 19: Setback of adjoining dwellings within 100m to the south (red area - denotes maximum permitted setback of 2m as per median setback calculations) (source: www.listmap.tas.gov.au © State Government of Tasmania)

Based on the above approximate calculations, the total median setback of buildings to the north and south, within 100m of the site is approximately 1.6m. Therefore, the minimum permitted setback is 0.6m and the maximum is 2.6m.

The proposal is setback no less than 0.6m from the boundary to New Town Road, therefore complies with the acceptable

This setback range is quite restrictive and does not allow sufficient space to articulate the façade and provide landscaping that will positively contribute to the proposals relationship with the streetscape.

The variations to the setback are necessary to provide the port cochere and access to the building and achieve an appropriate relationship to the streetscape, facilitating and promoting greater pedestrian safety and amenity.

A2

Building setback from a residential zone must be no less than:

(a) 3m;

(b) half the height of the wall, whichever is the greater.

P2

Building setback from the General Residential or Inner Residential Zone must be sufficient to prevent unreasonable adverse impacts on residential amenity by:

(a) overshadowing and reduction of sunlight to habitable rooms and private open space on adjoining lots to less than 3 hours between 9.00 am and 5.00 pm on June 21 or further decrease sunlight hours if already less than 3 hours;

(b) overlooking and loss of privacy;
(c) visual impact when viewed from adjoining lots, taking into account aspect and slope.

RESPONSE

P2 - Complies

The acceptable solution specifies that the setback should be 3m, or half the height of the wall, whichever is the greater.

Along the north and north-western elevation to Seymour Street properties and 54 New Town Road, the building is predominantly setback 10m from the boundary. However, portions of the Level 2 balcony planter boxes protrude from the building line, thereby reducing the setback to approximately 9.1m.

Along the south-western elevation to Clare Street, the building line is setback 3m. However, the wall height along this elevation varies between 0m and approximately15m, with the highest point of level 3 being setback into the building in a way that removes potential overlooking opportunities from that level. The lower levels have a built form that is setback 9.1m.

A setback at least half the height of the wall cannot be achieved along this elevation and this setback requires consideration against the performance criteria.

The performance criteria specifies that building setback from the General Residential or Inner Residential Zone must be sufficient to prevent unreasonable adverse impacts on residential amenity by:

> *overshadowing and reduction of sunlight to habitable rooms and private open space on adjoining lots to less than 3 hours between 9.00 am and 5.00 pm on June 21 or further decrease sunlight hours if already less than 3 hours;*

As illustrated in the accompanying shadow diagrams, the proposed development will not result in any significant overshadowing of adjoining Clare Street properties.

> *overlooking and loss of privacy;*

The proposal does not include any living areas, balconies or private open space areas which would result in overlooking of the adjoining Clare street residences, with dwellings that are closest to this boundary being orientated to avoid overlooking and loss of privacy for these dwellings which is further delivered through the extend wall which fans out past the extent of the dwelling to further obstruct viewing.

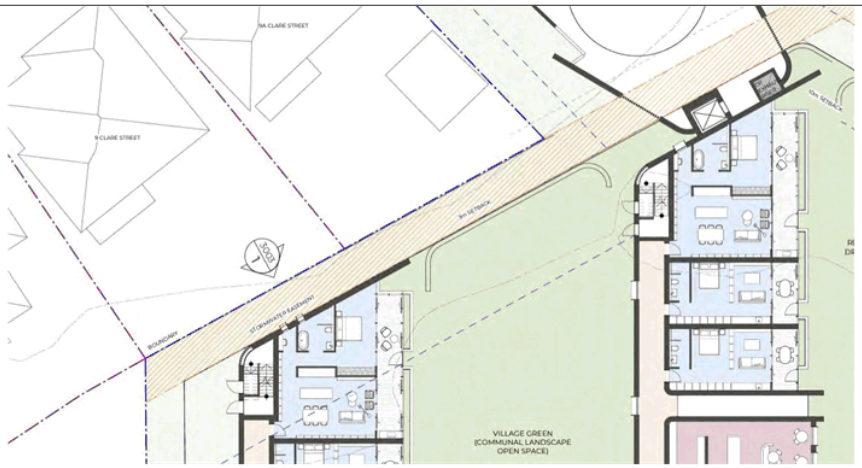


Figure 20: example of unit orientation of dwellings closest to Clare Street boundary. (Source: Woods Bagot)

visual impact when viewed from adjoining lots

The building will appear as a two-to-three storey building when viewed from the rear of 9, 9A and 7 Clare Street.

Cross sections provided in the Proposal Plans and Overlooking Diagrams included in the Design Report prepared by Woods Bagot accompany this application and demonstrate design will minimise overlooking opportunity to these residences.

15.4.3 Design
***Objective:** To ensure that building design contributes positively to the streetscape, the amenity and safety of the public and adjoining land in a residential zone.*
SCHEME REQUIREMENTS
A1 *Building design must comply with all of the following:* *(a) provide the main pedestrian entrance to the building so that it is clearly visible from the road or publicly accessible areas on the site;* *(b) for new building or alterations to an existing facade provide windows and door openings at ground floor level in the front façade no less than 40% of the surface area of the ground floor level facade ;* *(c) for new building or alterations to an existing facade ensure any single expanse of blank wall in the ground level front façade and facades facing other public spaces is not greater than 30% of the length of the facade;* *(d) screen mechanical plant and miscellaneous equipment such as heat pumps, air conditioning units, switchboards, hot water units or similar from view from the street and other public spaces;*

(e) incorporate roof-top service infrastructure, including service plants and lift structures, within the design of the roof;

(f) provide awnings over the public footpath if existing on the site or on adjoining lots;

(g) not include security shutters over windows or doors with a frontage to a street or public place.

RESPONSE

A1 - Complies

The following is in response to the acceptable solution A1.

(a) provide the main pedestrian entrance to the building so that it is clearly visible from the road or publicly accessible areas on the site;

The main pedestrian entrance to the site is via New Town Road and has been designed to be clearly visible from the road and footpath in both directions along New Town Road. It is noted that direct access to the ground floor units at the south of the New Town Road site will be provided for these units and it is intended that these accesses will be clearly identifiable to the relevant unit.



Figure 21: Proposal Plan showing proposed access to ground floor units along the southern portion of the sites New Town Road frontage (Source: Woods Bagot)

(b) for new building or alterations to an existing facade provide windows and door openings at ground floor level in the front façade no less than 40% of the surface area of the ground floor level facade;

In this instance, the front façade of the building is taken to be that which faces the frontage to New Town Road.

The façade incorporates a variety of materials, including a variety of materials including pigmented concrete/pre-cast, stone, timber and glazing utilising metal accent trims.

The ground floor includes a mix of vehicle access points, units and the building entrance way and common areas. Along this frontage of the building window and door openings account for approximately 50% of the ground floor frontage, exceeding the 40% required by A1(b).

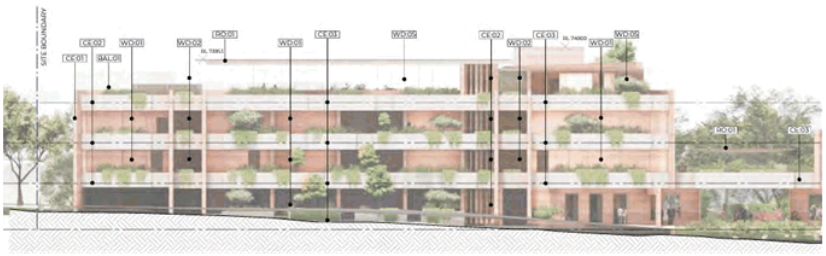


Figure 22: Eastern elevation showing southern portion of the proposal (New Town Road frontage) (Source: Woods Bagot)



Figure 23: Eastern elevation showing northern portion of the proposal (New Town Road frontage) (Source: Woods Bagot)

WD-01	APARTMENT FIXED AND OPENING WINDOWS	CE-01	RAMMED EARTH
WD-02	RECESSED HALLWAY WINDOWS	CE-02	PRECAST BLADE WALL
WD-04	APARTMENT METAL REVEAL WINDOWS	CE-03	CONCRETE TERRAZZO BALUSTRADE
WD-05	ROOFTOP TERRACE FULL HEIGHT GLAZING	RO-01	COPPER COLOURED SHEET METAL
		BAL-01	SERVICES SCREENING

(c) for new building or alterations to an existing facade ensure any single expanse of blank wall in the ground level front façade and facades facing other public spaces is not greater than 30% of the length of the facade;

The proposals frontage to New Town Road will be a combination of glazing, small (fine) elements of precast concrete providing a plinth, along with brick and metal cladding. There is no expanse of blank wall greater than 30% along the façade facing New Town Road. The building does not face any other public spaces.

(d) screen mechanical plant and miscellaneous equipment such as heat pumps, air conditioning units, switchboards, hot water units or similar from view from the street and other public spaces;

(e) incorporate roof-top service infrastructure, including service plants and lift structures, within the design of the roof;

Most mechanical and plant equipment will be located within the plant rooms and where proposed on the roof have been designed to be incorporated within the building and will not be viewable from the street.

(f) provide awnings over the public footpath if existing on the site or on adjoining lots;

n/a - no awnings exist on adjoining lots.

(g) not include security shutters over windows or doors with a frontage to a street or public place.

The proposals frontage to New Town Road does not include security shutters are proposed over windows or doors along this elevation. The remaining elevations do not front any public space and are setback from the nearest street (Clare Street).

A2
Walls of a building facing the General Residential Zone or Inner Residential Zone must be coloured using colours with a light reflectance value not greater than 40 percent.

RESPONSE

A2 - Complies

The north, north-west and south-western elevations will present a variety of earth-toned precast, precast blade wall, concrete terrazzo balustrading and copper coloured sheet metal, with the majority of these viewpoints being balcony areas, with glazed windows and doors setback in the building.

Additionally, landscaping proposed as part of the proposal on each balcony will further add to soften the appearance of the building from these adjoining residences.

These finishes are not anticipated to result in reflectance values that would result in amenity impacts or individually exceed a reflectance value of 40 percent.

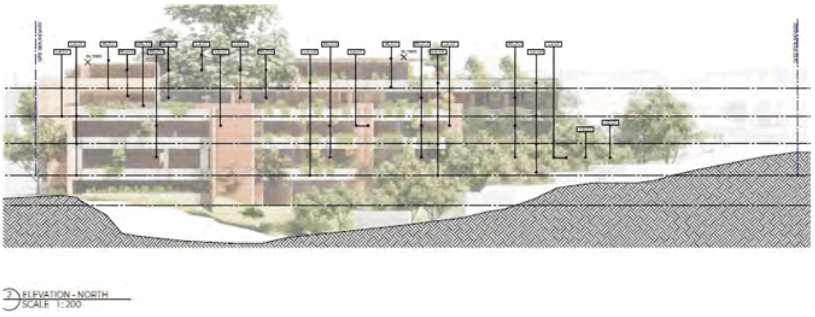


Figure 24: Northern elevation showing northern portion of the proposal (Source: Woods Bagot)

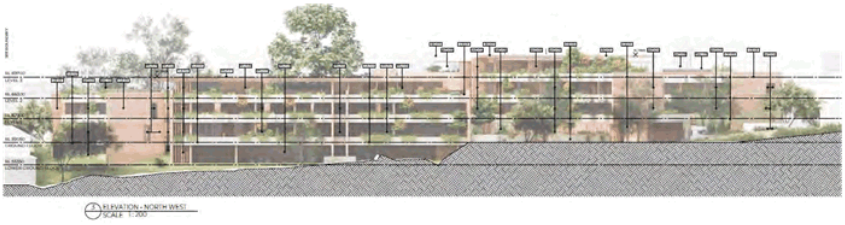


Figure 25: North west elevation showing northern portion of the proposal (Source: Woods Bagot)

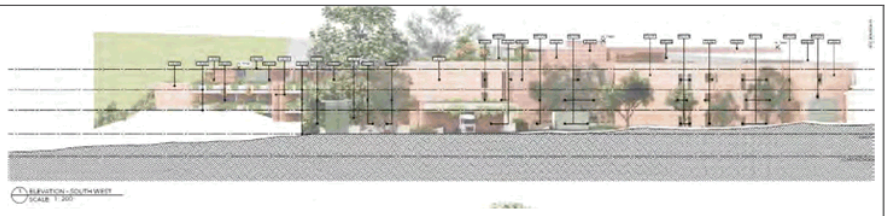


Figure 26: South west elevation showing northern portion of the proposal (Source: Woods Bagot)

Further detail on the external finishes is provided on the accompanying architectural documentation.

15.4.4 Passive Surveillance
***Objective:** To ensure that building design for non-residential uses provides for the safety of the public.*
SCHEME REQUIREMENTS
A1 *Building design for non-residential uses must comply with all of the following:* *(a) provide the main pedestrian entrance to the building so that it is clearly visible from the road or publicly accessible areas on the site;* *(b) for new buildings or alterations to an existing facade provide windows and door openings at ground floor level in the front façade which amount to no less than 40 % of the surface area of the ground floor level facade;* *(c) for new buildings or alterations to an existing facade provide windows and door openings at ground floor level in the façade of any wall which faces a public space or a car park which amount to no less than 30% of the surface area of the ground floor level facade;* *(d) avoid creating entrapment spaces around the building site, such as concealed alcoves near public spaces;* *(e) provide external lighting to illuminate car parking areas and pathways;* *(f) provide well-lit public access at the ground floor level from any external car park.*
RESPONSE
A1 - Complies As detailed in the response to Clause 15.4.3, the main pedestrian entrance to the building is clearly visible along New Town Road, which is where the proposed non-residential component of the proposal (café) will be accessed. The entrance to the café will be easily seen and clear to pedestrians when entering the building complying with A1(a) The non-residential use proposed does not directly front the street frontage and does not have its own facade therefore A1 (a) and (b) are not directly appliable.

The café does face out to the greenhouse pavilion of the proposal and is intended to incorporate outdoor seating in this area. The cafes frontage to this pavilion area will have greater than 30% windows and doors and as such complies with A1(c).

The café has been designed to integrate with the broader residential building and will be safely accessible and does not result in the creation of entrapment spaces complying with A1(d)

A1(e) and (f) lighting will be provided within the parking areas and external lighting will be provided at the rear of the site to ensure operability of the commercial access to the site. Further information on lighting is provided under clause 15.3.1.

15.4. 5 Landscaping

***Objective:** To ensure that a safe and attractive landscaping treatment enhances the appearance of the site and if relevant provides a visual break from land in a residential zone*

SCHEME REQUIREMENTS

A1

Landscaping along the frontage of a site is not required if all of the following apply:

(a) the building extends across the width of the frontage, (except for vehicular access ways);

(b) the building has a setback from the frontage of no more than 1m.

P1

Landscaping must be provided to satisfy all of the following:

(a) enhance the appearance of the development;

(b) provide a range of plant height and forms to create diversity, interest and amenity;

(c) not create concealed entrapment spaces;

(d) be consistent with any Desired Future Character Statements provided for the area.

RESPONSE

P1 - Complies

The primary frontage of the site is to Newtown Road and except for breaks provided for vehicular access and primary entry areas, the building extends across the width of the frontage.

To comply with A1 and avoid the need for landscaping, the building setback must not vary by more than 1m. Whilst portions of the lower-ground floor abut the boundary, the setbacks at ground floor level vary by more than 1m.

Notwithstanding these variations, substantial areas of landscaping have been provided along the length of the frontage, particularly on the north-eastern end of the building at lower ground level and along the south-eastern end.

The proposed landscaping serves to soften the appearance of the building, provides a range of plant heights and forms, enhances the urban character / visual qualities of the streetscape and improves the overall amenity of the area.

Please refer to the accompanying landscape plans for further details.

The proposal complies with P1.

A2

Along a boundary with the General Residential Zone or Inner Residential Zone landscaping must be provided for a depth no less than:

2m.

P2

Along a boundary with the General Residential Zone or Inner Residential Zone landscaping or a building design solution must be provided to avoid unreasonable adverse impact on the visual amenity of adjoining land in the General Residential Zone or Inner Residential Zone, having regard to the characteristics of the site and the characteristics of the adjoining residentially-zoned land.

RESPONSE

A2 - Complies

As per the accompanying landscape plan prepared by Bangay Garden Designs, landscaping has been provided along the northern, western and south-western boundaries in accordance with A2.

Although no landscaping is required along the southern elevation, as this section adjoins existing urban mixed use zoning, landscaping to a depth of 3m has been provided.

The proposed landscaping serves to soften the appearance of the building, provides a range of plant heights and forms, enhances the urban character / visual qualities of the streetscape and improves the overall amenity of the area and will be capable of responding to requirements relating to managing easements.

15.4.6 Outdoor Storage Areas

N/A - No outdoor storage areas are proposed.

15.4.7 Fencing

Objective: *To ensure that fencing does not detract from the appearance of the site or the locality and provides for passive surveillance.*

SCHEME REQUIREMENTS

A1

Fencing must comply with all of the following:

(a) fences, walls and gates of greater height than 1.5m must not be erected within 4.5m of the frontage;

(b) fences along a frontage must be at least 50% transparent above a height of 1.2m; *(c) height of fences along a common boundary with land in the General Residential Zone or Inner Residential Zone must be no more than 2.1m and must not contain barbed wire.*
RESPONSE
A1 - Will comply No fencing is proposed along the New Town Road frontage. In relation to other boundaries, any new fencing required will be provided along the boundaries with the residential zone that will be no more than 2.1m high and will not contain any barbed wire.

15.4.8 Residential Amenity
Objective: *To ensure that buildings for residential use provide reasonable levels of residential amenity and safety.*
SCHEME REQUIREMENTS
A1 *A dwelling must have at least one habitable room window (other than a bedroom) facing between 30 degrees west of north and 30 degrees east of north.* ***P1*** *A dwelling must be sited and designed to optimise sunlight to at least one habitable room (other than a bedroom)*
RESPONSE
A1/P1 - Complies Of the 61 residential apartments proposed, 25 will have at least one habitable room window (other than a bedroom) facing between 30 degrees east and west of north. Therefore, a response to the performance criteria is required, but will be limited to those apartments that do not comply with A1. Whilst the site has a favourable orientation, the unusual shape and dimensions of the site mean that apartments facing New Town Road and Seymour Street will have windows that fall outside the permitted orientation. Notwithstanding, all windows to habitable rooms (other than bedrooms) have been oriented to the east/north-east or the west/north-west and are carefully designed and sited to ensure optimal sunlight access. Coupled with the siting and design of balconies, private and communal areas of open space, future residents will have ample access to appropriate levels of sunlight.

A2

The potential for direct overlooking from windows of habitable rooms with a finished surface or floor level more than 1m above natural ground level on one lot to the windows of habitable rooms, balconies, decks and roof gardens on adjacent lots must be avoided or minimised by complying with any of the following:

(a) have a side boundary setback no less than 3 m;

(b) be offset no less than 1.5 m from the windows of habitable rooms on adjacent lots where on the same horizontal lane;

(c) have a window seal height no less than 1.5 m.

P2

The potential for direct overlooking from windows of habitable rooms with a finished surface or floor level more than 1m above natural ground level on one lot to the windows of habitable rooms, balconies, decks and roof gardens on adjacent lots must be avoided or minimised through their separation and off-set or by use of solid or translucent screening.

RESPONSE

A2 - Complies

Along the south and south-western elevations, all windows to habitable rooms with floor levels more than 1m above natural ground level are setback at least 3m from the boundary.

This is also the case along the north / north-western elevations, where the building and associated windows to habitable rooms are setback 10m from the side boundary.

The eastern elevation faces New Town Road, which provides significant separation from adjacent properties such that there is no potential for overlooking/loss of privacy to adjacent properties.

Neighbouring sections showing potential view lines are provided in the Proposal Plans prepared by Woods Bagot.

A3

Outdoor living space must be provided for a dwelling that complies with all of the following:
(a) be no less than 10m^2;

(b) have a width no less than 2m.

P3

Outdoor living space must be provided for a dwelling with dimensions sufficient for the projected requirements of the occupants.

RESPONSE

A3 - Complies

The proposal provides a variety of unit configurations which are intended to ensure usability of outdoor living spaces, with all units having a minimum 2m width and a range of outdoor living space sizes provided, ranging from approximately 24m^2 through to 728m^2 which is associated with the penthouse unit. The following provides an overview of the minimum widths and approximate area of private open space for each dwelling.

Dwelling			*Min width*	*min POS Area*
Ground floor	South wing	unit 1	2m	55m2
Ground floor	South wing	unit 2	2m	24m2
Ground floor	South wing	unit 3	2m	24m2
Ground floor	South-east wing	unit 4	2m	26m2
Ground floor	South-east wing	unit 5	2m	26m2
Ground floor	South-east wing	unit 6	2m	26m2
Ground floor	South-east wing	unit 7	2m	26m2
Ground floor	Central wing	unit 8	2m	24m2
Ground floor	Central wing	unit 9	2m	24m2
Ground floor	Central wing	unit 10	2m	54m2
Ground floor	north eastern wing	unit 11	2m	24m2
Ground floor	north eastern wing	unit 12	2m	39m2
Ground floor	north block	unit 13	2m	52m2
Ground floor	north western wing	unit 14	2m	69m2
Ground floor	north western wing	unit 15	2m	24m2
Ground floor	north western wing	unit 16	2m	24m2
Ground floor	north western wing	unit 17	2m	24m2
Ground floor	north western wing	unit 18	2m	36m2
Level 1	South wing	unit 19	2m	55m2
Level 1	South wing	unit 20	2m	24m2
Level 1	South wing	unit 21	2m	24m2
Level 1	South-east wing	unit 22	2.4m	49m2
Level 1	South-east wing	unit 23	2m	26m2
Level 1	South-east wing	unit 24	2m	26m2
Level 1	South-east wing	unit 25	2m	26m2
Level 1	South-east wing	unit 26	2m	26m2
Level 1	South-east wing	unit 27	2m	24m2
Level 1	South-east wing	unit 28	2m	26m2
Level 1	central wing	unit 29	4m	44m2
Level 1	central wing	unit 30	4m	44m3
Level 1	central wing	unit 31	2m	24m2
Level 1	central wing	unit 32	2m	24m2
Level 1	central wing	unit 33	2m	55m2

Level 1	north eastern wing	unit 34	2m	39m2
Level 1	north eastern wing	unit 35	2m	39m2
Level 1	north eastern wing	unit 36	2m	24m2
Level 1	north eastern wing	unit 37	2m	39m2
Level 1	north block	unit 38	2m	52m2
Level 1	north western wing	unit 39	2m	42m2
Level 1	north western wing	unit 40	2m	24m2
Level 1	north western wing	unit 41	2m	24m2
Level 1	north western wing	unit 42	2m	24m2
Level 1	north western wing	unit 43	2m	39m2
Level 2	South wing	unit 44	2m	57m2
Level 2	South wing	unit 45	2m	24m2
Level 2	South wing	unit 46	2m	24m2
Level 2	South east wing	unit 47	2.4m	24m2
Level 2	South east wing	unit 48	2m	26m2
Level 2	South east wing	unit 49	2m	26m2
Level 2	South east wing	unit 50	2m	26m2
Level 2	South east wing	unit 51	2m	26m2
Level 2	South east wing	unit 52	2m	40m2
Level 2	north eastern wing	unit 53	2-3.4m	164m2
Level 2	north eastern wing	unit 54	2-3.4m	150m2
Level 2	north western wing	unit 56	2-5m	165m2
Level 2	north western wing	unit 57	2-3.4m	153m2
Level 3	South east wing	unit 58	2-3.4m	164m2
Level 3	South east wing	unit 59	2-3.4m	83m2
Level 3	South east wing	unit 60	2-3.4m	96m2
Level 2/3	Central wing	unit 61	2m +	728m2

A4

Habitable rooms of dwellings adjacent to streets carrying more than 6000 vehicle per day must be designed to achieve internal noise levels no more than 45 dBa in accordance with relevant Australian Standards for acoustics control, (including AS3671 - Road Traffic, and AS2107 - Habitable Rooms).

P4

Habitable rooms of dwellings adjacent to streets carrying more than 6000 vehicle per day must be designed, through site layout and building design, to provide internal noise levels that accord a reasonable level of residential amenity for the occupants.

RESPONSE
A4 - Complies A noise impact assessment prepared by NVC demonstrates that, subject to adoption of the recommendations relating to acoustic noise controls identified in section 7 of the NVC report, the proposal satisfies the outcomes sought by A4.

4. CODES

4.1 POTENTIALLY CONTAMINATED LAND CODE

The infrastructure works located within the Inner Residential Zone have been identified under the utilities use classification under the zone, which is a no permit required use.

As per the advice provided as part of the previous application (PLN-19-291), JSA Consulting Engineers confirmed that the land within the inner residential zone has not been impacted by contaminated fill.

There is no fill in the area of the right of way and no works are proposed within this area. Therefore, the Code does not apply to these works.

Despite the above, a large portion of the remaining site area within the Urban Mixed Use Zone has been identified as possessing contaminated soils, therefore the provisions of the Code apply to works within Urban Mixed Use Zone. An Environmental Site Assessment and Contamination Management Plan was previously undertaken and prepared by GES, which have been updated and accompanying this submission.

4.1.1 USE STANDARDS

E2.5 Use Standards
Objective: *To ensure that potentially contaminated land is suitable for the intended use.*
SCHEME REQUIREMENTS
A1 *The Director, or a person approved by the Director for the purpose of this Code:* *(a) certifies that the land is suitable for the intended use; or* *(b) approves a plan to manage contamination and associated risk to human health or the environment that will ensure the land is suitable for the intended use.* ***P1*** *Land is suitable for the intended use, having regard to:* *(a) an environmental site assessment that demonstrates there is no evidence the land is contaminated; or* *(b) an environmental site assessment that demonstrates that the level of contamination does not present a risk to human health or the environment; or* *(c) a plan to manage contamination and associated risk to human health or the environment that includes:* *(i) an environmental site assessment;* *(ii) any specific remediation and protection measures required to be implemented before any use commences; and* *(iii) a statement that the land is suitable for the intended use.*
RESPONSE

P1 - Complies

The director has not certified or approved the plan for the development; therefore the proposal is to be assessed in response to the performance criteria.

P1 (c)(i)(ii) As per the accompanying Contamination Management Plan undertaken by GES, and subsequent advice, it has been determined that the site is suitable for the intended use provided the development proceeds in accordance with the recommendations contained within the ESA and CMP.

(iii) The CMP includes a statement that the land is suitable for the intended use. Please refer to the accompanying ESA and CMP for further detail.

4.1.2 DEVELOPMENT STANDARDS

E2.6.2 Excavation

***Objective:** To ensure that works involving excavation of potentially contaminated land does not adversely impact on human health or the environment.*

SCHEME REQUIREMENTS

A1

No acceptable solution.

P1

Excavation does not adversely impact on health and the environment, having regard to:

(a) an environmental site assessment that demonstrates there is no evidence the land is contaminated; or

(b) a plan to manage contamination and associated risk to human health and the environment that includes:

(i) an environmental site assessment;

(ii) any specific remediation and protection measures required to be implemented before excavation commences; and

(iii) a statement that the excavation does not adversely impact on human health or the environment.

RESPONSE

P1 - Complies

With regard to excavation, the proposal complies with P1 as follows:

P1 (b) (i) the accompanying ESA and CMP provided by GES provides risk management measures and recommendations to manage contamination on the site.

(ii) the accompanying CMP provides detailed guidelines on how excavation should be managed on site throughout each development stage to ensure minimal impacts on human and environmental health.

(iii) the ESA and CMP conclude that there are no ecological receptors in proximity to the site.

The report indicates that the risk to current and future construction workers and future onsite inhabitants is low.

Provided the recommendations in the CMP are undertaken and works are managed accordingly, both the ESA and CMP report find that the proposal and associated works can be undertaken with minimal impacts on human health and the environment.

4.2 ROAD AND RAILWAY ASSETS CODE

4.2.1 USE STANDARDS

E5.5.1 Existing road accesses and junctions
***Objective:** To ensure that the safety and efficiency of roads is not reduced by increased use of existing accesses and junctions.*
SCHEME REQUIREMENTS
A3 *The annual average daily traffic (AADT) of vehicle movements, to and from a site, using an existing access or junction, in an area subject to a speed limit of 60km/h or less, must not increase by more than 20% or 40 vehicle movements per day, whichever is the greater.* ***P3*** *Any increase in vehicle traffic at an existing access or junction in an area subject to a speed limit of 60km/h or less, must be safe and not unreasonably impact on the efficiency of the road, having regard to:* *(a) the increase in traffic caused by the use;* *(b) the nature of the traffic generated by the use;* *(c) the nature and efficiency of the access or the junction;* *(d) the nature and category of the road;* *(e) the speed limit and traffic flow of the road;* *(f) any alternative access to a road;* *(g) the need for the use;* *(h) any traffic impact assessment; and* *(i) any written advice received from the road authority.*
RESPONSE
P3 - Complies The proposal seeks to retain one existing crossover along New Town Road therefore the provisions of the clause apply. The clause also applies to the existing Clare Street access, as it will also be retained. The TIA assessment prepared by Midson Traffic, identifies and considers the matters to have regard to under this standard and confirms that the traffic generation will be predominantly residential in nature, consistent with the general nature of traffic in the surrounding network.

Further detail is provided in the accompanying TIA. Noting, a revised version of this TIA is intended to be submitted as further information to address parking and access requirements.

Additionally, it is noted that Hobart City Council are the road authority and GM Consent has been obtained for the lodging of the application.

4.2.2 DEVELOPMENT STANDARDS

E5.5.1 Road accesses and junctions
Objective: *To ensure that the safety and efficiency of roads is not reduced by the creation of new accesses and junctions.*
SCHEME REQUIREMENTS
A2 *No more than one access providing both entry and exit, or two accesses providing separate entry and exit, to roads in an area subject to a speed limit of 60km/h or less.* ***P2*** *For roads in an area subject to a speed limit of 60km/h or less, accesses and junctions must be safe and not unreasonably impact on the efficiency of the road, having regard to:* *(a) the nature and frequency of the traffic generated by the use;* *(b) the nature of the road;* *(c) the speed limit and traffic flow of the road;* *(d) any alternative access to a road;* *(e) the need for the access or junction;* *(f) any traffic impact assessment; and* *(g) any written advice received from the road authority.*
RESPONSE
A2 - Complies The proposal has two separate road frontages being Clare Street and New Town Road with the Clare Street access intending to provide only commercial and services access and the New Town Road Access providing residential and general visitor access to the site. New Town Road and Clare Street are both signposted 50km/h zones. The proposed access points and traffic calming measures/modifications are sufficient to ensure the continued safe and efficiency use of New Town Road and Clare Street. The proposal involves one access providing entry and exit to each road and therefore complies with A1.

E5.6.4 Sight distance at accesses, junctions and level crossings
Objective: *To ensure that accesses, junctions and level crossings provide sufficient sight distance between vehicles and between vehicles and trains to enable safe movement of traffic.*
SCHEME REQUIREMENTS
A3 *The annual average daily traffic (AADT) of vehicle movements, to and from a site, using an existing access or junction, in an area subject to a speed limit of 60km/h or less, must not increase by more than 20% or 40 vehicle movements per day, whichever is the greater.* *P3* *Any increase in vehicle traffic at an existing access or junction in an area subject to a speed limit of 60km/h or less, must be safe and not unreasonably impact on the efficiency of the road, having regard to:* *(a) the increase in traffic caused by the use;* *(b) the nature of the traffic generated by the use;* *(c) the nature and efficiency of the access or the junction;* *(d) the nature and category of the road;* *(e) the speed limit and traffic flow of the road;* *(f) any alternative access to a road;* *(g) the need for the use;* *(h) any traffic impact assessment; and* *(i) any written advice received from the road authority.*
RESPONSE
A3 - Complies The TIA assessment prepared by Midson Traffic, identifies that the available sight distance exceeds 80 metres in both directions from each access location, noting that cars parked on-street near the access can partially obscure available sight distance, but these are not considered permanent obstructions. The TIA confirms that the available sight distance at each access therefore complies with the requirements of Acceptable Solution A1 of Clause E5.6.4 of the Planning Scheme. Further detail is provided in the accompanying TIA. Noting, a revised version of this TIA is intended to be submitted as further information to address parking and access requirements.

4.3 PARKING AND ACCESS CODE

4.3.1 USE STANDARDS

E6.6.1 Number of Car Parking Spaces
Objective: *To ensure that:* *(a) there is enough car parking to meet the reasonable needs of all users of a use or development, taking into account the level of parking available on or outside of the land and the access afforded by other modes of transport.* *(b) a use or development does not detract from the amenity of users or the locality by:* *(i) preventing regular parking overspill;* *(ii) minimising the impact of car parking on heritage and local character.*
SCHEME REQUIREMENTS
A1 *The number of on-site car parking spaces must be:* *(a) no less than and no greater than the number specified in Table E6.1;* *except if:* *(i) the site is subject to a parking plan for the area adopted by Council, in which case parking provision (spaces or cash-in-lieu) must be in accordance with that plan;* ***P1*** *The number of on-site car parking spaces must be sufficient to meet the reasonable needs of users, having regard to all of the following:* *(a) car parking demand;* *(b) the availability of on-street and public car parking in the locality;* *(c) the availability and frequency of public transport within a 400m walking distance of the site;* *(d) the availability and likely use of other modes of transport;* *(e) the availability and suitability of alternative arrangements for car parking provision;* *(f) any reduction in car parking demand due to the sharing of car parking spaces by multiple uses, either because of variation of car parking demand over time or because of efficiencies gained from the consolidation of shared car parking spaces;* *(g) any car parking deficiency or surplus associated with the existing use of the land;* *(h) any credit which should be allowed for a car parking demand deemed to have been provided in association with a use which existed before the change of parking requirement, except in the case of substantial redevelopment of a site;* *(i) the appropriateness of a financial contribution in lieu of parking towards the cost of parking facilities or other transport facilities, where such facilities exist or are planned in the vicinity;* *(j) any verified prior payment of a financial contribution in lieu of parking for the land;* *(k) any relevant parking plan for the area adopted by Council;* *(l) the impact on the historic cultural heritage significance of the site if subject to the Local Heritage Code;*

(m) whether the provision of the parking would result in the loss, directly or indirectly, of one or more significant trees listed in the Significant Trees Code.

RESPONSE

P1 - Complies

The Acceptable Solution A1 establishes that number of on-site car parking spaces must be no less than and no greater than the number specified in Table E6.1. The table requires the following parking provision for the residential component of the development:

- Multiple dwellings, 1-bedroom 1 space per dwelling
- Multiple dwellings, 2 or more bedrooms 2 spaces per dwelling
- Visitor parking 1 space per 4 dwellings

This would result in a requirement for 35 spaces for the residential component - as is further detailed in the table below.

The visitor accommodation component is comprised of 38 x short term apartments/units, which require 1 space per unit under Table E6.1, for a total of 38 spaces - as detailed in the table below.

Level	Total no. of Units	Residential	Parking no. required	Short term Accommodation	Parking no. no. required
Ground Floor	18	**8 units** (5x 1 bed; 2x 2bed; 1x3bed)	11	10	10
Level 1	25	**10 units** (6x 1 bed; 3x 2bed; 1x3bed)	14	15	13
Level 2	15	**5 units** (3x 2bed; 1x3bed; 1 x penthouse)	10	10	10
Level 3	3	0	0	3	3
Total	**61**	**23**	**35**	**38**	**38**

Additionally:

- the café component requires: 15 spaces per 100m2 = **23 spaces**
- the business and professional services component of the development under Table E6.1 requires 1 space per 30m2 of floor area = the consulting rooms are approximately 100m^2 which equates to **4 spaces**

This equates to a total parking requirement of 106 spaces

- the sport and recreation component of the development under Table E6.1 requires spaces be provided subject to traffic and parking impact assessment.

The total parking provision provided for in the proposal is 70 spaces (67 spaces in the lower ground level and 3 spaces in the porte cochere). As this does not satisfy the requirements of the acceptable solution, a response to P1 is required.

It is intended that parking will be assigned for the residential and short-stay accommodation components of the development. It is intended that the allocation of parking would include:

Parking Allocation	*Parking Spaces*	*Location*
Residential - R01-35	35	Basement
Visitor (residential) - V01 -V02	2	Basement
Visitor (accessible) – V03-04	2	Basement
Visitor (drop-off pick up) – V05-07	3	Port Cochere
Short stay accommodation guest - H01-25	25	Basement
Staff – S01-03	3	Basement
Total	**70**	

The TIA prepared by Midson Traffic which accompanies this application confirms that the proposals compliance with P1.

E6.6.2 Number of Accessible Car Parking Spaces for People with a Disability
Objective: *To ensure that a use or development provides sufficient accessible car parking for people with a disability.*
SCHEME REQUIREMENTS
A1 *Car parking spaces provided for people with a disability must:* *(a) satisfy the relevant provisions of the Building Code of Australia;* *(b) be incorporated into the overall car park design;* *(c) be located as close as practicable to the building entrance.'* ***P1*** *No Performance Criteria.*
RESPONSE
A1 - Complies As stated in the accompanying TIA, the number of disabled spaces required is established under the National Construction Code (NCC). The NCC classifies the building as a Class 2 building (multi-unit residential buildings). No disabled parking provision is required for Class 2.

The café, consulting rooms and welling centre component of the development is classified as a 'Class 6' building. This requires 1 disabled parking space for every 100 car parking spaces. This is a requirement for 1 disabled space, which is provided.

The proposal provides for 2 disabled parking spaces within the lower ground floor and the Acceptable Solution A1 of Clause E6.6.2 of the Planning Scheme is met.

Further detail is provided in the accompanying TIA.

E6.6.3 Number of Motorcycle Parking Spaces
Objective: *To ensure enough motorcycle parking is provided to meet the needs of likely users of a use or development.*
SCHEME REQUIREMENTS
A1 *The number of on-site motorcycle parking spaces provided must be at a rate of 1 space to each 20 car parking spaces after the first 19 car parking spaces except if bulky goods sales, (rounded to the nearest whole number).* *Where an existing use or development is extended or intensified, the additional number of motorcycle parking spaces provided must be calculated on the amount of extension or intensification, provided the existing number of motorcycle parking spaces is not reduced.* *P1* *The number of on-site motorcycle parking spaces must be sufficient to meet the needs of likely users having regard to all of the following, as appropriate:* *(a) motorcycle parking demand;* *(b) the availability of on-street and public motorcycle parking in the locality;* *(c) the availability and likely use of other modes of transport;* *(d) the availability and suitability of alternative arrangements for motorcycle parking provision.*
RESPONSE
A1 - Complies The proposal generates a requirement for 3 motorcycle parking spaces. The proposal provides 4 motorcycle spaces across the basement levels complying with A1. Further detail is provided in the accompanying TIA prepared by Midson Traffic.

E6.6.4 Number of Bicycle Parking Spaces
Objective: *To ensure enough bicycle parking is provided to meet the needs of likely users and by so doing to encourage cycling as a healthy and environmentally friendly mode of transport for commuter, shopping and recreational trips.*
SCHEME REQUIREMENTS
A1

The number of on-site bicycle parking spaces provided must be no less than the number specified in Table E6.2. *P1* *The number of on-site bicycle parking spaces provided must have regard to all of the following: (a) the nature of the use and its operations; (b) the location of the use and its accessibility by cyclists; (c) the balance of the potential need of both those working on a site and clients or other visitors coming to the site.*
RESPONSE
A1 - Complies There are no bicycle parking requirements for the residential dwelling component of the proposal under Table E6.2 or the sport and recreation component. Under Table E6.2: • the café use would require 1 for 100m^2 of floor area available to the public and 1 for each 200m^2 floor area after the first 200m^2 floor area (minimum 2) • the business and professional services would require 1 for each 250m^2 floor area after the first 250m^2 floor area and 1 for each 1,000m^2 of floor area if the floor area exceeds 1000m^2 This results in the proposal requiring 3 parking spaces (2 employee and 1 visitor) for the café component and 6 parking spaces (5 employee and 1 visitor) for the business and professional services component. The proposed development provides a total of more than 30 bicycle parking spaces within a dedicated area within the car park and will comply with A1.

4.3.2 DEVELOPMENT STANDARDS

E6.7.1 Number of Vehicular Accesses
Objective: *To ensure that:* *(a) safe and efficient access is provided to all road network users, including, but not limited to: drivers, passengers, pedestrians, and cyclists, by minimising:* *(i) the number of vehicle access points; and* *(ii) loss of on-street car parking spaces;* *(b) vehicle access points do not unreasonably detract from the amenity of adjoining land uses;* *(c) vehicle access points do not have a dominating impact on local streetscape and character.*
SCHEME REQUIREMENTS
A1 *The number of vehicle access points provided for each road frontage must be no more than 1 or the existing number of vehicle access points, whichever is the greater.*

P1 *The number of vehicle access points for each road frontage must be minimised, having regard to all of the following:* *(a) access points must be positioned to minimise the loss of on-street parking and provide, where possible, whole car parking spaces between access points;* *(b) whether the additional access points can be provided without compromising any of the following:* *(i) pedestrian safety, amenity and convenience;* *(ii) traffic safety;* *(iii) residential amenity on adjoining land;* *(iv) streetscape;* *(v) cultural heritage values if the site is subject to the Local Historic Heritage Code;* *(vi) the enjoyment of any 'al fresco' dining or other outdoor activity in the vicinity.*
RESPONSE
P1 - Complies The primary access to basement parking will be provided through a single access along New Town Road. The additional port cochere access to the proposal will enhances the proposals integration with the street and at least 3 short stay, drop off/pick up parking spaces as well as providing for enhanced pedestrian safety and amenity. The TIA prepared by Midson Traffic proposes that relocation of the bus stop between the port cochere will further enhance the accessibility of this stop and would also result in reducing any impact on on-street car parking.
A2 *In the Central Business Zone and Particular Purpose Zone 10 (Royal Hobart Hospital) no new vehicular access is provided unless an existing access point is removed.*
RESPONSE
N/A
A3 *In Particular Purpose Zone 4 - Calvary Healthcare Hospital Campus access to the site is to be provided according to the location of approved access points off Augusta Road and Honara Avenue shown on the endorsed plans associated with permit PLN-14-00428-01. The other access points noted are to be utilised for emergency access only.*
RESPONSE
N/A

E6.7.2 Design of Vehicular Accesses
Objective: *To ensure safe and efficient access for all users, including drivers, passengers, pedestrians and cyclists by locating, designing and constructing vehicle access points safely relative to the road network.*
SCHEME REQUIREMENTS
A1 *Design of vehicle access points must comply with all of the following:* *(a) in the case of non-commercial vehicle access; the location, sight distance, width and gradient of an access must be designed and constructed to comply with section 3 – "Access Facilities to Off-street Parking Areas and Queuing Areas" of AS/NZS 2890.1:2004 Parking Facilities Part 1: Off-street car parking;* *(b) in the case of commercial vehicle access; the location, sight distance, geometry and gradient of an access must be designed and constructed to comply with all access driveway provisions in section 3 "Access Driveways and Circulation Roadways" of AS2890.2 - 2002 Parking facilities Part 2: Off-street commercial vehicle facilities.* *P1* *Design of vehicle access points must be safe, efficient and convenient, having regard to all of the following:* *(a) avoidance of conflicts between users including vehicles, cyclists and pedestrians;* *(b) avoidance of unreasonable interference with the flow of traffic on adjoining roads;* *suitability for the type and volume of traffic likely to be generated by the use or development;* *(c) ease of accessibility and recognition for users.*
RESPONSE
A1 - Complies In regard to A1(a) the Clare Street access is not assessed under this standard as the access is intended to be utilised by commercial vehicles. The New Town Road access is relevant and is considered within the TIA undertaken by Midson Traffic, which supports this application. This assessment has determined that this access satisfies the requirements of Acceptable Solution A1(a). Clause A1(b) is applicable to the Clare Street access and is considered within the TIA undertaken by Midson Traffic, which supports this application. This assessment has determined that this access satisfies the requirements of Acceptable Solution A1(b). Further detail is provided in the accompanying TIA.

E6.7.3 Vehicular Passing Areas Along an Access

Objective: *To ensure that:* *(a) the design and location of access and parking areas creates a safe environment for users by minimising the potential for conflicts involving vehicles, pedestrians and cyclists;* *(b) use or development does not adversely impact on the safety or efficiency of the road network as a result of delayed turning movements into a site.*
SCHEME REQUIREMENTS
A1 *Vehicular passing areas must:* *(a) be provided if any of the following applies to an access:* *(i) it serves more than 5 car parking spaces;* *(ii) is more than 30 m long;* *(iii) it meets a road serving more than 6000 vehicles per day;* *(b) be 6 m long, 5.5 m wide, and taper to the width of the driveway;* *(c) have the first passing area constructed at the kerb;* *(d) be at intervals of no more than 30 m along the access.* ***P1*** *Vehicular passing areas must be provided in sufficient number, dimension and siting so that the access is safe, efficient and convenient, having regard to all of the following:* *(a) avoidance of conflicts between users including vehicles, cyclists and pedestrians;* *(b) avoidance of unreasonable interference with the flow of traffic on adjoining roads;* *(c) suitability for the type and volume of traffic likely to be generated by the use or development;* *(d) ease of accessibility and recognition for users.*
RESPONSE
P1 - Complies Although the proposal generates a requirement for vehicular passing bays for the New Town Road access as per A1, the length of the access and the design of the car parking and circulation areas would not support or require passing areas. The two-way access from New Town Road will have a width of 6m. The access points are designed for two-way entry and exit, as are the internal circulation areas. Therefore, vehicles are able to manoeuvre on site and enter and exit in forward direction and no passing areas are required. Further detail is provided in the accompanying TIA, for which it is noted a revised version is intended to be submitted as further information to address parking and access requirements.

E6.7.4 On-Site Turning
Objective: *To ensure safe, efficient and convenient access for all users, including drivers, passengers, pedestrians and cyclists, by generally requiring vehicles to enter and exit in a forward direction.*

SCHEME REQUIREMENTS
A1 *On-site turning must be provided to enable vehicles to exit a site in a forward direction, except where the access complies with any of the following:* *(a) it serves no more than two dwelling units;* *(b) it meets a road carrying less than 6000 vehicles per day.*
RESPONSE
A1 - Complies The proposed vehicle circulation within the basement car parking area ensures vehicles can turn on-site and enter and exit the site in a forward direction.

E6.7.5 Layout of Parking Areas
***Objective:** To ensure that parking areas for cars (including assessable parking spaces), motorcycles and bicycles are located, designed and constructed to enable safe, easy and efficient use.*
SCHEME REQUIREMENTS
A1 *The layout of car parking spaces, access aisles, circulation roadways and ramps must be designed and constructed to comply with section 2 "Design of Parking Modules, Circulation Roadways and Ramps" of AS/NZS 2890.1:2004 Parking Facilities Part 1: Off-street car parking and must have sufficient headroom to comply with clause 5.3 "Headroom" of the same Standard.* *P1* *The layout of car parking spaces, access aisles, circulation roadways and ramps must be safe and must ensure ease of access, egress and manoeuvring on-site.*
RESPONSE
A1 - Complies The TIA accompanying this proposal considers the requirements of E6.7.5 and has determined that development complies with the requirements of Acceptable Solution A1 of Clause.

E6.7.6 Surface Treatment of Parking Areas
***Objective:** To ensure that parking spaces and vehicle circulation roadways do not detract from the amenity of users, adjoining occupiers or the environment by preventing dust, mud and sediment transport.*
SCHEME REQUIREMENTS
A1

Parking spaces and vehicle circulation roadways must be in accordance with all of the following;

(a) paved or treated with a durable all-weather pavement where within 75m of a property boundary or a sealed roadway;

(b) drained to an approved stormwater system,

unless the road from which access is provided to the property is unsealed.

RESPONSE

A1 - Complies

As per the accompanying civil plans, the parking areas will be paved with durable all-weather pavement in compliance with A1 and will be drained where necessary to stormwater infrastructure.

E6.7.7 Lighting of Parking Areas

Objective: *To ensure parking and vehicle circulation roadways and pedestrian paths used outside daylight hours are provided with lighting to a standard which:*

(a) enables easy and efficient use;

(b) promotes the safety of users;

(c) minimises opportunities for crime or anti-social behaviour; and

(d) prevents unreasonable light overspill impacts.

SCHEME REQUIREMENTS

A1

Parking and vehicle circulation roadways and pedestrian paths serving 5 or more car parking spaces, used outside daylight hours, must be provided with lighting in accordance with clause 3.1 "Basis of Design" and clause 3.6 "Car Parks" in AS/NZS 1158.3.1:2005 Lighting for roads and public spaces Part 3.1: Pedestrian area (Category P) lighting.

RESPONSE

A1 - Complies

The lighting design will be based on the requirements of AS/NZS 1158.3.1. (2005) Pedestrian area (P Category) lighting - Performance and design requirements.

E6.7.8 Landscaping of Parking Areas

Objective: *To ensure that large parking and circulation areas are landscaped to:*

(a) relieve the visual impact on the streetscape of large expanses of hard surfaces;

(b) screen the boundary of car parking areas to soften the amenity impact on neighbouring properties;

(c) contribute to the creation of vibrant and liveable places;

(d) reduce opportunities for crime or anti-social behaviour by maintaining clear sightlines.
SCHEME REQUIREMENTS
A1 *Landscaping of parking and circulation areas must be provided where more than 5 car parking spaces are proposed. This landscaping must be no less than 5 percent of the area of the car park, except in the Central Business Zone where no landscaping is required.*
RESPONSE
A1 - Can comply No landscaping is required as the parking areas are located within the Basement levels. These areas will not be visible from the streetscape or from public areas. However, as per the accompanying landscape plan prepared by Bangay Garden Designs, landscaping is proposed within the Clare Street access to the site and is capable of complying with A1.

E6.7.9 Design of Motorcycle Parking Areas
Objective: *To ensure that motorcycle parking areas are located, designed and constructed to enable safe, easy and efficient use.*
SCHEME REQUIREMENTS
A1 *The design of motorcycle parking areas must comply with all of the following:* *(a) be located, designed and constructed to comply with section 2.4.7 "Provision for Motorcycles" of AS/NZS 2890.1:2004 Parking Facilities Part 1: Off-street car parking;* *(b) be located within 30 m of the main entrance to the building.*
RESPONSE
A1 - Complies The proposed parking is designed in accordance with the Australian Standard and have been located within 30m of stairwells and lifts which provide access to the ground floor.

E6.7.10 Design of Bicycle Parking Facilities
Objective: *To encourage cycling as a healthy and environmentally friendly mode of transport for commuter, shopping and recreational trips by providing secure, accessible and convenient bicycle parking spaces.*
SCHEME REQUIREMENTS

A1 *The design of bicycle parking facilities must comply with all the following;* *(a) be provided in accordance with the requirements of Table E6.2;* *(b) be located within 30 m of the main entrance to the building.*
RESPONSE
A1 - Complies Bicycle parking has been provided for compliant with the requirements under Table E6.2 and are located within 30m from lifts and stairwells to level 1, which provides access to the ground floor.
A2 *The design of bicycle parking spaces must be to the class specified in table 1.1 of AS2890.3-1993 Parking facilities Part 3: Bicycle parking facilities in compliance with section 2 "Design of Parking Facilities" and clauses 3.1 "Security" and 3.3 "Ease of Use" of the same Standard.* [R1]
RESPONSE
A2 - Complies The bicycle parking spaces will be provided/constructed to comply with AS 2890.3.

E6.7.11 Bicycle End of Trip Facilities
***Objective:** To ensure that cyclists are provided with adequate end of trip facilities.*
SCHEME REQUIREMENTS
A1 *For all new buildings where the use requires the provision of more than 5 bicycle parking spaces for employees under Table E6.2, 1 shower and change room facility must be provided, plus 1 additional shower for each 10 additional employee bicycle spaces thereafter.* *P1* *End of trip facilities must be provided at an adequate level to cater for the reasonable needs of employees having regard to all of the following:* *(a) the location of the proposed use and the distance a cyclist would need to travel to reach the site;* *(b) the users of the site and their likely desire to travel by bicycle;* *(c) whether there are other facilities on the site that could be used by cyclists;*
RESPONSE

P1 - Complies

The proposal requires more than 5 bicycle parking spaces across the café and business and professional services components of the proposal totalling 7 employee spaces. While not specific cycling end of trip facilities are proposed given the relatively small number of spaces required, it is anticipated there would be access provided (as needed) to utilise shower and change room facilities that are associated with the business and professional services uses.

E6.7.12 Siting of Car Parking
Objective: *To ensure that the streetscape, amenity and character of urban areas is not adversely affected by siting of vehicle parking and access facilities.*
SCHEME REQUIREMENTS
A1 *Parking spaces and vehicle turning areas, including garages or covered parking areas in the Inner Residential Zone, Urban Mixed Use Zone, Village Zone, Local Business Zone and General Business Zone must be located behind the building line of buildings located or proposed on a site except if a parking area is already provided in front of the building line of a shopping centre.* *P1* *Parking spaces and vehicle turning areas, including garages or covered parking areas in the Inner Residential Zone, Urban Mixed Use Zone, Village Zone, Local Business Zone and General Business Zone may be located in front of the building line where topographical or other site constraints dictate that this is the only practical solution because of one or more of the following:* *(a) and only if designed and located to satisfy all of the following: there is a lack of space behind the building line to enable compliance with A1;* *(b) it is not reasonably possible to provide vehicular access to the side or rear of the property;* *(c) the gradient between the front and the rear of existing or proposed buildings is more than 1 in 5;* *(d) the length of access or shared access required to service the car parking would constitute more than 75% of the depth of the relevant lot;* *(e) the access driveway cannot be located at least 2.5 m from a habitable room window of a building defined as a residential building in the Building Code of Australia;* *(f) the provision of the parking behind the building line would result in the loss of landscaped open space and gardens essential to the values or character of a Heritage Place or Precinct listed in the Heritage Code in this planning scheme;* *(g) the provision of the parking behind the building line would result in the loss directly or indirectly of one or more significant trees listed in the Significant Trees Code in this planning scheme,* *and only if designed and located to satisfy all of the following:* *(i) does not visually dominate the site;* *(ii) maintains streetscape character and amenity;*

(iii)	*does not result in a poor quality of visual or audio amenity for the occupants of immediately adjoining properties, having regard to the nature of the zone in which the site is located and its preferred uses;*
(iv)	*allows passive surveillance of the street.*

RESPONSE

A1 - Complies

Although the port corche will be capable of providing short term loading/unloading style parking for up to 3 vehicles, parking spaces will be predominantly within the lower ground flood level, with only a services access provided via the Clare Street access.

The building line is identified as the front of the building, which is to New Town Road, therefore no on-site car parking is provided in front of the building line.

E6.7.13 Facilities for Commercial Vehicles

Objective: *To ensure that facilities for commercial vehicles are provided on site, as appropriate.*

SCHEME REQUIREMENTS

A1

Commercial vehicle facilities for loading, unloading or manoeuvring must be provided on-site in accordance with Australian Standard for Off-street Parking, Part 2 : Commercial. Vehicle Facilities AS 2890.2:2002, unless:

(a) the delivery of all inward bound goods is by a single person from a vehicle parked in a dedicated loading zone within 50 m of the site;

(b) the use is not primarily dependent on outward delivery of goods from the site.

RESPONSE

A1 - Complies

The loading area for the proposal is provided within the access provides access to SRV and MRV vehicles and facilitates forward entry and exit at Clare Street. The TIA accompanying the proposal considers the proposed design and that it complies with the requirements of AS2890.2 and satisfies the requirements Acceptable Solution A1 of Clause E6.7.13 of the Planning Scheme. Noting that a revised version is intended to be submitted as further information to address parking and access requirements.

E6.7.14 Access to a Road
Objective: To ensure that access to the road network is provided appropriately.
SCHEME REQUIREMENTS
A1 *Access to a road must be in accordance with the requirements of the road authority.*
RESPONSE
A1 - Complies Access points will be constructed in accordance with the relevant Australian Standards and Council requirements and a request for consent for works within the road reservation accompanies this application.

4.4 STORMWATER MANAGEMENT CODE

4.4.1 DEVELOPMENT STANDARDS

E7.7.1 Stormwater Drainage and Disposal
Objective: To ensure that stormwater quality and quantity is managed appropriately.
SCHEME REQUIREMENTS
A1 *Stormwater from new impervious surfaces must be disposed of by gravity to public stormwater infrastructure.*
RESPONSE
A1 - Complies As detailed in the accompanying Concept Stormwater Management and Flood Hazard Report and plans prepared by PDA, the stormwater system will be designed so that all roof areas, outlets from water tanks and sealed ground surfaces will be drained to the Council stormwater. Refer to engineering drawing 53851MD -C-020 P1.
A2 *A stormwater system for a new development must incorporate water sensitive urban design principles [R1] for the treatment and disposal of stormwater if any of the following apply:* *(a) the size of new impervious area is more than 600 m2;* *(b) new car parking is provided for more than 6 cars;* *(c) a subdivision is for more than 5 lots.* *P2* *A stormwater system for a new development must incorporate a stormwater drainage system of a size and design sufficient to achieve the stormwater quality and quantity targets in*

accordance with the State Stormwater Strategy 2010, as detailed in Table E7.1 unless it is not feasible to do so.
RESPONSE
A2 - Complies As per the attached stormwater report and plans, the stormwater system will incorporate water sensitive urban design principles for the treatment and disposal of stormwater. PDA have considered that the proposed will provide primary stormwater treatment in the form of proprietary 200 µm mesh baskets in all entry pits. Tertiary treatment will be provided downstream by Council with money paid by the developer in lieu of treatment provided on the site.
A3 *A minor stormwater drainage system must be designed to comply with all of the following:* *(a) be able to accommodate a storm with an ARI of 20 years in the case of non-industrial zoned land and an ARI of 50 years in the case of industrial zoned land, when the land serviced by the system is fully developed;* *(b) stormwater runoff will be no greater than pre-existing runoff or any increase can be accommodated within existing or upgraded public stormwater infrastructure.*
RESPONSE
A3 - Complies The Concept Stormwater Management and Flood Hazard Report identifies that piped stormwater diversion, as well as all drainage infrastructure within the site will be sized for an ARI of 20 years (AEP of 5%). The concept drains model of the existing system indicates that this achievable. The report further identifies that if the proportion of impervious area is greater than 72%, detention storage will be provided in the form of rainwater tanks to compensate for this.
A4 *A major stormwater drainage system must be designed to accommodate a storm with an ARI of 100 years.*
RESPONSE
A4 - Complies As per the accompanying Concept Stormwater Management and Flood Hazard Report and plans prepared by PDA, the proposed stormwater system will be capable of complying with A4.

4.5 HISTORIC HERITAGE CODE

A small section of the north-western portion of the site falls within the NT7 Heritage Area: Frazer Street as shown in the figure below. However, the code does not apply to use and no works are proposed within the extent of the overlay.

Therefore, the provisions of the Code do not apply.

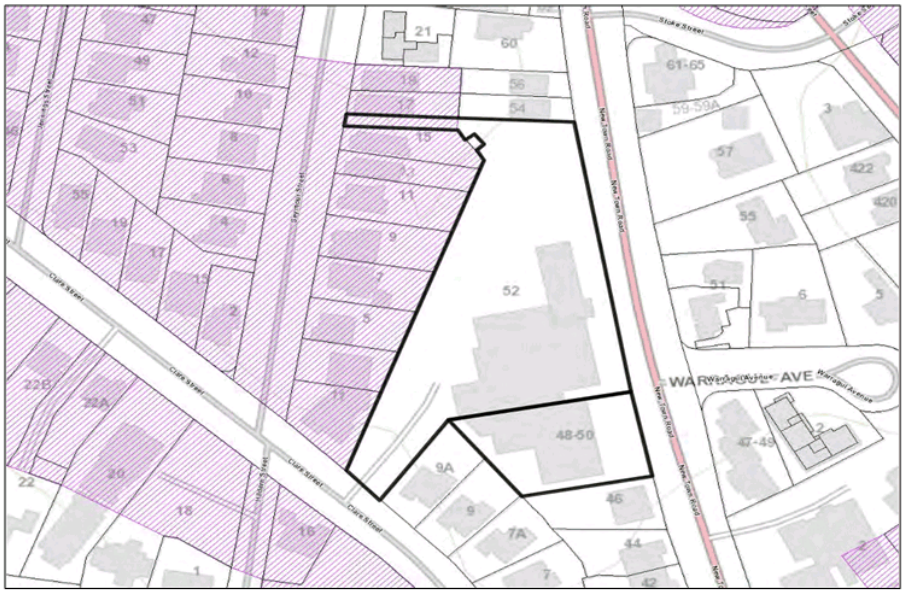


Figure 27: Extent of heritage precinct within the site (source: www.thelist.tas.gov.au © State Government of Tasmania).

4.6 INUNDATION PRONE AREAS CODE

The site has been identified as susceptible to flooding as a result of overland flow. Therefore, a response to the provisions of the Code has been provided.

4.6.1 DEVELOPMENT STANDARDS

E15.7.4 - Riverine Inundation Hazard Areas
Objective: *To ensure that risk from riverine, watercourse or inland flooding is appropriately managed and takes into account the use of the buildings.*
SCHEME REQUIREMENTS
A1 *A new habitable building must have a floor level no lower than the 1% AEP (100 yr ARI) storm event plus 300mm.* ***P1*** *A new habitable building must have a floor level that satisfies all of the following:* *(a) risk to users of the site, adjoining or nearby land is acceptable;* *(b) risk to adjoining or nearby property or public infrastructure is acceptable;* *(c) risk to buildings and other works arising from riverine flooding is adequately mitigated through siting, structural or design methods;* *(d) need for future remediation works is minimised;* *(e) provision of any developer contribution required pursuant to policy adopted by Council for riverine flooding protection works.*
RESPONSE
A1 - Will comply In pre-application discussions, Council has advised that their flood modelling is now outdated and therefore new modelling will be required as part of the detailed design, which will then be used to set the floor levels to ensure compliance with this clause such that any risk from riverine, watercourse or inland flooding is appropriately managed.
A2 *An extension to an existing habitable building must comply with one of the following:* *(a) floor level of habitable rooms is no lower than the 1% AEP (100 yr ARI) storm event plus 300 mm;* *(b) floor area of the extension no more than 60m2 as at the date of commencement of this planning scheme.* ***P1*** *An extension to an existing habitable building must satisfy all of the following:* *(a) floor level to be no lower than existing floor level;* *(b) risk to users of the site, adjoining or nearby land is not increased;* *(c) risk to adjoining or nearby property or public infrastructure is not increased.*

RESPONSE
N/A - proposal does not involve an extension.
A3 *The total floor area of all non-habitable buildings, outbuildings and Class 10b buildings under the Building Code of Australia, on a site must be no more than 60m2.* *P3* *A non-habitable building, an outbuilding or a Class 10b building under the Building Code of Australia, must satisfy all of the following:* *(a) risk to users of the site, adjoining or nearby land is acceptable;* *(b) risk to adjoining or nearby property or public infrastructure is acceptable;* *(c) need for future remediation works is minimised;* *(d) provision of any developer contribution required pursuant to policy adopted by Council for riverine flooding protection works;*
RESPONSE
P3 - Complies The proposal involves non-habitable buildings/outbuildings that will be greater than 60m^2 and as such P3 has been considered by PDA in the accompanying Concept Stormwater Management and Flood Hazard Report prepared by PDA. This report considers the proposals compliance with P3.

5. SUMMARY

This report has been prepared to accompany a development application to Hobart City Council for a proposed Residential use (Multiple Dwelling (23 units); Visitor accommodation (Short Term Accommodation (38 Units); Food Services use (Café); Business and Professional Services use (Consulting Rooms); and Sport and Recreation use (Wellness Centre) and associated works at 48-52 New Town Road, New Town.

The proposal requires a number of changes, upgrades and modifications to infrastructure within New Town Road and Clare Street. These changes include crossovers, provision of a loading zone, modifications to the footpath and service upgrades. Specific details of these works are contained within the accompanying architectural and civil documentation.

Due to title inconsistencies, part of the road reservation falls within the site boundaries. This has required changes to the width of the footpath. Landowner consent for these works has been obtained.

The proposal will require excavations on-site and the accompanying geo-technical report, Environmental Site Assessment and Contamination Management Plan have been prepared to address the relevant provisions of the Scheme.

An Architectural Statement (Woods Bagot DA Report) addressing the design of the building also accompanies this application.

With regard to car parking, this report and in the accompanying TIA that the combined provision of 70 car parking spaces, coupled with the provision of motorcycle spaces and a dedicated bicycle parking room complies with the relevant acceptable solutions and performance outcomes and is more than sufficient to meet the demand generated by the proposal.

The cafe tenancies and commercial activities proposed as part of the application will provide additional services to support the proposal and serve the wider community.

The proposed development has been considered against the relevant provisions of the *Hobart Interim Planning Scheme* and is considered to comply with the outcomes sought by the planning scheme.

16	Please submit an amended Environmental Site Assessment with the following updates and clarifications: 1. The submitted ESA includes a number of references to the proposed use being an 'independent living development', 'retirement home' and 'supported living facility'. The ESA should be updated to reflect the current proposal, which includes residential and visitor accommodation. 2. The submitted ESA makes reference to a different owner/client /developer. The ESA should be updated to reflect the current owner/client/developer. 3. The development plans included in the submitted ESA have been superseded by the development plans submitted with the application. The plans included in the ESA should be updated. Figure 7 should also be updated to reflect the current proposal. 4. The ESA should be updated to reflect current site conditions (e.g. section 3.2). 5. Clarification as to whether the on-site UPSS infrastructure has been decommissioned and removed, or remains in-situ and will be removed as part of the proposed development. 6. The ESA (and CMP) recommend that consideration be given to the use of personal air monitoring devices by construction workers. Please include guidance on what should be considered when determining if air monitoring devices should be worn or not. Please also ensure that the ESA is consistent with regard to these recommendations (Table 65 states '*as a precaution the CMP should be followed, and workers should follow best practices for working in confined spaces including a buddy system and specalised air monitoring equipment*'.) 7. Please clarify recorded groundwater levels at the site and the depth of excavation proposed relative to likely groundwater levels. Section 6.2.3 states '*the surface of the site is proposed to be excavated to 55.35 m AHD which is above the groundwater level in MW1 at 55.8, above groundwater in MW2 at 55.2 m AHD and below the groundwater in MW3 at 58.6 m AHD*'. How is 55.35m above 55.8m? Also 55.35m is the lowest proposed finished floor level, not the maximum excavation depth (slab and footings etc.). 8. It is noted that groundwater has been recorded above 2m BGS in MW3 and that vapour probe testing is therefore recommended, but does not appear to have been undertaken. Please clarify why this has not been undertaken, and if this is part of the post-excavation soil and groundwater sampling required under the CMP. 9. Table 65 states '*once the new building is complete, if it is deemed necessary indoor vapour monitoring may be required to ensure that the spaces are safe to inhabit*'. Please clarify if this will be determined as part of the post-excavation soil and groundwater sampling required under the CMP. 10. Table 65 states '*although groundwater contamination has been identified, no vapour risk has been identified*' whereas section 14.4 states '*these exceedances indicate that there may be a risk to human health including indoor vapour risk'*. Please clarify. 11. The ESA states that '*once the UPSS infrastructure is removed then the risk from the groundwater will be mitigated'*. Please include justification for this conclusion, noting that the report also states that it is plausible that there is secondary groundwater contamination from off-site sources.	

Response comments

Response to Request for Further Information
Please find attached updated documents and response below, addressing the following RFI items:

1 - TasWater RAI
Please refer to the updated civil drawings and ET calculations.
Details regarding the sewer line (E)S/1 to (E)S/4 are only approximate, pending an updated site survey.

2 - Planning Generic
(2) - The property at 11 Clare Street forms part of the application. A copy of the additional title (CT 94370/5) that was missed accompanies this response. 17 Seymour Street was not included in the owner declaration list, as no works are required. It does not form part of the application.

(3) - 54 New Town Road is not required to form part of the application. We request that the title document for this property be removed from the document set.

(7) - A 3D file has already been submitted by email, in advance of the UDAP meeting.

(8) - The proponent has indicated that soil nails/anchors are not proposed at this stage. If this were to change following detailed design, the proponent acknowledges this would required further consent and approval.

#3 - HER Fi 2
(1) & (2) - Works within the right-of-way are limited to service works and the area made good.

#9 - ENGr Fi2
(1), (2) & (3) Please refer to the updated plan and section diagram, illustrating setbacks and width of the footpath to be retained.

A further response addressing the remaining FI items will be submitted shortly.

Documents

Version	Document Date	Document Type	Description	Prepared By
1	24 June 2025	Architectural Plans	NTR Building setback / footpath width	Woods Bagot
1	24 June 2025	General	Response to TasWater RAI	PDA

RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
252465	1
EDITION	DATE OF ISSUE
8	21-Jul-2024

SEARCH DATE : 13-Dec-2024
SEARCH TIME : 12.13 PM

DESCRIPTION OF LAND

City of HOBART
Lot 1 on Plan 252465
Derivation : Whole of 0A-2R-8Ps. Gtd. to M. Everall Part of 1A-3R-10Ps. Gtd. to S. Bendall Part of 2A-1R-35.1/2Ps. Gtd. to J. Dunn.
Prior CT 2616/6

SCHEDULE 1

N201067 TRANSFER to 52 NEW TOWN ROAD PTY LTD Registered 21-Jul-2024 at noon

SCHEDULE 2

Reservations and conditions in the Crown Grant if any
BURDENING EASEMENT: the right of drainage for William Joseph Hugh Clifford and Henry Percy Roberts and Ada Alice Rogers their executors administrators and assigns to construct on strip of land marked Drain 1.22 wide passing through the said land within described such drain or drains as may be necessary for the efficient drainage of the lands and any buildings thereon erected and to keep the same in repair with full and free right and liberty for them their heirs executors administrators or assigns and their agents or workmen to enter upon such strip of land at all times during the day and to do all such acts and things as shall be reasonably necessary for the purpose of constructing the said drains and maintaining the same in proper repair and condition.
BURDENING EASEMENT: Right of Drainage [appurtenant to the land comprised in Certificate of Title Volume 431 Folio 119, Volume 562 Folio 79, Volume 678 Folio 22 and Volume 2287 Folio 47) over the drainage easement 1.52 Wide shown passing through the said land within described.
C452904 BURDENING EASEMENT: A right of carriageway (appurtenant to Lot 1 on D.32216)over the Right of

RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

Way shown passing through the said land within described Registered 14-May-2003 at noon

A157979 LEASE to The Hydro Electric Commission of a leasehold estate for the term of ninety-nine (99) years from 31-Dec-1961 of 0A-0R-0.6/10Ps. of the above land (Diagram No. 441/14) Together with the right to lay and maintain cables. Registered 28-Aug-1962 at noon
Leasehold Title(s) issued: 82674/1

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

FOLIO PLAN

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

OWNER

FOLIO REFERENCE C.T. 2616 – 6

GRANTEE

PLAN OF TITLE

LOCATION

CITY OF HOBART

FIRST SURVEY PLAN No. (C/T 2616.0.)

COMPILED BY L.D.B.B.

SCALE 1: 600 LENGTHS IN METRES

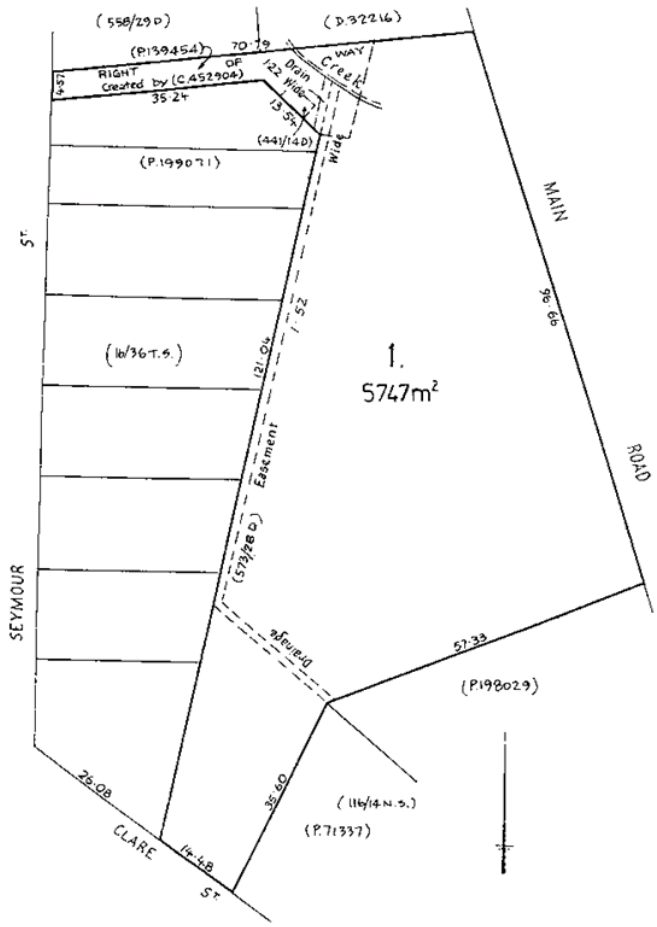
Registered Number

P 252465

APPROVED 9/5/03

Alice Kawa
Recorder of Titles

MAPSHEET MUNICIPAL CODE No. 114 / 5225-42	LAST UPI No GJC93	LAST PLAN No. –	ALL EXISTING SURVEY NUMBERS TO BE CROSS REFERENCED ON THIS PLAN



RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
198029	1
EDITION	DATE OF ISSUE
5	21-Jul-2024

SEARCH DATE : 13-Dec-2024
SEARCH TIME : 12.15 PM

DESCRIPTION OF LAND

City of HOBART
Lot 1 on Plan 198029
Derivation : Whole of Lots 2 & 3 Gtd to A Woods
Prior CT 2616/7

SCHEDULE 1

N201067 TRANSFER to 52 NEW TOWN ROAD PTY LTD Registered 21-Jul-2024 at noon

SCHEDULE 2

Reservations and conditions in the Crown Grant if any
BENEFITING EASEMENT: a right of drainage over the Drainage Easement marked A.B.C. on Plan No. 198029
BURDENING EASEMENT: a right of drainage (appurtenant to the land comprised in Certificate of Title Volume 562 Folio 79) over the Drainage Easement marked C.D. on Plan No. 198029
BURDENING EASEMENT: a right of drainage (appurtenant to the land comprised in Certificate of Title Volume 431 Folio 119) over the Drainage Easement marked C.E. on Plan No. 198029

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

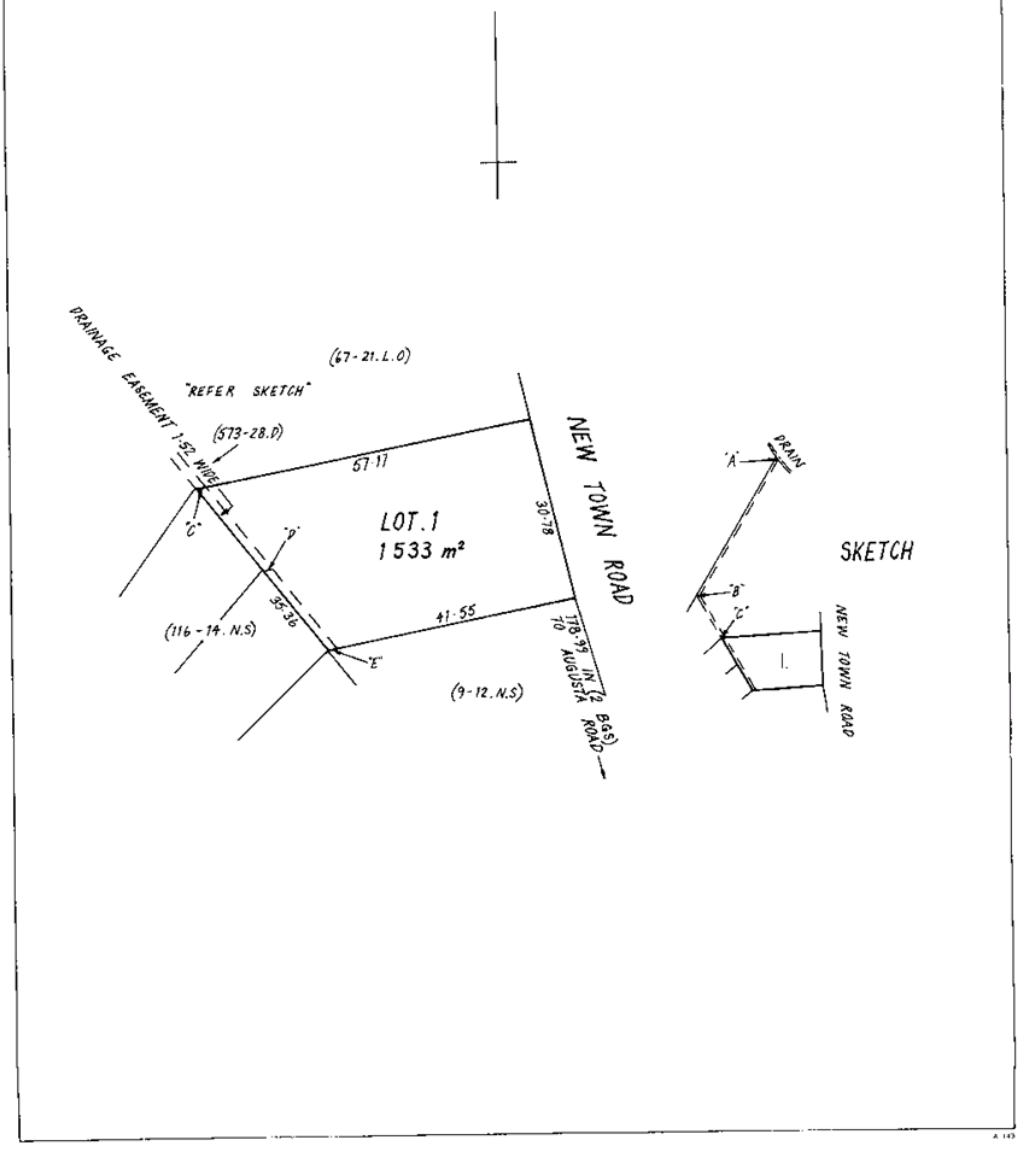
FOLIO PLAN

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

OWNER FOLIO REFERENCE CT:- 2616 - 7 GRANTEE	PLAN OF TITLE LOCATION CITY OF HOBART FIRST SURVEY PLAN No. 254 - 27.D COMPILED BY L.T.O SCALE 1: 600 LENGTHS IN METRES	Registered Number P.198029 APPROVED - 1 DEC 1997 Recorder of Titles
MAPSHEET MUNICIPAL CODE No. 114 (5225-42)	LAST UPI No 2102491	LAST PLAN No.
ALL EXISTING SURVEY NUMBERS TO BE CROSS REFERENCED ON THIS PLAN		



SURVEY NOTES

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

PDA
SURVEYORS, ENGINEERS & PLANNERS

127 Bathurst Street
Hobart, Tasmania 7000
Phone (03) 6234 3217

ABN 71 217 806 325
pda.hbt@pda.com.au
www.pda.com.au

Our Ref: 48187MD
L230201_48187MD to LTO re SIO Notes.docx

1 February 2023

Recorder of Titles
Land Titles Office
PO Box 541
HOBART TAS 7001

Dear Sir/Madam,

RE: Survey Information Only Survey Notes for Remark Survey

Herewith please find attached Survey Information Only Survey Notes, forwarded in accordance with *Section 3.3.1.1.(b)* of the Survey Directions pursuant to the *Surveyors Act 2002*.

Name of Registered Surveyor:	Matthew Stephen Gillis Denholm
Main LTO Plan Reference:	P252465
Number of Pages Deposited:	Six (6)
Surveyor's Reference:	48187MD

Yours faithfully,
PDA Surveyors, Engineers & Planners
Per:

Matthew Denholm
DIRECTOR and REGISTERED LAND SURVEYOR

SID 164449

HOBART:
C.M. Terry, BSurv (Tas.), M.SSSI (Director)
H. Clement, BSurv (Tas.), M.SSSI (Director)
M.S.G. Denholm, BGeom (Tas.), M.SSSI (Director)
T.W. Walter, Dip. Surv & Map (Director)
M. Westerberg, M.E.M., M.I.E. AUST., C.P.ENG. (Director)
D. Panton, B.E. F.I.E. AUST., C.P.ENG. (Consultant)
A. Collins, Ad. Dip. Surv & Map, (Senior Associate)
L.H. Kiely, Ad. Dip. Civil Eng, Cert IV I.T., (Associate)

KINGSTON:
A.P. (Lex) McIndoe, BSurv (Tas.), M.SSSI (Director)
M.M. Stratton, BSurvSpSc, GradDipLandSurv (Tas.) (Associate)

LAUNCESTON:
M.B. Reid, BGeom (Hons) (Tas.), M.SSSI (Director)
J.W. Dent, OAM, B. Surv (Tas.), M.SSSI (Consultant)

BURNIE/DEVONPORT:
A.W. Eberhardt, BGeom (Tas.), M.SSSI (Director)
A.J. Hudson, B. SURV. (Tas.), M.SSSI. (Consultant)

OFFICES ALSO AT:
- 6 Freeman St, Kingston, TAS 7050 (03) 6229 2131
- 10/16 Main Rd, Huonville, TAS 7109 (03) 6264 1277
- 3 Franklin St, Swansea, TAS 7190 (03) 6130 9099
- 3/23 Brisbane St, Launceston, TAS 7250 (03) 6331 4099
- 16 Emu Bay Rd, Deloraine, TAS 7304 (03) 6362 2993
- 6 Queen Street, Burnie, TAS 7320 (03) 6431 4400
- 77 Gunn St, Devonport, TAS 7310 (03) 6423 6875

SURVEY NOTES

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

LAND TITLES OFFICE www.dpiw.tas.gov.au contact ldrbsearch@dpiw.tas.gov.au Ph 6233 3585

LTO COVER PAGE
FOR
SURVEY INFORMATION ONLY SURVEY NOTES
DEPOSITED FOR PUBLIC RECORD PER LTO CIRCULAR 1 OF 2007

Surveyor to complete this Section where shown thus * :

The attached survey notes deposit is for public record, and not for titling purposes directly. Would you please file with the MAIN LTO PLAN No. shown below.

***NAME OF REGISTERED SURVEYOR:** M.S.G. DENHOLM

***SURVEY FIRM:** PDA SURVEYORS, ENGINEERS & PLANNERS

***MAIN LTO PLAN:** *(enter the Volume No. of the main title affected):* P252465
leave blank if unsure

***No. OF PAGES DEPOSITED** - (including this sheet): 6

***Signed by:** M Denholm, 1/2/2023
(Registered Land Surveyor) *(Date)*

SEE ATTACHED SURVEY NOTES FOR SURVEY PURPOSE

* OPTIONAL SURVEY PURPOSE CONTINUATION - (*NB: NOT FOR SURVEYOR REPORTING*):-

SURVEY PREPARED FOR ADHESION OF FR 252465/1 AND FR 198029/1.

ADHESION OF TITLES NOW UNLIKELY TO PROCEED FOR THE FORESEEABLE FUTURE.

SIO REFERENCE (ALLOCATED BY LTO) : 184449

WARNING: ALWAYS SEARCH THE CURRENT CADASTRE.

Adress: Level 1, 134 Macquarie Street, Hobart Postal Address: PO Box 541, Hobart, 7001

SURVEY NOTES

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

OWNER: NORTHWEST HEALTHCARE AUSTRALIAN PROPERTY LIMITED

FOLIO REFERENCE: FR 252465/1
FR 198029/1

GRANTEE: PART OF 2-1-35½ GTD TO JOHN DUNN
WHOLE OF 0-2-8 GTD TO MARIA EVERALL
PART OF 1-3-10 GTD TO SAMUEL BENDALL
WHOLE OF LOTS 2 & 3 GTD TO ANDREW WOODS

PLAN OF SURVEY

BY SURVEYOR: M. S. G. DENHOLM of PDA
127 BATHURST STREET, HOBART

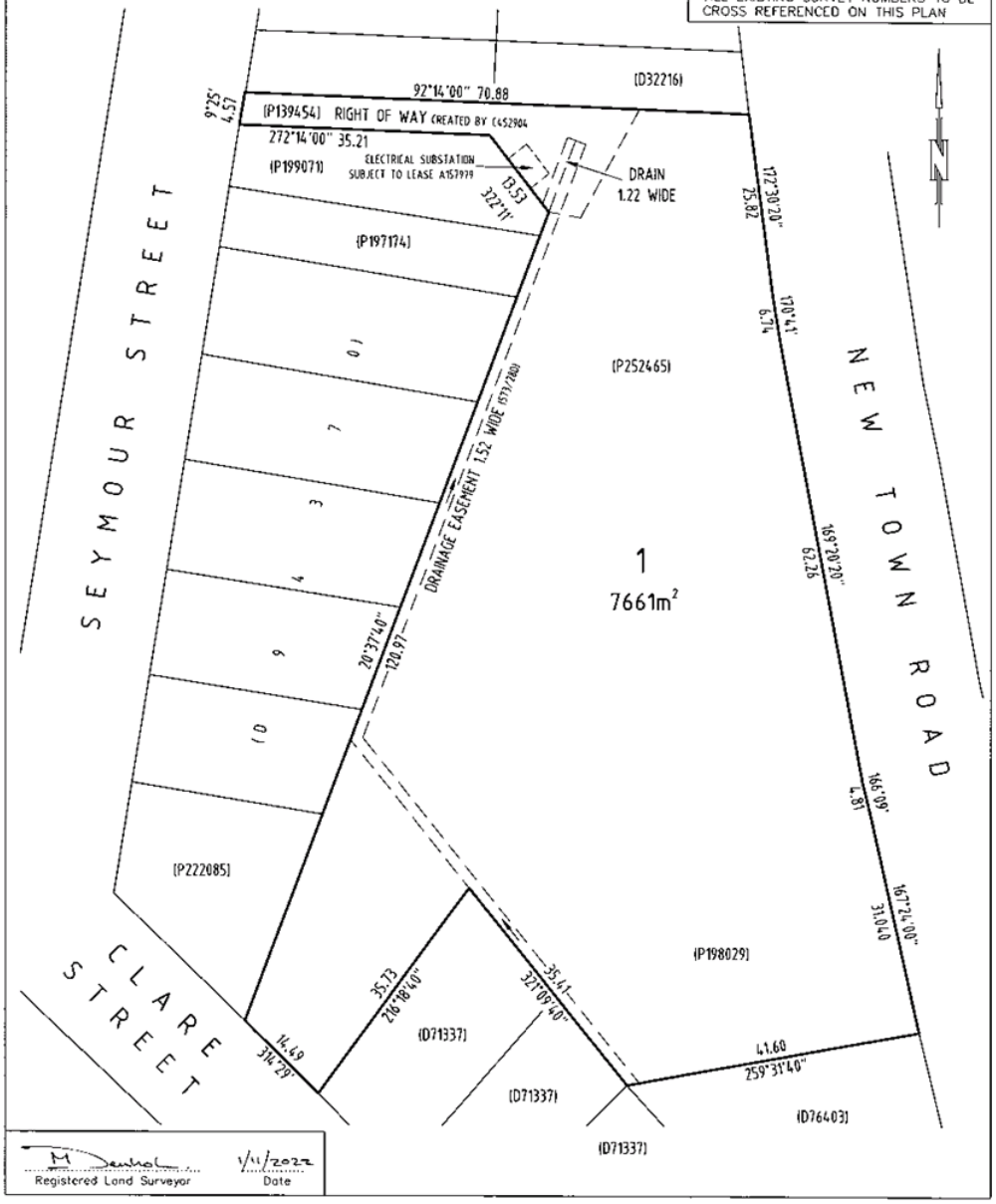
LOCATION: CITY OF HOBART

SCALE 1:500 LENGTHS IN METRES

Registered Number
SI0184449

APPROVED
EFFECTIVE FROM .....
Recorder of Titles

ALL EXISTING SURVEY NUMBERS TO BE CROSS REFERENCED ON THIS PLAN

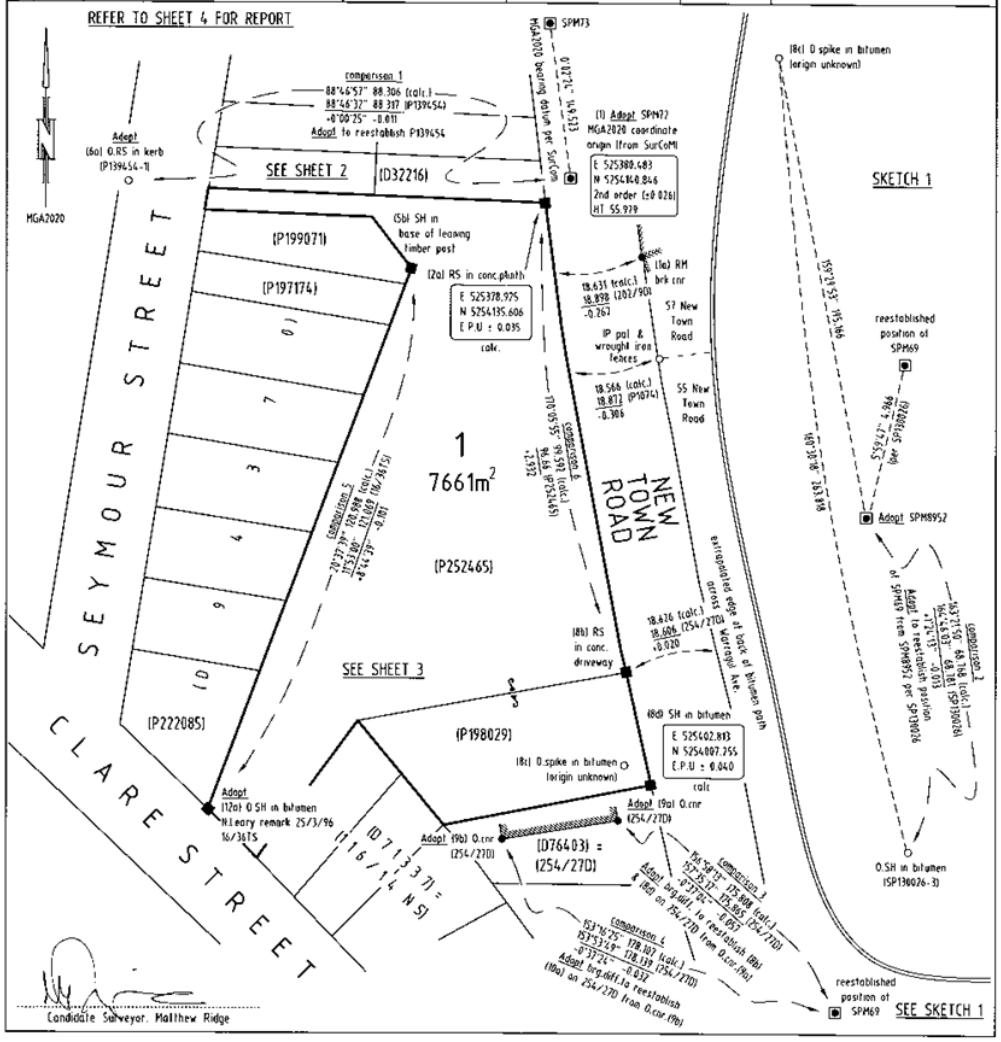


SURVEY NOTES

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

SURVEY NOTES SHEET 1 OF 4 SHEETS	Registered Number SIO 184119	SURVEY CERTIFICATE I, MATTHEW STEPHEN GILLIS DENHOLM of HOBART in Tasmania a Registered Land Surveyor HEREBY CERTIFY that: (a) this survey is based upon the best evidence that the nature of the case admits. (b) the survey notes have been truly compiled from surveys made by me or made under my supervision; and (c) this survey and accompanying survey notes comply with the relevant legislation affecting surveys and are correct for the purpose required. Signature Date 1 / 11 / 2022
CROSS REFERENCE PLAN NUMBERS USED AS PART OF THIS SURVEY	LENGTHS IN METRES	
Owner: Northwest Healthcare Australian Property Limited		
Folio Reference: FR.252465/1 FR.198029/1		
Purpose of Survey: Adhesion of FR.252465/1 and FR.198029/1		
Survey Commenced: 8/9/2021	Survey Completed: 20/1/2022	Surveyors Ref: 48187MD
Horizontal Datum: GDA2020	Bearing Datum: MGA2020	Combined Scale Factor: 0.999599
MGA2020 COORDINATE ORIGIN		
SURCOM Mark ID: SPM72	E: 525380.483	N: 5254140.846 EPU ±0.026



SURVEY NOTES

RECORDER OF TITLES

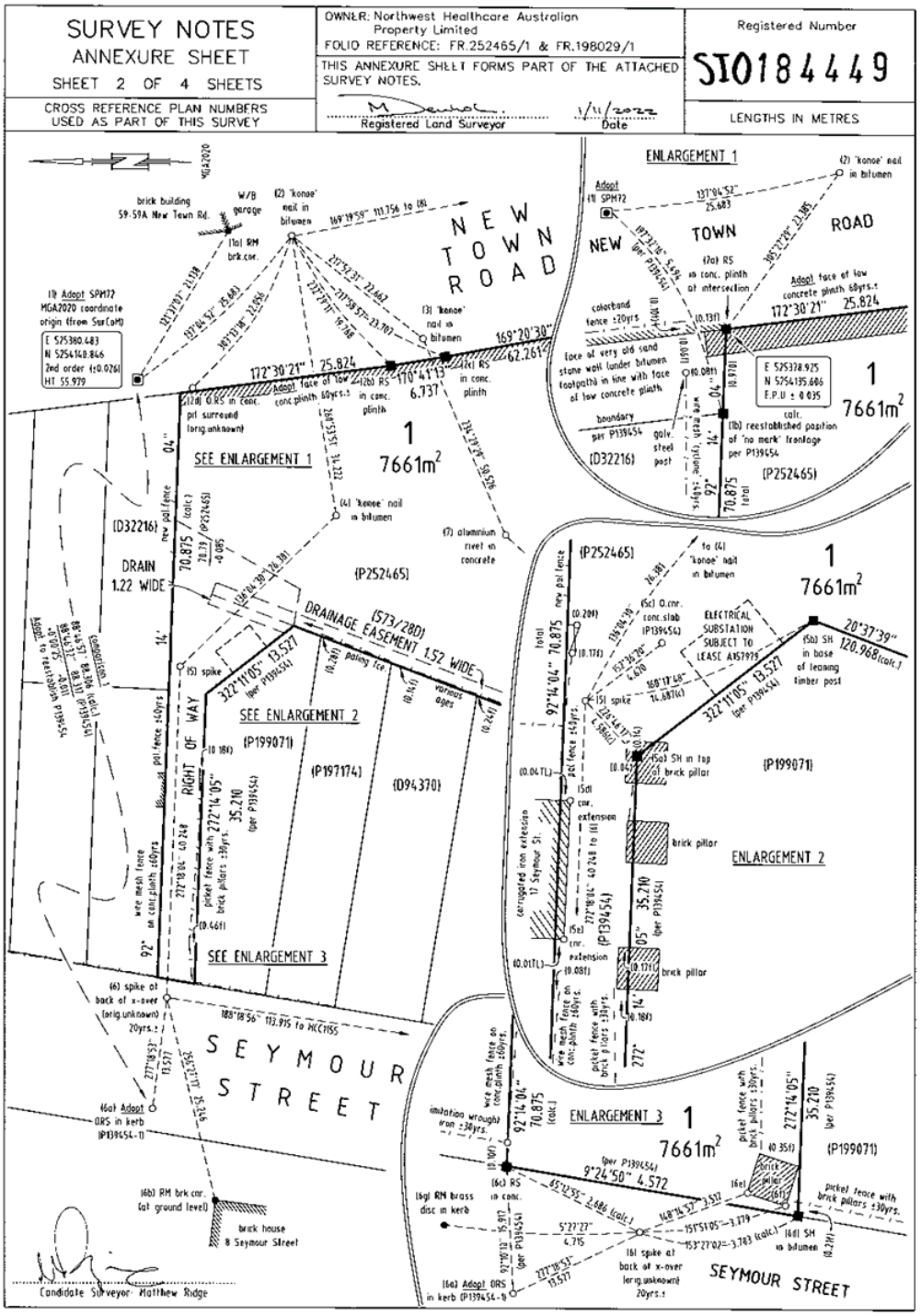
Issued Pursuant to the Land Titles Act 1980

SURVEY NOTES
ANNEXURE SHEET
SHEET 2 OF 4 SHEETS

CROSS REFERENCE PLAN NUMBERS USED AS PART OF THIS SURVEY

OWNER: Northwest Healthcare Australian Property Limited
FOLIO REFERENCE: FR.252465/1 & FR.198029/1
THIS ANNEXURE SHEET FORMS PART OF THE ATTACHED SURVEY NOTES.
Registered Land Surveyor 1/11/2022 Date

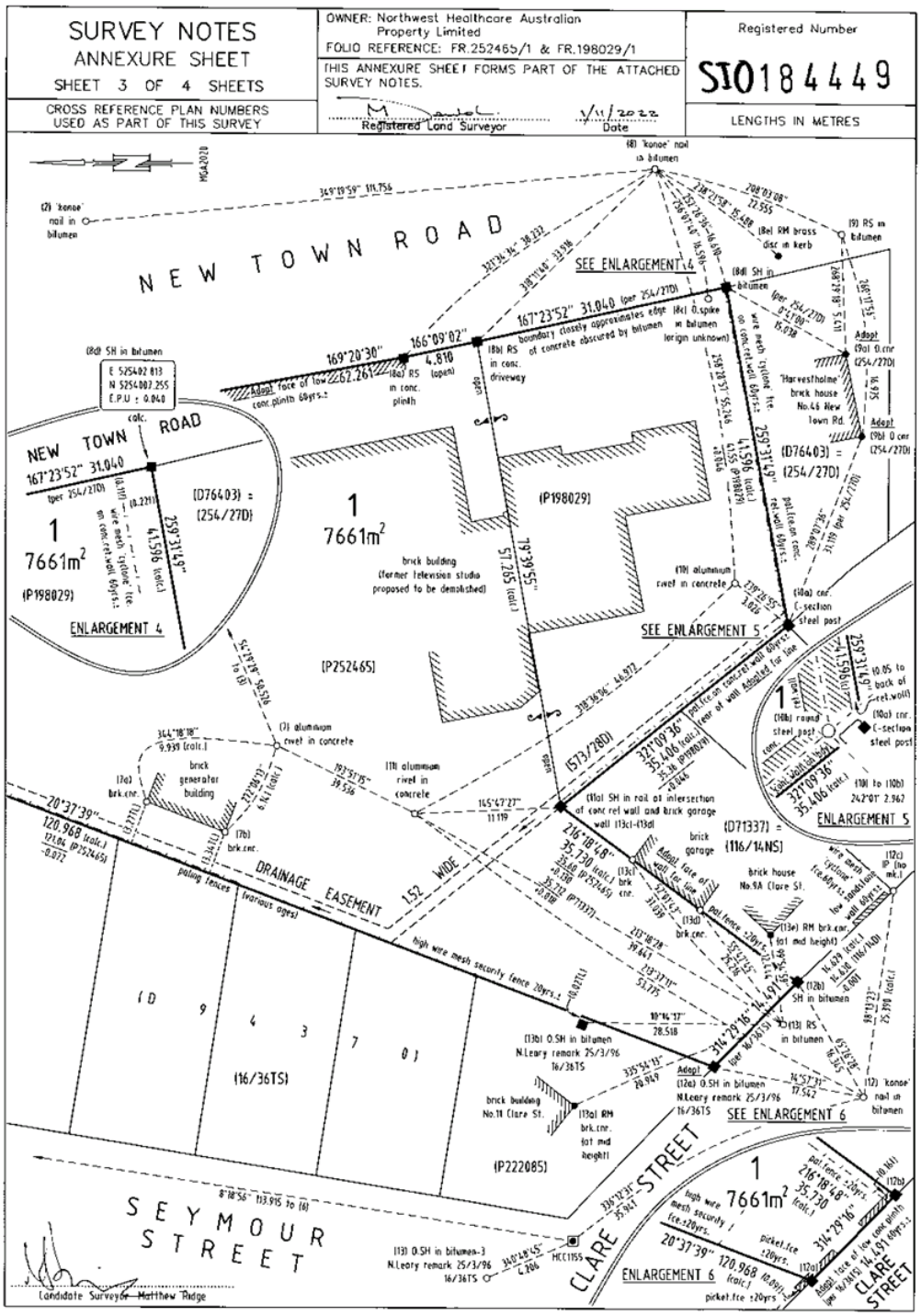
Registered Number
SI0184449
LENGTHS IN METRES



SURVEY NOTES

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980



SURVEY NOTES

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

SURVEY NOTES ANNEXURE SHEET SHEET 4 OF 4 SHEETS	OWNER: Northwest Healthcare Australian Property Limited FOLIO REFERENCE: FR.252465/1 & FR.198029/1 THIS ANNEXURE SHEET FORMS PART OF THE ATTACHED SURVEY NOTES.	Registered Number SIO184449
CROSS REFERENCE PLAN NUMBERS USED AS PART OF THIS SURVEY	Registered Land Surveyor — Date 1/11/2022	LENGTHS IN METRES

NOTES

1. Survey method: Leica MS50 1" Total Station
2. MGA2020 bearing datum calculated between SPM72 & SPM73 per SurCOM
3. All boundaries are Open unless indicated otherwise.
4. Comparison 1 bearing difference was adopted to re-establish (1b) from SPM72, and (6a),(6d),(5a),(5b) from (6a) ORS in kerb per P139454
5. Comparison 3 bearing difference was adopted to re-establish (8d) & (8b) from (9a) per 254/27D
6. Comparison 4 bearing difference was adopted to re-establish (10a) from (9b) per 254/27D The line of (8b) to (8d) was found to closely follow the line of a concrete strip, assumed to be the extent of a driveway since partially obscured by bitumen, supporting the boundary definition here
7. The face of the brick garage wall at 9A Clare Street was adopted from (13c) to (13d), and (11a) was calculated at the intersection of the rear of the concrete retaining wall between (10a) & (11a), and (13c) & (13d)
8. OSH in bitumen (from N. Leary Remark dated 25/3/1996) adopted as corner at (12a) Road frontage face of low concrete plinth ±60yrs on Clare Street has been adopted between (12a) & (12b) maintaining the frontage distance per 16/3615 from (12a).
9. Road frontage face of low concrete plinth ±60yrs along New Town Road has been adopted at (2b),(2c),(8a) Intersection of (6c) & (1b), and face of low concrete plinth ±60yrs was adopted for the corner at (2a)

   Various surveys of the eastern side of New Town Road show offsets to occupation purportedly indicating the boundary of FR 252465/1 These surveys can be briefly summarised as follows

   a) 23/34TS - shows offsets across New Town Road of 99.9 links (18.286m)

   b) 202/9D - shows offset across New Town Road of 62 feet (18.898m)

   c) 186/31D - shows offsets across New Town Road of 60 feet to 61 feet 11 inches (18.288m to 18.872m)

   Adopting a straight line for the New Town Road frontage of FR 252465/1 would result in the width of New Town Road being less than 18m in some areas, and as narrow as 17.5m, and given the disagreement with the evidence of occupation of the site, this was not considered as an option

   Copies of Lands Office surveys C7/21LO, S/54HOB and 9/23BUCK have been obtained The width of these original surveys across FR 252465/1 from the well-defined frontage of Seymour Street was able to be compared This comparison generally indicates an excess with the alignment adopted by following the low concrete plinth ±60yrs There is inconclusive evidence as to whether the New Town Road boundary was intended to be a straight line as is generally depicted on P252465, however the curvature of New Town Road and the presentation of this boundary by the historical Lands Office surveys would appear to indicate that the boundary generally followed retaining wall. Inadequate dimensioning of this boundary on C7/21LO prevents this boundary from being precisely reproduced using measurements.

   The face of an old sandstone retaining wall covered by a bitumen footpath could be seen exposed in the embankment to the north of (2a) which coincided with the outer face of the low concrete plinth supporting the decision to adopt this side of the plinth It is suspected that this old sandstone wall runs beneath the footpath of New Town Road along the frontage of FR 252465/1 and is that likely shown on C7/21LO, but due to the reclaimed land that now extends from New Town Road well into the site, there is no practical way to determine the location of this buried sandstone wall without significant excavation works being undertaken

   During subsequent engineering investigation works undertaken in 2022, several sections of the bitumen footpath in New Town Road were exposed revealing the top of the buried sandstone wall which was found to generally follow the curve of the low concrete plinth. In the absence of any better evidence being available at the time of this survey, for the purpose of re-establishing the New Town Road boundary of FR 252465/1, the alignment of the low concrete plinth ±60yrs is considered the best evidence of occupation and hence the title boundary of FR 252465/1 along New Town Road

RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
199071	1
EDITION	DATE OF ISSUE
4	08-Nov-2023

SEARCH DATE : 14-Mar-2025
SEARCH TIME : 02.14 PM

DESCRIPTION OF LAND

City of HOBART
Lot 1 on Plan 199071
Derivation : Parts of 2R-8P & 2A-1R-35 1/2P Gtd to M Everall & J Dunn respectively.
Prior CT 3148/53

SCHEDULE 1

N163186 TRANSFER to CHENG SHIH WONG and EVELYN JANE WONG Registered 08-Nov-2023 at 12.03 PM

SCHEDULE 2

Reservations and conditions in the Crown Grant if any
BENEFITING EASEMENT: the right for War Service Homes Commissioner to construct on the strip of land marked B.C. on P199071 such drain or drains as may be necessary for the efficient drainage of the said land within described any buildings thereon and to keep the same in repair with full and free right and liberty for his heirs, executors, administrators and assigns and his agents or workmen to enter upon such strip of land at all times during the say and to do all such acts and things as shall be reasonaby necessary for the purpose of constructing the said drains and maintaining the same in proper repair and condition
BURDENING EASEMENT: a similar right of drainage and entry over the strip of land marked A.B. on P199071 for Henry Newall and other owners for the time being of the remaining lands shown on Diagram 16/36 T.S. or their executors, administrators and assigns.
E366315 MORTGAGE to Westpac Banking Corporation Registered 08-Nov-2023 at 12.04 PM

UNREGISTERED DEALINGS AND NOTATIONS

RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

No unregistered dealings or other notations

FOLIO PLAN

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

OWNER

FOLIO REFERENCE C.T. 3148-53

GRANTEE

PLAN OF TITLE

LOCATION
CITY OF HOBART

FIRST SURVEY PLAN No. 16/36 T.S

COMPILED BY L.T.O.

SCALE 1:300 LENGTHS IN METRES

Registered Number
P.199071

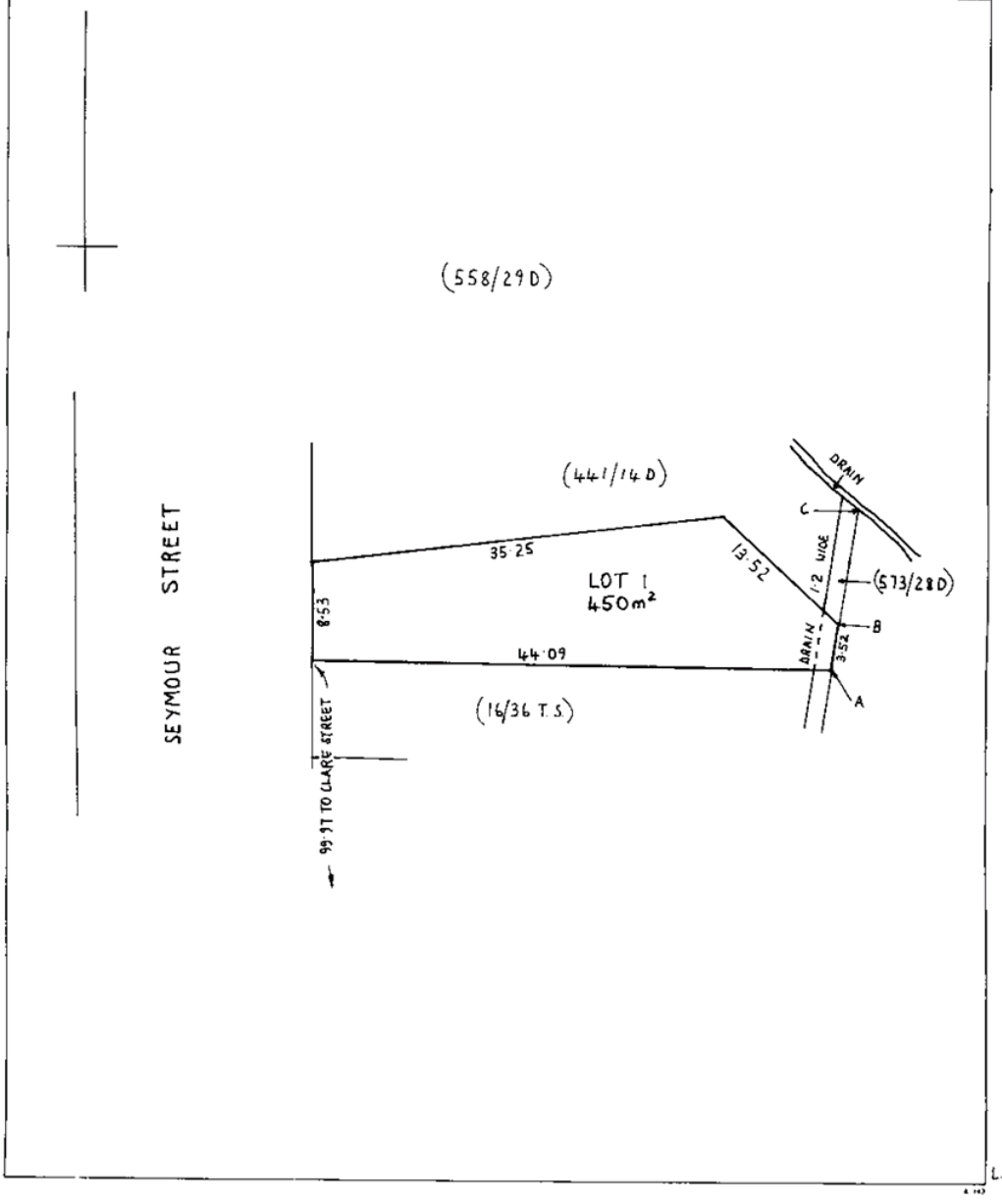
APPROVED 04 MAR 1998
Recorder of Titles

MAPSHEET MUNICIPAL CODE No. 114 (5225-42)

LAST UPI No 2102498

LAST PLAN No. —

ALL EXISTING SURVEY NUMBERS TO BE CROSS REFERENCED ON THIS PLAN



RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
197174	1
EDITION	DATE OF ISSUE
6	14-Jan-2020

SEARCH DATE : 14-Mar-2025
SEARCH TIME : 01.43 PM

DESCRIPTION OF LAND

City of HOBART
Lot 1 on Plan 197174
Derivation : Part of 0A-2R-8Ps. Gtd. to M. Everall.
Prior CT 3038/21

SCHEDULE 1

M787808 TRANSFER to TORELO BARE PTY LTD Registered 14-Jan-2020 at 12.01 PM

SCHEDULE 2

Reservations and conditions in the Crown Grant if any
BENEFITING EASEMENT: the right of Henry Knight and Joan Moira Paul their executors administrators and assigns to construct on the strip of land marked B.E.D.F. on Plan No. 197174 such drain or drains as may be necessary for the efficient drainage of the said land and any buildings on Plan No. 197174 erected and tokeep the same in repair with full and free right and liberty for their heirs executors administrators and assigns and their agents or workmen to enter upon such strip of land at all times during the day and to do all such acts and things as shall be reasonably necessary for the purpose of constructing the said drains and maintaining the same in proper repair and condition.
BURDENING EASEMENT: a similar right of drainage and entry over the strip of land marked A.B.C.D. for the owners for the time being of the remaining lands shown on the said diagram or their executors administrators and assigns.
M796054 MORTGAGE to Rohan Bill Targett and Emma Jane Targett Registered 14-Jan-2020 at 12.02 PM

UNREGISTERED DEALINGS AND NOTATIONS

RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

No unregistered dealings or other notations

the List

FOLIO PLAN
RECORDER OF TITLES
Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

ORIGINAL – NOT TO BE REMOVED FROM TITLES OFFICE

R.P. 1409
TASMANIA
REAL PROPERTY ACT, 1862, as amended
NOTE REGISTERED FOR OFFICE
CONVENIENCE TO REPLACE

CERTIFICATE OF TITLE
Book
Vol
3138 21

Cert. of Title Vol. 858 Fol. 12

I certify that the person described in the First Schedule is the [illegible] estate in fee simple in the land within described together with such interests [illegible] encumbrances and interests as are shown in the Second Schedule. In witness whereunto signed my name and affixed my seal.

Recorder of Titles.

NOTE—ENTRIES CANCELLED UNDER SIGNATURE OF THE RECORDER OF TITLES ARE NO LONGER SUBSISTING.

DESCRIPTION OF LAND

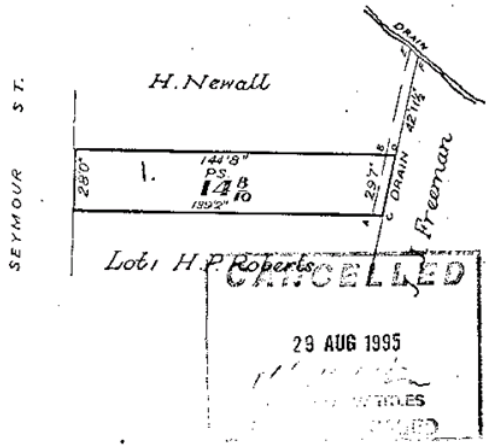
CITY OF HOBART
FOURTEEN PERCHES AND EIGHT TENTHS OF A PERCH on the Plan hereon

FIRST SCHEDULE (Continued overleaf)

JOAN MOIRA PAUL of Hobart, Married Woman

SECOND SCHEDULE (Continued overleaf)

TOGETHER WITH a the right of Henry Knight and Joan Moira Paul their executors administrators and assigns to construct on the strip of land marked B.E.D.F. hereon such drain or drains as may be necessary for the efficient drainage of the said land and any buildings hereon erected and to keep the same in repair with full and free right and liberty for their heirs executors administrators and assigns and their agents or workmen to enter upon such strip of land at all times during the day and to do all such acts and things as shall be reasonably necessary for the purpose of constructing the said drains and maintaining the same in proper repair and condition
SUBJECT TO a similar right of drainage and entry over the strip of land marked A.B.C.D. for the time being of the remaining lands shown on the said diagram or their executors administrators and assigns



REGISTERED NUMBER 197174

Part of 0A-2R-9Ps. Gtd.to M. Everall Meas.in Ft.&Ins. 16/36 T.S.

FIRST Edition. Registered
Derived from C.T. Vol.858.Fol.12. Transfer A73794 H. Knight
Application A146962

RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
94370	1
EDITION	DATE OF ISSUE
8	03-Sep-2021

SEARCH DATE : 14-Mar-2025
SEARCH TIME : 01.42 PM

DESCRIPTION OF LAND

City of HOBART
Lot 1 on Diagram 94370 (formerly being 16-36TS)
Derivation : Part of 1A-3R-10Ps. Gtd. to S. Bendall
Prior CT 3171/63

SCHEDULE 1

C659680 TRANSFER to GLENN ROBERTSON WOODFALL and VICTORIA JANE WOODFALL Registered 08-Aug-2005 at 12.01 PM

SCHEDULE 2

Reservations and conditions in the Crown Grant if any
BENEFITING EASEMENT the right for Louisa Caroline Roberts her Executors Administrators and Assigns to construct on the strip of land marked Right of drainage running from the Northern Boundary of Lot 1 to Drain on D. 94370 such drain or drains as may be necesary for the efficient drainage of the said land within described and any buildings thereon erected and to keep the same in repair with full and free right and liberty for her heirs and executors administrators or assigns and her agents or workmen to enter upon such strip of land at all times during the day and to do all such acts and things as shall be reasonably necessary for the purpose of constructing the said drains and maintaining the same in proper repair and condition
BURDENING EASEMENT the right for Ada Alice Rogers and her executors administrators and assigns to construct on the strip of land marked Right of drain passing through the said Lot 1 such drain or drains as may be necessary for the efficient drainage of the remainder of the land shown on Diagram NO. 16/36 T.S. and any buildings which may hereafter be erected thereon and to keep the same in repair with full and free right for the said Ada Alice Rogers her executors administrators and assigns and her or their agents and workmen to enter upon such strip of land at all

RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

times during the day time and to do all such works acts and things as shall be reasonably necessary for the purpose of constructing the said drains and maintaining the same in proper repair andcondition

E273956 MORTGAGE to B&E Ltd Registered 03-Sep-2021 at 12.01 PM

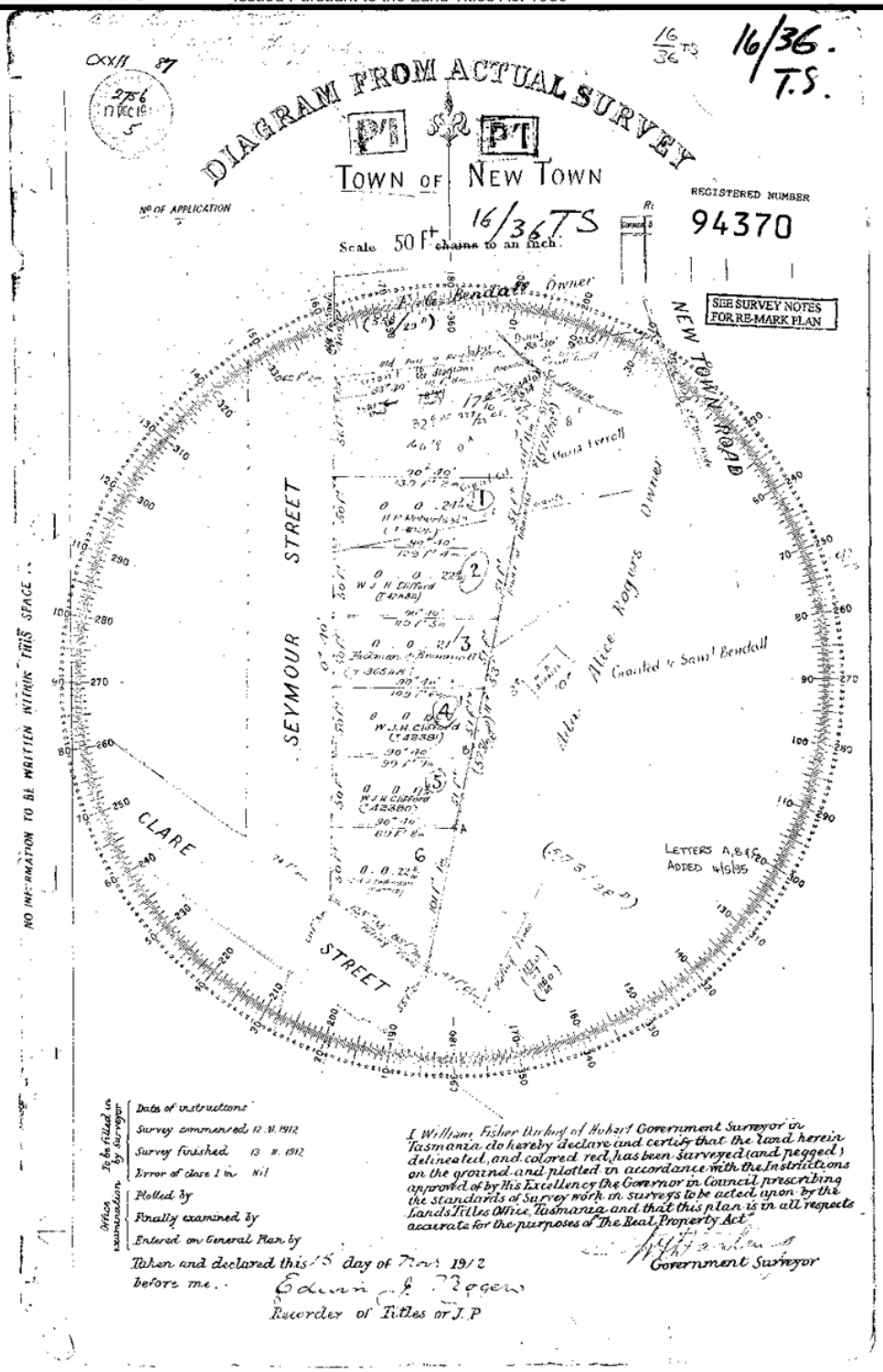
UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

FOLIO PLAN

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980



RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
94370	2
EDITION	DATE OF ISSUE
2	30-Mar-2016

SEARCH DATE : 14-Mar-2025
SEARCH TIME : 01.41 PM

DESCRIPTION OF LAND

City of HOBART
Lot 2 on Diagram 94370 (formerly being 16-36TS)
Derivation : Part of 1A-3R-10Ps. Gtd. to S. Bendall
Prior CT 2903/22

SCHEDULE 1

M540778 ASSENT to ANN MARY COLEMAN Registered 30-Mar-2016 at 12.01 PM

SCHEDULE 2

Reservations and conditions in the Crown Grant if any
BENEFITING EASEMENT the right for Ailsa Emily Howard her executors administrators and assigns to construct on the strip of land marked Right of Drainage passing from the said land within described to Drain D. 94370 such drain or drains as may be necessary for the efficient drainage of the land comprised herein and any buildings thereon erected and to keep the same in repair with full and free right and liberty for her heirs executors administrators and assigns and her agents or workmen to enter upon such strip of land at all times during the day and to do all such acts and things as shall be reasonably necessary for the purpose of constructing the said drains and maintaining the same in proper repair and condition
BURDENING EASEMENT the right for Ada Alice Rogers and her executors administrators and assigns to construct on the land marked Right of Drainage passing through the said land within described such drain or drains as may be necessary for the efficient drainage of the remainder of her land on Diagram No. 94370 and any buildings which may hereafter be erected theroen and to keep the same in repair with full and free right for the said Ada Alice Rogers her executors administrators and assigns and her and their agents and workmen to enter upon the said land at all times

RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

during the day time and to do all such works acts and things as shall be reasonably necessary for the purpose of constructing the said drains and maintaining the same in proper repair and condition

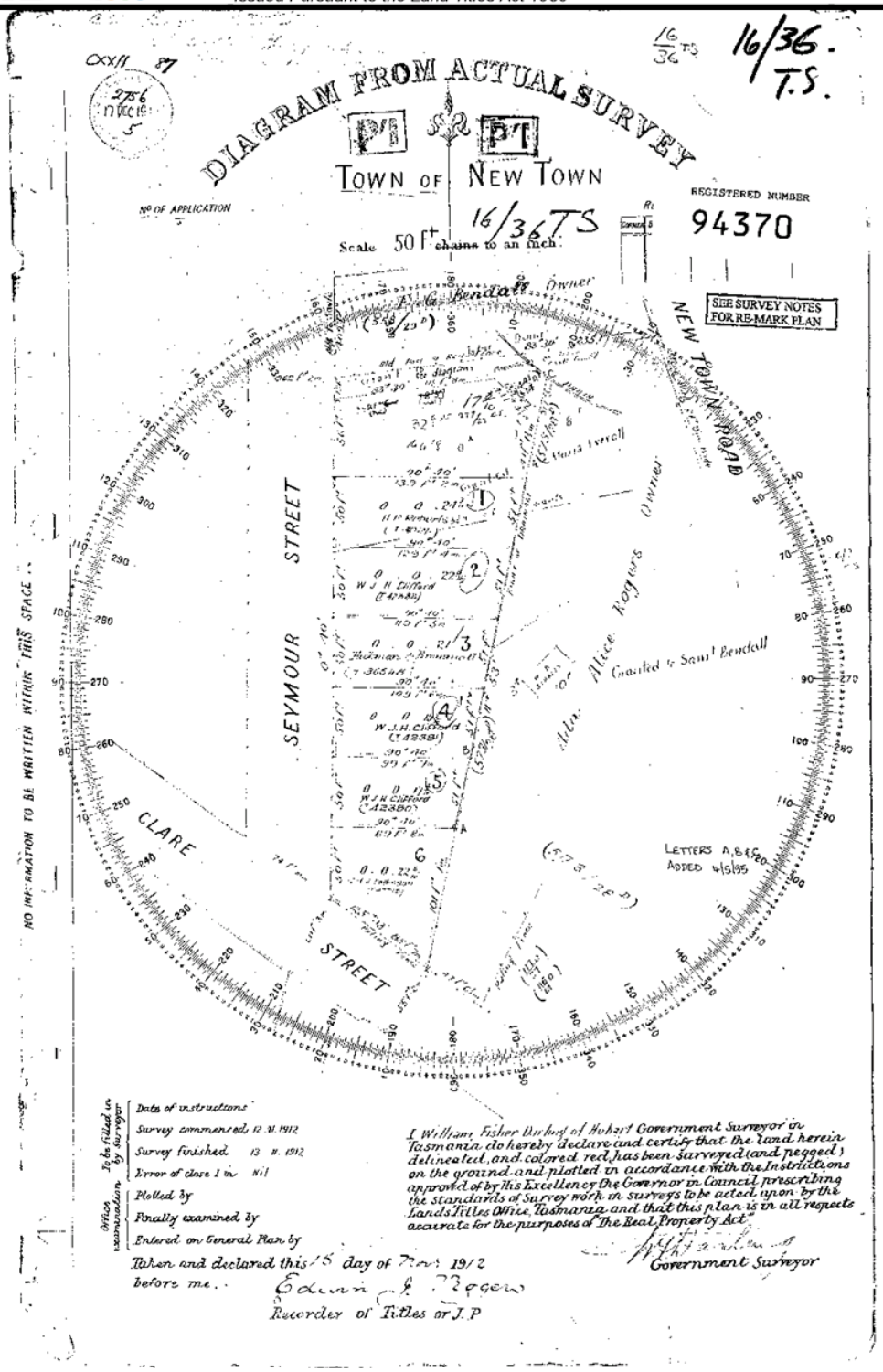
UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

FOLIO PLAN

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980



RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
94370	3
EDITION	DATE OF ISSUE
6	07-Apr-2020

SEARCH DATE : 14-Mar-2025
SEARCH TIME : 01.40 PM

DESCRIPTION OF LAND

City of HOBART
Lot 3 on Diagram 94370 (formerly being 16-36TS)
Derivation : Part of 1A-3R-10Ps. Gtd. to S.Bendall
Prior CT 3148/92

SCHEDULE 1

M814767 TRANSFER to NICHOLAS ANDREW THOMAS and WAN-CHI WU
Registered 07-Apr-2020 at noon

SCHEDULE 2

Reservations and conditions in the Crown Grant if any
SUBJECT TO the right for William Joseph Hugh Clifford his executors administrators and assigns to construct on the strip of land shown passing through Lot 3 and marked Right of Drainage such drain or drains as may be necessary for the - efficient drainage of Lots 2,4 and 5 marked on D 94370 and any building thereon erected Also to keep the same in repair with full and free right and liberty for his heirs executors administrators or assigns and his agents or workmen to enter upon such strip of land at all times during the day and to do all such acts and things as shall be reasonably necessary for the purpose of constructing the said drains and maintaining the same in proper repair and condition
E212479 MORTGAGE to Perpetual Corporate Trust Limited
Registered 07-Apr-2020 at 12.01 PM

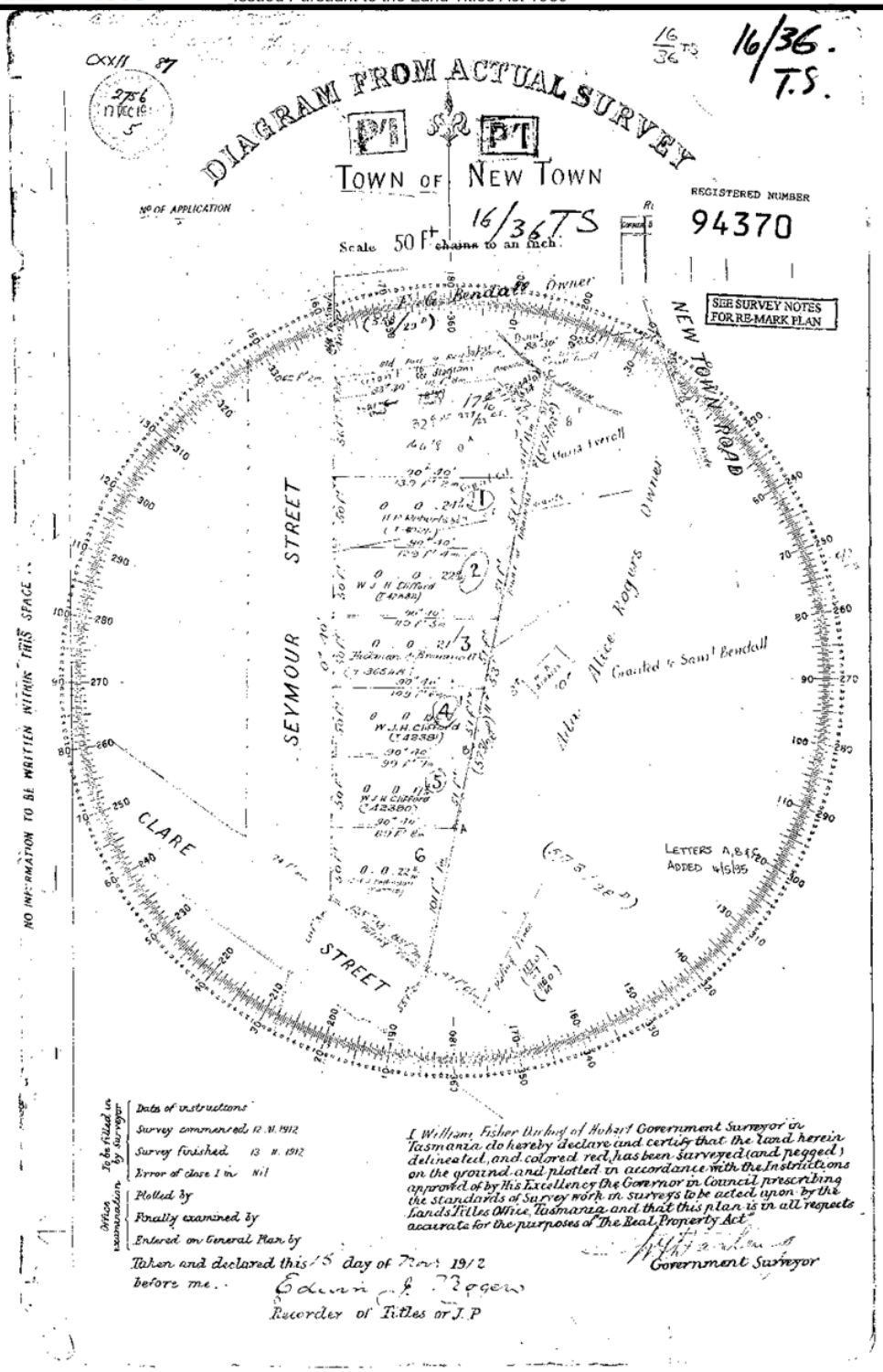
UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

FOLIO PLAN

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980



RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
94370	4
EDITION	DATE OF ISSUE
10	12-May-2020

SEARCH DATE : 14-Mar-2025
SEARCH TIME : 01.39 PM

DESCRIPTION OF LAND

City of HOBART
Lot 4 on Diagram 94370 (formerly being 16-36TS)
Derivation : Part of 1A-3R-10Ps Gtd to S Bendall
Prior CT 3186/22

SCHEDULE 1

M817768 TRANSFER to DALE EDWARD WEBSTER and PATRICIA CLAIRE WEBSTER Registered 12-May-2020 at noon

SCHEDULE 2

Reservations and conditions in the Crown Grant if any
BENEFITING EASEMENT: a right for Anne Newitt her executors administrators and assigns to construct on the Drainage Easement passing from the said land within described to the Drain on D 94370 such drain or drains as may be necessary for the efficient drainage of the land within described and any buildings thereon erected and to keep the same in repair with full and free right and liberty for her heirs executors administrators and assigns and her agents or workmen to enter upon such strip of land at all times during the day and to do all such acts and things as shall be reasonably necessary for the purpose of constructing the said drains and maintaining the same in proper repair and condition
BURDENING EASEMENT: the right for Ada Alice Rogers her executors administrators and assigns to construct on the Drainage Easement passing through the said land within described such drain or drains as may be necessary for the efficient drainage of the remainder of land on D 94370 and any buildings which may hereafter be erected thereon and to keep the same in repair with full and free right for the said Ada Alice Rogers her executors administrators and assigns and her or their agents and workmen to enter upon such strip of land at all times during the day time

RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

and do all such works acts and things as shall be reasonably necessary for the purpose of constructing the said drains and maintaining the same in proper repair and condition

E219240 MORTGAGE to Commonwealth Bank of Australia
Registered 12-May-2020 at 12.01 PM

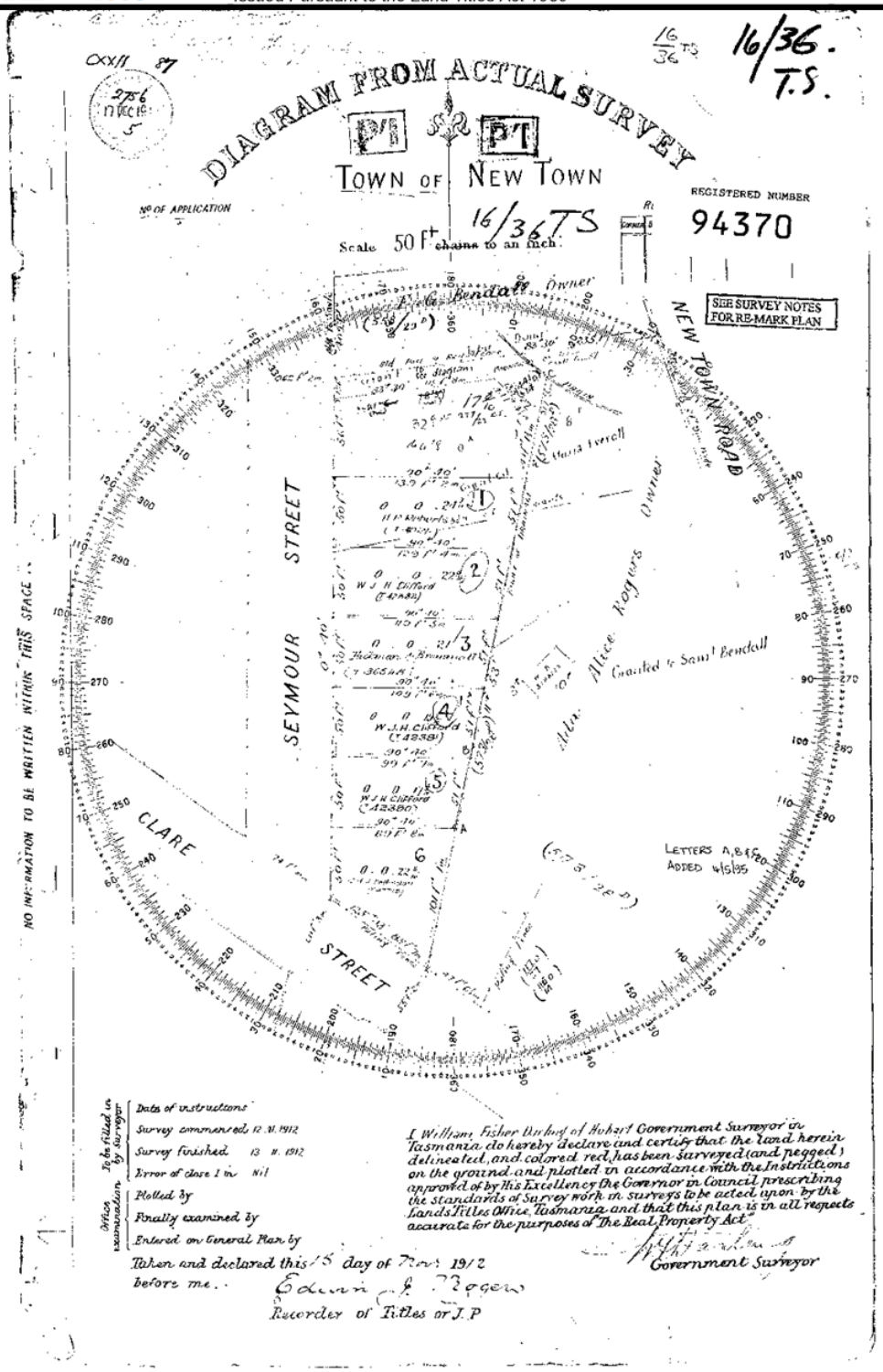
UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

FOLIO PLAN

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980



RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
94370	5
EDITION	DATE OF ISSUE
3	15-Aug-2006

SEARCH DATE : 30-Jun-2025
SEARCH TIME : 05.10 PM

DESCRIPTION OF LAND

City of HOBART
Lot 5 on Diagram 94370 (formerly being 16-36TS)
Derivation : Part of 1A-3R-10Ps. Gtd. to S. Bendall
Prior CT 2588/56

SCHEDULE 1

C676025 TRANSFER to HEALTH SERVICES UNION OF AUSTRALIA TASMANIA NO.1 BRANCH Registered 15-Aug-2006 at 12.01 PM

SCHEDULE 2

Reservations and conditions in the Crown Grant if any
TOGETHER WITH the right for Charles Sinclair his executors administrators and assigns to construct on the strip of land marked B.C. on D.94370 such drain or drains as may be necessary for the efficient drainage of the land comprised herein and any buildings thereon erected and to keep the same in repair with full and free right and liberty for his heirs executors administrators or assigns and his agents or workmen to enter upon such strip of land at all times during the day and to do all such acts and things as shall be reasonably necessary for the purpose of constructing the said drains and maintaining the same in proper repair and condition
SUBJECT TO the right for Ada Alice Rogers and her executors administrators and assigns to construct on the strip of land marked A.B. on D.94370 such drain or drains as may be necessary for the efficient drainage of the remainder of her land shown on Diagram No. D.94370 and any buildings which may hereafter be erected thereon and to keep the same in repair with full and free right for the said Ada Alice Rogers her executors administrators and assigns and her and their agents and workmen to enter upon such strip of land at all times during the day time and to do all

such works Acts and things as shall be reasonably necessary for the purpose of constructing the said drains and maintaining the same in proper repair and condition.

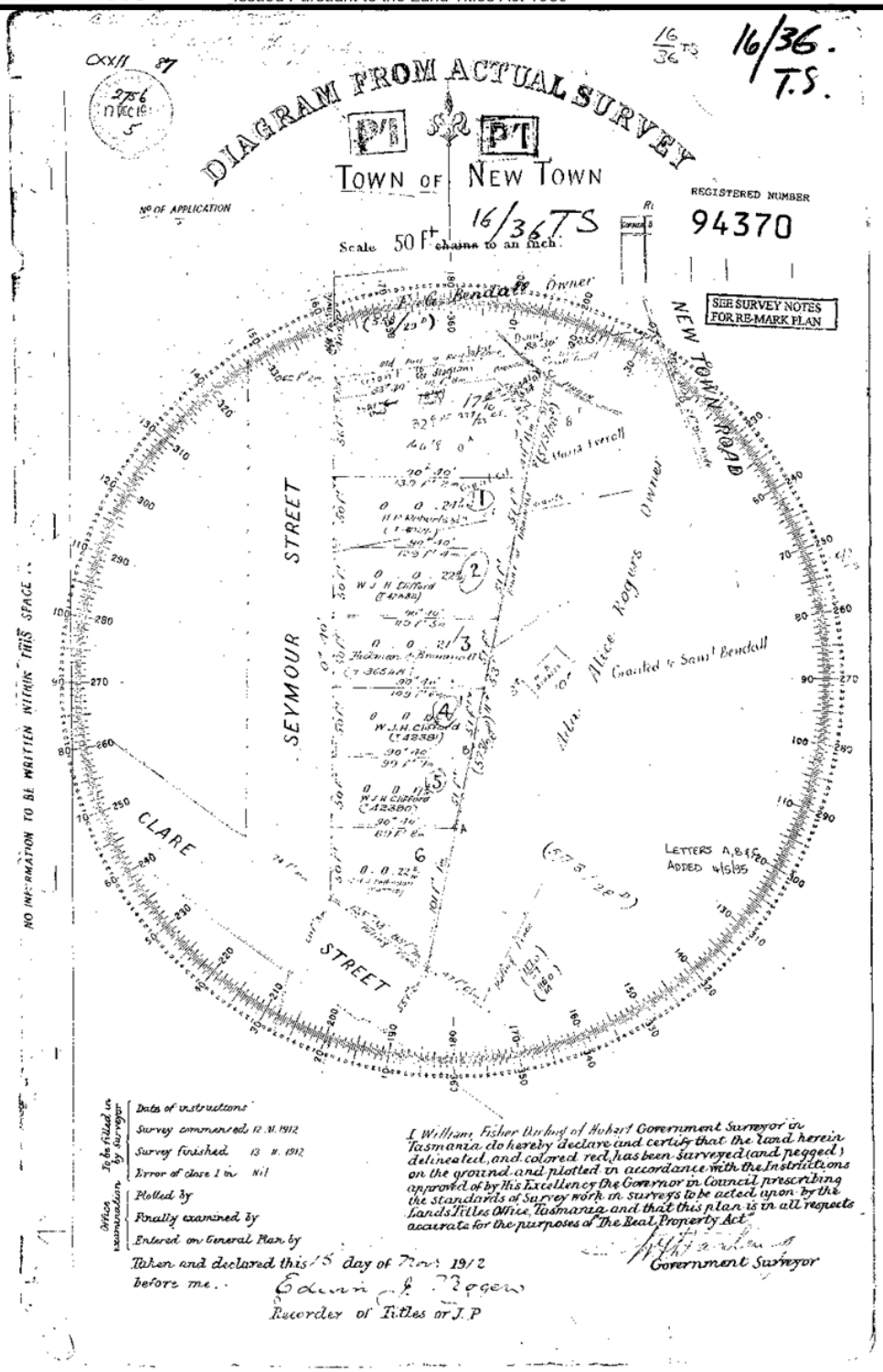
UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

FOLIO PLAN

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980



RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
222085	6
EDITION	DATE OF ISSUE
3	15-Aug-2006

SEARCH DATE : 14-Mar-2025
SEARCH TIME : 01.38 PM

DESCRIPTION OF LAND

City of HOBART
Lot 6 on Plan 222085
Derivation : Part of 1A-3R-10Ps. Gtd. to S. Bendall
Prior CT 2764/72

SCHEDULE 1

C676025 TRANSFER to HEALTH SERVICES UNION OF AUSTRALIA TASMANIA NO.1 BRANCH Registered 15-Aug-2006 at 12.01 PM

SCHEDULE 2

Reservations and conditions in the Crown Grant if any

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

FOLIO PLAN

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

ORIGINAL - NOT TO BE REMOVED

R.P. 1469

TASMANIA

REAL PROPERTY ACT, 1862, as amended

CERTIFICATE OF TITLE

Register Book
Vol. Fol.

Cert. of Title Vol.412. Fol.23.

I certify that the person described in the First Schedule is the registered proprietor of an estate in fee simple in the land within described together with such interests and subject to such encumbrances and interests as are shown in the Second Schedule. In witness whereof I have hereunto signed my name and affixed my seal.

Recorder of Titles.

DESCRIPTION OF LAND

CITY OF HOBART
TWENTY TWO PERCHES AND EIGHT TENTHS OF A PERCH on the Plan hereon.

FIRST SCHEDULE(continued overleaf)

TASMANIAN TELEVISION LIMITED.

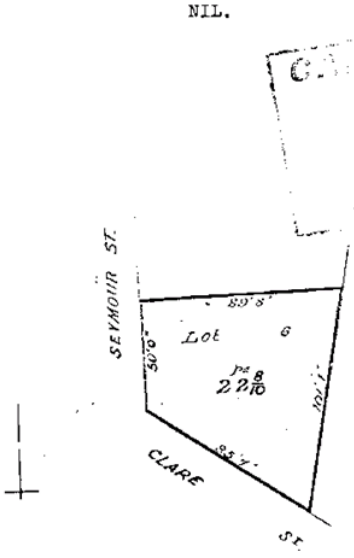
SECOND SCHEDULE(continued overleaf)

NIL.

NOTE—ENTRIES CANCELLED UNDER SIGNATURE OF THE RECORDER OF TITLES ARE NO LONGER SUBSISTING.

REGISTERED NUMBER 222085

Lot 6 of this plan consists of all the land comprised in the above-mentioned cancelled folio of the Register.



Part of 1A-3R-10Pchs. Gtd. to S. Bendall - Meas. in ft. & ins. 16/36PS.

FIRST Edition. Registered 20 [illegible] 1978

Derived from C.T. Vol. 412 Fol. 23 - Transfer A249022 E.B. Barwick.

RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
71337	1
EDITION	DATE OF ISSUE
5	07-Sep-2015

SEARCH DATE : 14-Mar-2025
SEARCH TIME : 01.36 PM

DESCRIPTION OF LAND

City of HOBART
Lot 1 on Diagram 71337 (formerly being 116-14NS)
Derivation : Part of 3A-9P Gtd to C Sefton.
Prior CT 2616/9

SCHEDULE 1

M531681 TRANSFER to CHRIS HIRAS Registered 07-Sep-2015 at noon

SCHEDULE 2

Reservations and conditions in the Crown Grant if any
BENEFITING EASEMENT: a right of drainage over the drainage easement shown on D71337
E19909 MORTGAGE to Australia and New Zealand Banking Group Limited Registered 07-Sep-2015 at 12.01 PM

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

FOLIO PLAN

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

N.S. 116/14

DIAGRAM FROM ACTUAL SURVEY

CITY OF HOBART

Scale 30 ft to an inch.

REGISTERED NUMBER 71337

Part of Ó. 3. 39 Glut to Chas Sefton.

REFERENCE TO CORNERS

COR.	BEARING	DISTANCE IN LINKS	FROM

116/14 D

SEYMOUR ST

CLARE ST

J. J. Freman Owner

E. A. Ramsay & others Owrs

A. J. Williams

J. W. O. Dermell

Isabella Haines Owr

E. Warren Owr

A. C. Bowden Owr

1 Ó. 0. 21⅞

2

3 Ó. 0. 20⅛

4 Ó. 0. 22⅞

I, William Fisher Darling of Hobart, Authorised Surveyor, of Tasmania, do hereby certify that this plan has been made from surveys executed by me or under my own personal supervision, inspection, and field check, and that both plan and survey are correct, and have been made in accordance with the by-laws of the Surveyors' Board, dated 1st May, 1913.

W F Darling

Authorised Surveyor.

To be filled in by Surveyor.
- Date of Instructions
- Survey commenced 11. 1. 1938
- Survey finished
- Error of close 1 in

Office examination.
- Plotted by
- Examined as to boundaries
- Mathematically checked
- Entered on Card by

Dated this 1st day of Feb. 1938

RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
71337	2
EDITION	DATE OF ISSUE
2	21-Dec-1995

SEARCH DATE : 06-Mar-2025
SEARCH TIME : 02.39 PM

DESCRIPTION OF LAND

City of HOBART
Lot 2 on Diagram 71337 (formerly being 116-14NS)
Derivation : Part of 0A-3R-39Ps. Gtd. to C. Sefton
Prior CT 2616/8

SCHEDULE 1

B883087 TRANSFER to STEPHEN WILLIAM SONNEVELD Registered 21-Dec-1995 at 12.01 PM

SCHEDULE 2

Reservations and conditions in the Crown Grant if any
BENEFITING EASEMENT: Right of Drainage over the drainage easement on d. 86354
BURDENING EASEMENT: Right of Drainage [appurtenant to Lot 3 on Diagram NO. 71337) over the Drainage Easement marked C.D. on D. 86354
B883088 MORTGAGE to Commonwealth Bank of Australia Registered 21-Dec-1995 at 12.02 PM

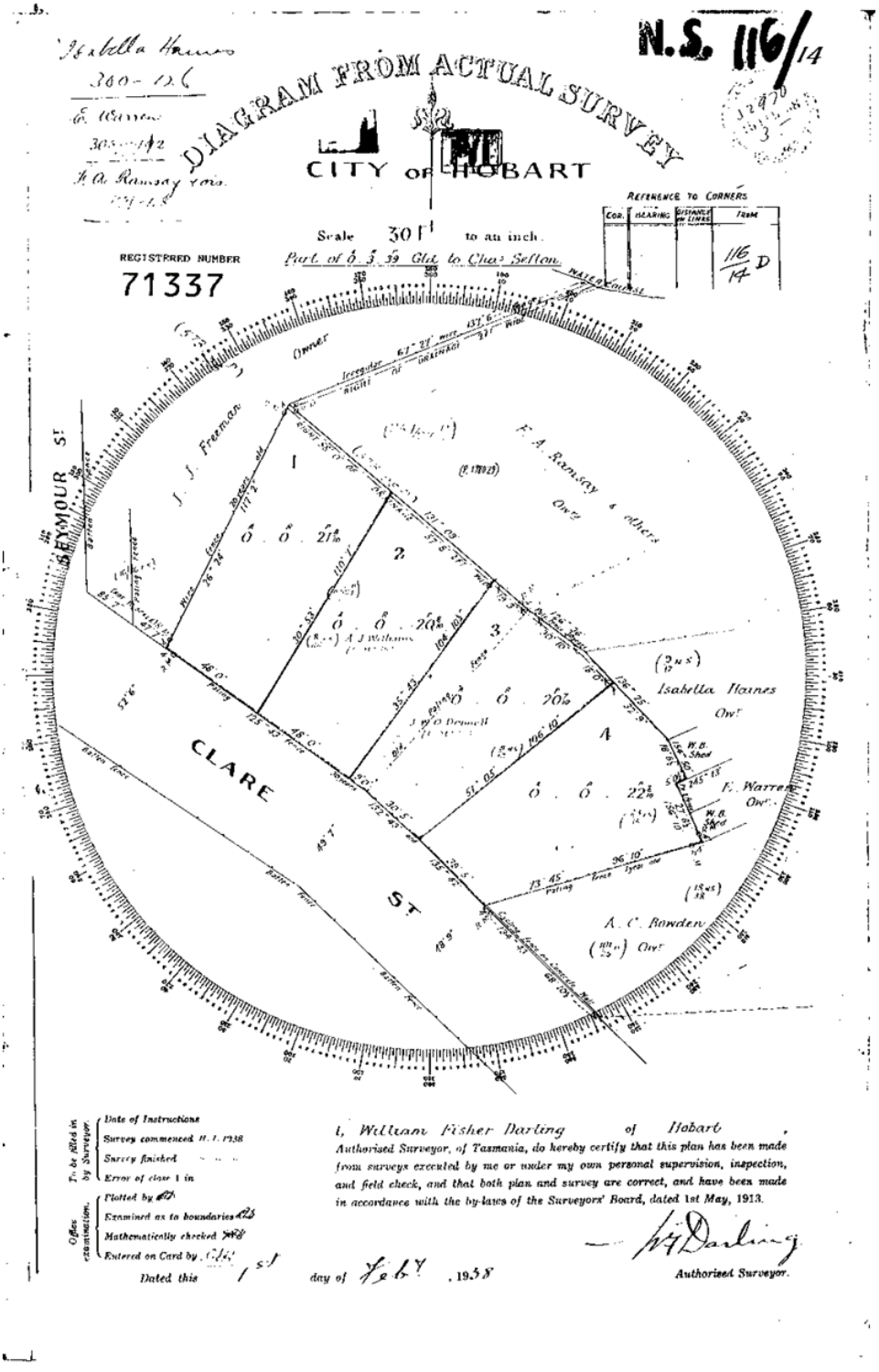
UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

FOLIO PLAN

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980



RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
71337	3
EDITION	DATE OF ISSUE
4	07-Mar-2023

SEARCH DATE : 06-Mar-2025
SEARCH TIME : 02.38 PM

DESCRIPTION OF LAND

City of HOBART
Lot 3 on Diagram 71337 (formerly being 116-14NS)
Derivation : Part of 0A-3R-39Ps. Gtd. to C.Sefton
Prior CT 2287/47

SCHEDULE 1

C251768 TRANSFER to ANDREW FULLER and BETH GAYE WARDLAW
Registered 18-Oct-2000 at 12.01 PM

SCHEDULE 2

Reservations and conditions in the Crown Grant if any
BENEFITING EASEMENT: Right of Drainage over the drainage easement marked A.B. and C.D. on D86354
89142 BOUNDARY FENCES CONDITION in Transfer

UNREGISTERED DEALINGS AND NOTATIONS

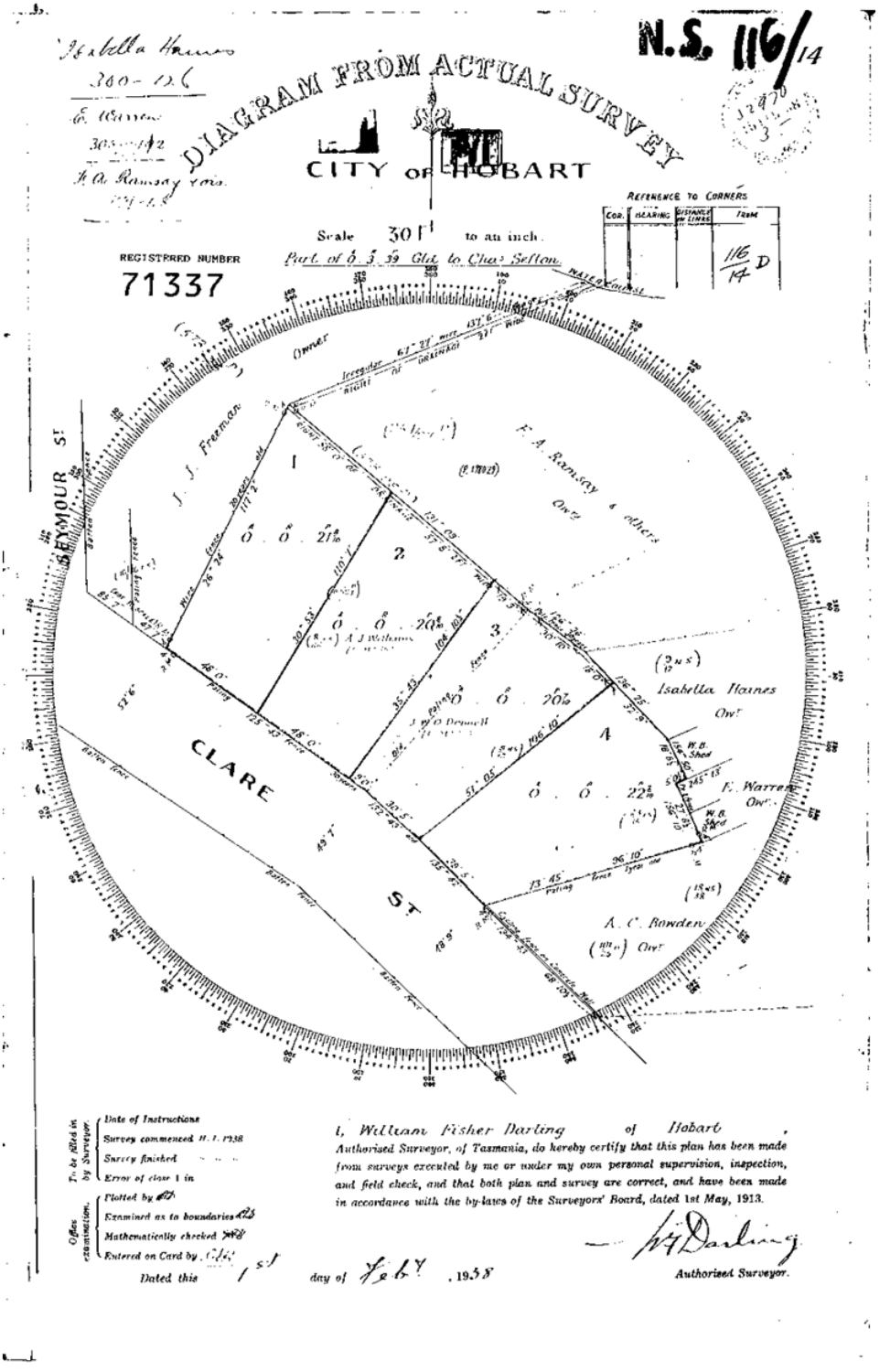
No unregistered dealings or other notations

FOLIO PLAN

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government



To be filled in by Surveyor.
Date of Instructions
Survey commenced 11. 1. 1938
Survey finished
Error of close 1 in

Office examination.
Plotted by
Examined as to boundaries
Mathematically checked
Entered on Card by

Dated this 1st day of Feb. 1938

I, William Fisher Darling of Hobart, Authorised Surveyor, of Tasmania, do hereby certify that this plan has been made from surveys executed by me or under my own personal supervision, inspection, and field check, and that both plan and survey are correct, and have been made in accordance with the by-laws of the Surveyors' Board, dated 1st May, 1913.

W. F. Darling

Authorised Surveyor.

RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
76403	1
EDITION	DATE OF ISSUE
3	20-Apr-2000

SEARCH DATE : 06-Mar-2025
SEARCH TIME : 02.35 PM

DESCRIPTION OF LAND

City of HOBART
Lot 1 on Diagram 76403 (formerly being 254-27D)
Derivation : Part of 0A-2R-5Ps. Gtd. to A. Woods
Prior CT 2344/73

SCHEDULE 1

C225215 DOMINIC DI CARLO Registered 20-Apr-2000 at noon

SCHEDULE 2

Reservations and conditions in the Crown Grant if any
C225160 MORTGAGE to Perpetual Trustees Tasmania Limited
Registered 20-Apr-2000 at 12.03 PM
C706423 TRANSFER of MORTGAGE C225160 to Murdoch Clarke
Mortgage Management Limited Registered 09-Nov-2006
at noon

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

FOLIO PLAN

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

REGISTERED NUMBER 76403

DIAGRAM FROM A/C SURVEY

CITY OF HOBART

Part of grant to Andrew Woods

No. OF APPLICATION

Helen Satchell

CT 6149/791

Scale 40 feet to an inch

REFERENCE TO CORNERS

COR.	BEARING	DISTANCE IN LINKS	FROM

K. G. JAMESON

I. Haines Owner

NEWTOWN ROAD

HOBART CITY COUNCIL

This Plan is approved subject to any rights of way or drainage easements shown hereon being incorporated in the transfer of any allotments affected by such plans.

Sealed this day of 19

Town Clerk

To be filled in by Surveyor.

Date of Instructions

Survey commenced

Survey finished 19-9-57

Error of close 1 in

Office examination.

Plotted by

Examined as to boundaries

Mathematically checked

Entered on Card by

Dated this 20th day of September, 1957

I, Edward Kathearn Lilley of Hobart, Registered Surveyor, of Tasmania, do hereby certify that this plan has been made from surveys executed by me or under my own personal supervision, inspection, and field check, and that both plan and survey are correct, and have been made in accordance with the Land Surveyors' By-Law No. 2, dated 3rd July, 1946.

Authorised Surveyor.

City of HOBART

GENERAL MANAGER CONSENT

Reference
GMC-HOB-2024-0064

Address
52 NEW TOWN RD NEW TOWN TAS 7008

Titles
252465/1

Applicant

Name	Email	Phone	Address	Involvement
Kate Heckelmann	kate@ireneinc.com.au	0401530453	49 Tasma St, North Hobart, Tasmania, Australia, 7000	Applicant
THE HOUSE FAMILY OFFICE - by their agent Ireneinc Planning and Urban Design Kate Heckelmann	phil@ireneinc.com.au	0401530453	49 Tasma Street, North Hobart, 7000, Australia	Applicant Agent

Council Reference

Council Proposed Use or Development Description

Consent Information

Information
I advise that pursuant to Section 52 of the Land Use Planning and Approvals Act 1993, I grant my consent on behalf of the Council as the owner/administrator of the above land for you to make application to the Council for a planning permit for the development described above and as per the attached documents. I granted consent pursuant to delegation, a copy of which is enclosed.

Please note that the granting of the consent is only for the making of the application and in no way should such consent be seen as prejudicing any decision the Council is required to make as the statutory planning authority.

This consent does not constitute an approval to undertake any works and does not authorise the owner, developer or their agents any right to enter or conduct works on any Council managed land whether subject to this consent or not.

If planning approval is granted by the planning authority, you will be required to seek approvals and permits from the Council as both landlord, land manager, or under other statutory powers (such as other legislation or Council ByLaws) that are not granted with the issue of a planning permit under a planning scheme. This includes the requirement for you to reapply for a permit to occupy a public space under the Council's Public Spaces By-Law if the proposal relates to such an area.

Accordingly, I encourage you to continue to engage with the Council about these potential requirements.

Signatory



Signed: Michael Stretton
Signature applied by: Alison Surtees

Supporting Documents

Version	Document Date	Document Type	Description	Prepared By
2	17 Jan 2025	Site Plan	Revised Attachment 1 - Site Plan - Concept Civil Drawings_20250117	PDA Surveyors, Engineers & Planners

Submitted on **28/02/2025**

Form published: 05/07/2024 13:52

48-52 New Town Road

Noise Impact Assessment



Ref: 24118 48-52 New Town Road NIA_02
25 September 2025

NVC
NOISE VIBRATION CONSULTING

Executive Summary

A residential apartment development is proposed for construction on a currently unoccupied site at 48-52 New Town Road, New Town. The proposal includes nominally 58 one to three bedroom apartments, and amenities including a wellness centre, gym, cinema, chapel, medical offices, and shared outdoor space.

The development is located within an Urban Mixed Use zone under the Hobart Interim Planning Scheme 2015 (the Scheme), and thus a noise impact assessment is required to address the requirements of the Scheme as well as the Tasmanian Environmental Management and Pollution Control (Noise) Regulations 2016 (the Tasmanian Noise Regulations). This document provides such a noise impact assessment.

Noise measurements were conducted on-site at 48-52 New Town Road to determine existing ambient noise levels in the area. A software noise model representative of daily noise emissions of site was constructed using mechanical services and general operational information provided by the proponent. Noise predictions from the software noise model determined that noise levels have the potential to exceed the night time project criterion noise level at the boundary of site and at the nearest residential receivers. It was identified that noise from fixed mechanical plant was the dominant noise source during night time at most of the site boundary. Recommendations were provided such that noise levels are predicted to achieve the requirements of the Scheme and the Tasmanian Noise Regulations. Such recommendations include:

- All commercial vehicles are to access site during the daytime only and within the following hours: 7:00AM to 5:00PM Monday to Friday, 8:00AM to 5:00PM Saturday, and 9:00AM to midday Sundays and public holidays. This includes deliveries, servicing, grounds maintenance, or otherwise.
- The louvres to the carpark ventilation plant room are required to be minimum R_w 26, such as Flexshield Sonic Series SL4-20 or equivalent.
- If the wellness centre plant room is to have louvres facing the residential boundary, the louvres are to be at least R_w 29, such as Flexshield Sonic Series SL3-45 or equivalent.
- It is recommended to minimise line of sight between mechanical plant units and the surrounding residences.
- Outdoor music associated with the cafe must occur within daytime hours (8:00AM to 6:00PM).
- It is recommended that all apartments facing New Town Road are to have minimum 6.38 mm laminated single glazing, or 6 mm float glass / 12 mm gap / 6 mm float glass double glazing.

Provided the recommendations outlined within this report are implemented, noise levels are predicted to demonstrate likely compliance with the Scheme and the Tasmanian Noise Regulations. An assessment of the proposed hours of operation and noise levels therefore concluded that sections 15.3.1-P1, 15.3.1-A2, 15.3.1-A4, and 15.4.8-A4 of the Hobart Interim Planning Scheme 2015 are achieved.

48-52 New Town Road
Noise Impact Assessment

Prepared for:
The House Family Office

Prepared by:
NVC
Level 1, 95 Elizabeth Street
Hobart TAS 7000
0437 659 123
jack@nvc.com.au

Document Control

Ref	Date	Author	Reviewed	Comments
24118 48-52 New Town Road NIA	17/12/24	J Lewis	J Parry	Initial Issue.
24118 48-52 New Town Road NIA_01	19/12/24	J Lewis		Cafe location changed.
24118 48-52 New Town Road NIA_02	25/09/25	J Lewis		Minor wording changes.

Table of Contents

Executive Summary 2
1. Background 5
1.1.Site and Surrounding Area 5
1.2.Proposed Operations 6
2. Noise Measurements 7
3. Criteria 8
3.1.Adopted Criteria 11
4. Predictions - External Noise Intrusion 12
5. Predictions - Site Noise Emissions 13
5.1.Modelled Noise Sources 14
5.2.Noise Model Results 15
6. Discussion 19
7. Recommendations 20
8. Assessment 21
Appendix A – Acoustic Glossary 22

Table of Figures

Figure 1.1: Site and Surrounding Area 5
Figure 1.2: Site Plans (Ground Floor Interiors) 6
Figure 5.1. Modelled Noise Source Locations 15
Figure 5.2: Predicted Noise Level Contours - Daytime 16
Figure 5.3: Predicted Noise Level Contours - Night time 17

Table of Tables

Table 2.1: Summary of Noise Measurements 7
Table 3.1: Acoustic Environmental Indicator levels - Tas Noise EPP 10
Table 3.2: Adopted Criteria 11
Table 5.1: Modelled Noise Sources - Fixed Mechanical Plant 14
Table 5.2: Predicted Noise Level - All Sources 18

1. BACKGROUND

A residential apartment development is proposed for construction on a currently unoccupied site at 48-52 New Town Road, New Town. The proposal includes nominally 58 one to three bedroom apartments, and amenities including a wellness centre, gym, cinema, chapel, medical offices, and shared outdoor space. Vehicle access is also proposed on various parts of site.

The site is immediately surrounded by existing residential dwellings. A noise impact assessment is required to obtain planning approval, which must determine the expected operational noise emissions from the site, and assess these emissions against the requirements of the Hobart Interim Planning Scheme 2015. This report provides an assessment of the proposed development, to determine likely compliance with the Scheme, originally completed by NVC in December 2024.

1.1. Site and Surrounding Area

The proposed site is located at 48-52 New Town Road, New Town within an Urban Mixed Use zone under the Hobart Interim Planning Scheme 2015 (the Scheme). The site to be developed is outlined by the solid white line in Figure 1.1, below.

The site is surrounded by Inner Residential zoning comprising detached dwellings to the north, east and west, with additional Urban Mixed Use zones to the south and south-east. The nearest buildings within the Urban Mixed Use zone to the south consist of dental centres, not residential dwellings. The site is located on New Town Road, a primary thoroughfare connecting the northern suburbs of Hobart and the Hobart CBD, and thus sees significant vehicle volumes during all hours.

The site is currently a primarily flat and empty block with the north portion of site elevated above and looking down upon the western residential zone.

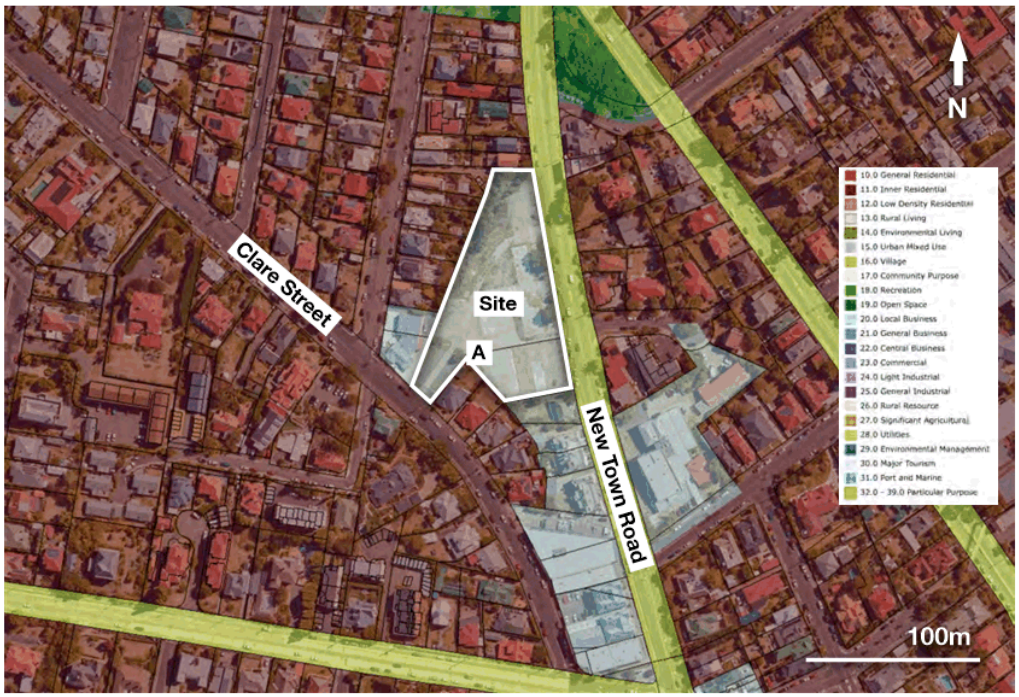


FIGURE 1.1: SITE AND SURROUNDING AREA

1.2. Proposed Operations

The proposal seeks to develop a a residential apartment development consisting of nominally 58 one to three bedroom apartments, with amenities including a wellness centre, gym, chapel, medical offices, and shared outdoor space. The building is to consist of a primarily rammed earth facade, with significant glazing on all sides. An underground carpark located beneath the southern half of the site will be accessible to residents of the development. A site plan is shown in Figure 1.2, below.



FIGURE 1.2: SITE PLANS (GROUND FLOOR INTERIORS)

The cafe located in the middle of site adjacent the greenhouse pavilion is proposed to operate from 7:00AM to 10:00PM, however is likely to primarily cater for breakfast and lunch dining. The outdoor cafe seating area may include small speakers for background listening music.

The Clare Street entrance to site has capacity for a heavy vehicle parking / turning circle and is to be used by delivery or service vehicles.

2. NOISE MEASUREMENTS

Unattended noise measurements were made between the 14th and the 19th of November 2024, to quantify existing noise levels in the area surrounding site. Measurements used Svan Type 1 sound level meters, logging in A-weighted decibels with a *Fast* response time. The data set comprised overall levels, one-third octave spectra and full statistical data. Measurements were made on-site at location A, as shown in Figure 1.1, with the measured noise levels presented in Table 2.1, below.

TABLE 2.1: SUMMARY OF NOISE MEASUREMENTS

Time Period	Sound Pressure Level, dBA		
	L10	L90	LEQ
Day (8:00AM - 6:00PM)	53	45	51
Night (6:00PM - 8:00AM)	47	36	44

The following notes are relevant to the measured noise levels and observations made whilst attending site:

- Noise from vehicles on New Town Road was the dominant noise source.
  - Broadband tyre noise was almost continuously audible whilst taking attended measurements at Location A.
  - Engine noise from heavy vehicles or motorbikes was dominant when vehicles passed by but only occurred intermittently.
- Broadband tyre noise from vehicles on Clare Street was audible while vehicles were passing nearby the south-west entrance to site but was of short duration and infrequent.

3. CRITERIA

Tasmanian Planning Scheme - Hobart

The development is within an Urban Mixed Use zone under the Hobart Interim Planning Scheme 2015. Section 15.3.1 of the Scheme addresses non-residential use and the potential for this use to have impact on surrounding residential amenity. The sections relevant to noise are reproduced below.

15.3.1 Non-Residential Use

Objective:	
To ensure that non-residential use does not unreasonably impact residential amenity.	
Acceptable Solutions	Performance Criteria
A1 Hours of operation must be within: (a) 7.00 am to 9.00 pm Mondays to Fridays inclusive; (b) 8.00 am to 6.00 pm Saturdays; (c) 9.00 am to 5.00 pm Sundays and Public Holidays; except for office and administrative tasks or visitor accommodation.	**P1** Hours of operation must not have an unreasonable impact upon the residential amenity through commercial vehicle movements, noise or other emissions that are unreasonable in their timing, duration or extent.
A2 Noise emissions measured at the boundary of the site must not exceed the following: (a) 55 dB(A) (LAeq) between the hours of 8.00 am to 6.00 pm; (b) 5dB(A) above the background (LA90) level or 40dB(A) (LAeq), whichever is the lower, between the hours of 6.00 pm to 8.00 am; (c) 65dB(A) (LAmax) at any time. Measurement of noise levels must be in accordance with the methods in the Tasmanian Noise Measurement Procedures Manual, second edition, July 2008, issued by the Director of Environmental Management, including adjustment of noise levels for tonality and impulsiveness. Noise levels are to be averaged over a 15 minute time interval.	**P2** Noise emissions measured at the boundary of the site must not cause environmental harm.

A4 Commercial vehicle movements, (including loading and unloading and garbage removal) to or from a site must be limited to within the hours of: (a) 7.00 am to 5.00 pm Mondays to Fridays inclusive; (b) 8.00 am to 5.00 pm Saturdays; (c) 9.00 am to 12 noon Sundays and Public Holidays.	**P4** Commercial vehicle movements, (including loading and unloading and garbage removal) must not result in unreasonable adverse impact upon residential amenity having regard to all of the following: (a) the time and duration of commercial vehicle movements; (b) the number and frequency of commercial vehicle movements; (c) the size of commercial vehicles involved; (d) the ability of the site to accommodate commercial vehicle turning movements, including the amount of reversing (including associated warning noise);

Section 15.4.8 of the Scheme addresses residential amenity of the proposed residential apartments, with the section relating to noise presented below.

15.4.8 Residential Amenity

Objective:	
To ensure that buildings for residential use provide reasonable levels of residential amenity and safety.	
Acceptable Solutions	**Performance Criteria**
A4 Habitable rooms of dwellings adjacent to streets carrying more than 6000 vehicle per day must be designed to achieve internal noise levels no more than 45 dBa in accordance with relevant Australian Standards for acoustics control, (including AS3671 - Road Traffic, and AS2107 - Habitable Rooms).	**P4** Habitable rooms of dwellings adjacent to streets carrying more than 6000 vehicle per day must be designed, through site layout and building design, to provide internal noise levels that accord a reasonable level of residential amenity for the occupants.

AS2107 and AS3671

AS2107 provides recommended internal noise levels for residential buildings near major roads. Given that AS2107 is relevant to the Scheme if more than 6000 vehicles per day use the adjacent road (New Town Road), it is assumed New Town Road is classified as a major road. The relevant section of AS2107 has been reproduced below.

Item	Type of occupancy/activity	Design sound level ($L_{Aeq,t}$) range	Design reverberation time (T) range, s
7	RESIDENTIAL BUILDINGS (see Note 5 and Clause 5.2)		
	Houses and apartments in inner city areas or entertainment districts or near major roads—		
	Apartment common areas (e.g. foyer, lift lobby)	45 to 50	—
	Living areas	35 to 45	—
	Sleeping areas (night time)	35 to 40	—
	Work areas	35 to 45	—

The intent of AS3671 is to provide methods for attaining appropriate internal noise levels such that unreasonable noise does not impact residential amenity. The construction requirements presented within AS3671 are intended to provide internal noise levels outlined within AS2107. Therefore, achieving the recommended noise levels within AS2107 also achieves the requirements of AS3671.

Tasmanian Environmental Management and Pollution Control (Noise) Regulations

Additionally, the Tasmanian Environmental Management and Pollution Control (Noise) Regulations 2016[1] detail the following criteria for the operation of fixed equipment, under section 7.1:

"(1) *A person must not operate fixed equipment on any premises -*

a. *from 7:00AM until 10:00PM, if the fixed equipment, when so operated, emits noise that is greater than 45 dBA; or*

b. *from 10:00PM until 7:00AM, if the fixed equipment, when so operated, emits noise that is greater than 40 dBA."*

It is noted that the Tasmanian Noise Regulations criteria apply 1 m from the residential building facade, rather than at the boundary of the site.

Tasmanian Environmental Protection Policy

For additional context regarding residential amenity, in *Table 1* of the Noise EPP[2], a list of Acoustic Environmental Indicator levels are given for which the environmental values specified in the Noise EPP "*…will be protected for the majority of the human population where the acoustic environment indicator levels are not exceeded…*" A section of that table is reproduced here in Table 3.1.

TABLE 3.1: ACOUSTIC ENVIRONMENTAL INDICATOR LEVELS - TAS NOISE EPP

Specific Environment	Critical Health Effect	LAeq dBA	Time hrs	LAmax dBA
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

Note that the daytime and evening, and nighttime criteria refer to the periods of 6AM to 10PM and 10PM to 6AM respectively, and use the $Leq_{(16\text{-hour})}$ and $Leq_{(8\text{-hour})}$ metrics respectively.

[1] *Environmental Management and Pollution Control (Noise) Regulations 2016*, 2016

[2] *Environmental Protection Policy (Noise) 2009*, Department of Environment, Parks, Heritage and the Arts, Tasmania.

3.1. Adopted Criteria

The adopted project criteria, based on the above, are summarised in Table 3.2, below:

TABLE 3.2: ADOPTED CRITERIA

Source	Time Period	Criteria	
All Noise Sources	Day (8AM - 6PM)	55 dBA $L_{eq(15\text{-minute})}$	Tasmanian Planning Scheme
	Night (6PM - 8AM)	40 dBA $L_{eq(15\text{-minute})}$	
	Any Time	65 dBA Lmax	
Fixed Mechanical Plant	Day (8AM - 6PM)*	45 dBA	Tasmanian Noise Regulations
	Night (6PM - 8AM)*	40 dBA	

* The Scheme time periods of 8AM to 6PM and 6PM to 8AM for day and night times respectively, have been adopted for fixed mechanical plant as these timeframes are tighter than the requirements of the Tasmanian Noise Regulations.

The tightest criteria applies at the boundary of site, and thus all criteria in Table 2.2 is applicable at the boundary of site.

Additionally, to protect the residential amenity of future occupants of the proposed residential apartments, the internal noise level criteria for apartments adjacent New Town Road according to AS2107 is adopted as the following:

Sleeping areas **40 dBA Leq**

Living Areas **45 dBA Leq**

4. PREDICTIONS - EXTERNAL NOISE INTRUSION

To address Section 15.4.8 of the Scheme, internal noise levels within the apartments adjacent New Town Road have been assessed. Note that traffic data to determine the number of vehicles traversing New Town Road each day is not available to NVC and therefore it is assumed at least 8000 vehicles pass each day. As such, Section 15.4.8 of the Scheme is required to be addressed.

The following comments relevant to the predicted internal noise levels are relevant:

- It is assumed that at least 8000 vehicles pass site on New Town Road each day. It is noted that no traffic count data is available to NVC, and thus given the scale of the road and the areas it is servicing, this is taken to be conservative.
- It is assumed that no other roads adjacent site exceed 6000 vehicles per day.
- Traffic noise has been modelled as the daytime Leq over the entire day period.
    - Traffic noise at the facade has been determined using a combination of site measurement data and CoRTN[3].
- The facade construction is assumed to consist of primarily 6.38 mm laminated single glazing and rammed earth (assumed nominally 250 mm thick).

With the above assumptions, internal noise levels within the apartments nearest to New Town Road are predicted to be 40 dBA_{adj}, therefore achieving the recommended noise levels for sleeping areas. Note that sleeping areas are typically assessed against the night time Leq which is likely significantly lower, and thus using the daytime noise level is conservative.

[3] Calculation of Road Traffic Noise, Department of Transport Welsh Office, 1988.

5. PREDICTIONS - SITE NOISE EMISSIONS

A software noise model of the site and surrounding area has been constructed using *iNoise*[4] software, which implements the ISO9613 algorithms for environmental noise. The predictions account for geometric divergence, barrier attenuation, atmospheric absorption, reflections/screening from buildings, and ground absorption. It is noted that ISO9613 assumes atmospheric conditions favourable to noise propagation, i.e. the receiver being downwind of the source, or a mild temperature inversion.

The following comments and assumptions are relevant to the software noise model for all scenarios:

- 1 m topographical contours (from LiDAR data) have been used to define the ground level across the site and nearby topography.
- The existing houses surrounding the site have been included in the model, with their extents based off aerial photographs from TheList.
    - All buildings surrounding site have been modelled with a height of 3.5 m.
- The proposed buildings on site have been modelled with dimensions and heights as shown within the most recent drawing set (P4 - For DA Coordination - 18/12/24), provided to NVC by Woods Bagot on 18th December 2024.
- No fences or other acoustic screening has been modelled. Small fencing and foliage is ignored as this will only reduce the propagation of noise from site. The model therefore assesses a worst-case scenario.
- The model only considers operational site noise emissions from equipment, vehicles, and activities on site. Noise from nearby traffic or residential noise is not included.
- The ground across the entirety of site and the surrounding area has been assumed to have a ground factor of 0 (100% reflective). This is very conservative.
- All buildings have been modelled to have a reflection factor of 0.8 (80% reflective).
- As per the Tasmanian Noise Measurement Procedures Manual[5], noise levels have been predicted at 1.2 m above ground level.
- The only internal noise emissions considered in the model are from major mechanical plant within buildings on site.
    - The facade construction is such that smaller internal mechanical plant will have no meaningful difference in the site's noise emissions
- Residential noise associated with the site has not been included within the model. See Section 6, below, for further commentary.

Note the saw-tooth appearance in some of the predictive noise contours is an artefact of resolving the spatial resolution used to define the contour map, and not a physical effect.

In addition to the below contours, five locations (locations 1-5 in Figure 5.1, below) have been selected as the worst-affected nearest residential boundaries surrounding site. Numerical noise levels have been provided at these locations for each modelled scenario.

[4] iNoise V2024 Pro, DGMR Software.

[5] *Noise Measurement Procedures Manual*, Department of Environment, Parks, Heritage and the Arts, July 2008.

5.1. Modelled Noise Sources

The following assumptions are relevant to noise sources used in the software noise model:

- The mechanical plant details shown in Table 5.1 and Figure 5.1 are based on preliminary information from the project team. Where specific information is not available, assumptions have been made based on NVC's experience with similar projects.
  - Mechanical plant sound power levels have been taken from manufacturer data sheets and NVC's database of previously measured equipment.
  - Information on the mechanical plant located within the wellness facility plant room that services the pool has not been provided at this stage. It has been assumed that these units will require ventilation using louvres located on the western side of the building, facing the residential units. Given the direct line of sight and proximity to the residential dwellings, this is a worst-case assumption.
    - Noise from the wellness facility plant room have been included as an air handling unit and a heat pump. It is expected that these noise sources will be dominant compared to any other smaller mechanical plant within the room and therefore control the noise level within this space.
  - It is assumed that all mechanical plant is operating simultaneously and continuously at all hours.
- The cafe is proposed to be open from 7:00AM to 10:00PM, and therefore is modelled during both the day and night scenarios.
- It is assumed and strongly recommended that all commercial vehicles will access site during day hours only.

TABLE 5.1: MODELLED NOISE SOURCES - FIXED MECHANICAL PLANT

Modelled Noise Source		Qty.	Description	Sound Power Level (dBA)	Location
Pool Plant Room	AHU Inlet	1	Air handling unit for pool (46 kW heating capacity)	79	Internal. Assumed Flexshield SL4-20 louvres fitted.
	AHU Outlet	1		85	
	Heat Pump	1	Heat pump servicing pool (47 kW heating capacity)	79	
AC Units		51	AC Condensers (12.5 kW heating capacity)	70 ea.	1 m above roof.
Carpark Fans	Carpark Exhaust Air Duct	1	Commercial carpark axial ventilation fan.	90 ea.	Internal. Noise emitted via duct 3 m above ground level.
	Carpark Supply Air Louvre	1			Internal. Assumed Flexshield SL4-20 louvres fitted.
Cafe Patrons		15	15 people all speaking simultaneously outside the cafe.	68 ea.	1.2 m above ground level.
Cafe Speakers		2	Cafe speakers playing music appropriate for background listening within outdoor cafe seating area.	80 ea.	2 m above ground level.

Modelled Noise Source	Qty.	Description	Sound Power Level (dBA)	Location
Commercial Vehicle	1	Delivery / service vehicle accessing site.	85	0.75 m above ground level.

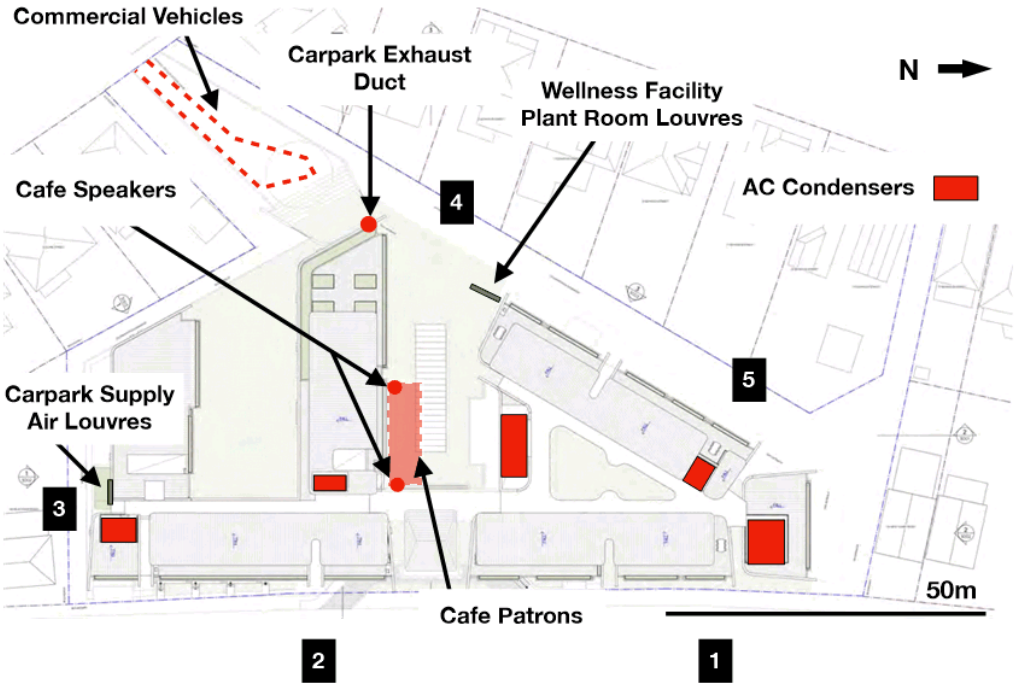


FIGURE 5.1. MODELLED NOISE SOURCE LOCATIONS

5.2. Noise Model Results

The results are presented in Figure 5.2 and Figure 5.3, below, with three coloured noise contours shown, as described below. Note that the contours are presented at a height of 1.2 m.

Acceptable levels for night time (< 40 dBA) in green.
Acceptable levels for daytime (< 55 dBA) shown in yellow.
Excessive levels (> 55 dBA, requires performance criteria to be assessed for suitability) in red.



FIGURE 5.2: PREDICTED NOISE LEVEL CONTOURS - DAYTIME



FIGURE 5.3: PREDICTED NOISE LEVEL CONTOURS - NIGHT TIME

Table 5.2, below, shows the predicted noise levels at the five worst-affected residential receivers when all noise sources on site are occurring simultaneously.

TABLE 5.2: PREDICTED NOISE LEVEL - ALL SOURCES

Period	Source	Predicted Sound Pressure Level (dBA), $Leq_{15\text{-minute}}$					
		Location					Criteria
		1	2	3	4	5	
Day (8AM - 6PM)	Fixed Plant	39	34	39	41	31	**45**
	All Sources	39	35	39	44	31	**55**
Night (6PM - 8AM)	Fixed Plant	39	34	39	41	31	**40**
	All Sources	39	35	39	43	31	**40**

6. DISCUSSION

- All results have been assessed for intrusive or dominant characteristics as per the Tasmanian Noise Measurement Procedure Manual, with no adjustments required.
- Residential noise associated with the site has not been included within the model.
    - The intention behind the Scheme is to determine whether the additional noise sources from a development are likely to impose intrusive noise on the existing noise environment and thus subsequently on nearby existing residential use. Noise from residents driving light vehicles and parking, talking in outdoor seating areas, mowing lawns or using other grounds maintenance equipment, is all existing within the current noise environment of the area, and thus it is highly unlikely that this type of noise would be considered intrusive or impose sleep disturbance.
    - Noise from the gym such as weights impacting the ground or music has not been included in the software noise model. Assuming a standard facade construction such as the proposed rammed earth or 6.38 mm laminated glazing, noise levels are predicted to have no meaningful impact on the proposed development's noise emissions.
- Internal noise from the cafe has not been included within the model. Typical indoor cafe noise such as patrons talking or background music is unlikely to be audible at the nearest residence due to the attenuation through a typical facade. Thus, only outdoor cafe noise has been modelled.
- The assumption that all mechanical plant is operating continuously at maximum capacity is highly conservative.
    - The load requirement on each unit is likely to vary throughout the day and night, with the night time likely more quiet due to a reduced requirement for heating / cooling.
    - Generally, mechanical plant that is required to operate at all times will not operate at maximum capacity to reduce equipment fatigue, and thus modelling maximum capacity noise levels for all units is conservative and unlikely to occur in practice.
- Figure 5.3 and Table 5.2 show that noise emissions exceed the night time criterion at one location (location 4) surrounding site, but do not exceed the daytime criterion at any location.
    - Table 5.2 shows that night time noise levels at the residential boundary are controlled by a combination of mechanical plant noise and the the cafe, and thus it is recommended that noise control be applied to the mechanical plant on the western side of site and to the cafe. See Section 7, below.
    - It should be noted that the criteria outlined by the Scheme is relatively conservative, with the Tasmanian Noise EPP suggesting over 45 dBA as an 8-hour Leq outside an open window during the night time may cause sleep disturbance. Predicted noise levels do not exceed 45 dBA as a 15-minute Leq, and thus are unlikely to cause sleep disturbance.
    - It has been assumed that the louvres to the wellness centre plant room and the car park supply air plant room are minimum 200 mm deep acoustic louvres, such as Flexshield Sonic Series SL4-20.
        - Note that no details on louvres have been provided, and thus Flexshield Sonic Series SL4-20 acoustic louvres are recommended at a minimum, with additional recommendations outlined in Section 7.

7. RECOMMENDATIONS

The software noise modelling shows that predicted noise levels have the potential to exceed the night time criterion due to fixed mechanical plant. The following is recommended to control noise levels at the surrounding residential boundary:

- All commercial vehicles are to access site during the daytime only and within the following hours: 7:00AM to 5:00PM Monday to Friday, 8:00AM to 5:00PM Saturday, and 9:00AM to midday Sundays and public holidays. This includes deliveries, servicing, grounds maintenance, or otherwise.
- The louvres for the carpark supply air fans are required to have a minimum manufacturer rated sound reduction of R_w 26. As noted previously, suitable acoustic louvres include Flexshield Sonic Series SL4-20, or equivalent.
- If the wellness centre plant room is to have louvres facing the residential boundary, the louvres are to have a minimum manufacturer rated sound reduction of R_w 29. Example of suitable acoustic louvres include Flexshield Sonic Series SL3-45, or equivalent.
    - Note that compliance with the night time criterion of 40 dBA is predicted, following the implementation of such louvres.
- It is recommended to minimise line of sight between mechanical plant units and the residential boundary as much as is practicable.
    - Currently, the majority of condenser units are located on the roof of the buildings such that there is minimal line of sight and/or significant distance to the surrounding residential zone. This is appropriate.
- Outdoor music associated with the cafe must occur within daytime hours (8:00AM to 6:00PM).
- It is recommended that all apartments facing New Town Road are to have minimum 6.38 mm laminated single glazing, or 6 mm float glass / 12 mm gap / 6 mm float glass double glazing.

8. ASSESSMENT

The following comments are relevant in addressing the acceptability of the development:

- The software noise modelling in Section 5 demonstrates that noise emissions from the proposed development are predicted to exceed the night time criterion under the currently proposed design. Section 7 demonstrates that after appropriate acoustic control, noise levels are predicted to achieve compliance with the noise level criteria taken from the Scheme and the Tasmanian Noise Regulations.
    - After implementing acoustic noise control (as described in Section 7 of this report), worst-case noise levels during the night time are predicted to be less than the existing measured night time noise level (Leq), and nominally 4 dB above the background noise level (L90). As such, noise from site is likely to be be intermittently audible at the boundary of site.
    - Note that the TAS Noise EPP specify an outdoor noise level of less than 45 dBA $Leq_{(8\text{-hour})}$ outside an open window during the night time to avoid sleep disturbance. The predicted noise levels are significantly lower than the TAS Noise EPP, and thus are unlikely to cause sleep disturbance.
    - Additionally, a typical residential facade is likely to provide attenuation of the noise emissions from the proposed development during the night time, such that noise from site is unlikely to be audible indoors.
    - Therefore, provided the above recommendations are implemented, Section 15.3.1-A2 of the Scheme and the TAS Noise Regulations are satisfied.
- Fixed mechanical plant will be operational 24/7. The noise levels from these sources are acceptable under Section 15.3.1-A2 of the Scheme, and thus the Performance Criteria under Section 15.3.1-P1 is also satisfied.
- All commercial vehicle movements are proposed to occur within the periods outlined under the Acceptable Solutions for Section 15.3.1-A4.
- Provided the recommendations in Section 7 regarding apartment facades adjacent New Town Road are satisfied, predicted internal noise levels achieve the Acceptable Solutions under Section 15.4.8-A4 of the Scheme.

Therefore, provided the recommendations in Section 7 are implemented, the proposed development is unlikely to cause unreasonable loss of residential amenity to the surrounding residential areas, and thus demonstrates likely compliance with sections 15.3.1-P1, 15.3.1-A2, 15.3.1-A4, and 15.4.8-A4 of the Hobart Interim Planning Scheme 2015, and the Environmental Management and Pollution Control (Noise) Regulations 2016.

Appendix A – Acoustic Glossary

Ambient Noise	All noise associated with a measurement, and typically ignoring the particular noise under investigation. Typically measured as Leq and will usually comprise noise from many sources.
Background Noise	Background noise describes the underlying level of noise present in the ambient noise. It may be described as the average of the minimum noise levels measured, and is typically measured by the statistical L90 level.
Decibel [dB]	The scale used for describing sound. It is a logarithmic scale that uses a reference sound pressure of 20 μPa, or reference sound power of 10^{-12} Watts.
dBA	A-weighted decibel. The human ear does not perform linearly and is better at hearing high frequency rather than low frequency sounds, ie. low frequency sound at the same dB level as a high frequency sound will be perceived as quieter. To replicate the human ear response a frequency weighting, denoted as an A-weighting, is applied to the sound. A sound measured in this way is then an A-weighted sound pressure level with units dBA. Practically all noise is measured using the A-weighting.
Leq	Energy averaged sound pressure level over a period of time, usually 10 to 15 minutes. Units of decibels, typically A weighted (LAeq). Because the decibel scale is a logarithmic ratio, the higher noise levels have far more sound energy, and therefore the Leq level tends to indicate an average which is strongly influenced by short-term, high level noise events. Many studies show that human reaction to level-varying sounds tends to relate closer to the LAeq noise level than any other descriptor.
Frequency	Frequency is synonymous with pitch and has the units of Hertz (Hz) or cycles per second. A bass drum produces a low frequency sound, and a small bell a high frequency sound. The frequency range for human hearing is approximately 30Hz to 16kHz.
L10, L90…	Ln is the sound pressure level that is exceeded for n% of the time. Hence the L10 describes the noisier events during the interval, and L90 the quieter events. The L90 is often used to describe the background level. A significant variation between the L10 and L90 would indicate an environment where there is a strong variation in noise levels, and the background is not the dominant source. As the variation between the L10 and L90 decreases, the background becomes more dominant.
Lmax	The instantaneous maximum level using the time response and frequency weighting set for the meter (typically Fast response, A weighted).
Inversion	A condition typically occurring on clear, still nights which is characterised by the air near the ground being colder than air at higher altitudes. The increasing speed of sound with altitude bends the sound back towards the ground causing a focussing of the sound in a small area. The inversion effect can cause increases in noise levels of 5 to 10 dB with greater increases in exceptional circumstances.

GES
GEO-ENVIRONMENTAL
SOLUTIONS



2018



2025

ENVIRONMENTAL SITE ASSESSMENT Version 9

52 New Town Road, New Town, Tasmania

June 2025

Report for The House Family Office

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DOCUMENT CONTROL

Title	Version	Date	Author	Comments	Reviewed By
Environmental Site Assessment: 48-52 New Town Road, New Town.	1	26 September 2018	S. Joyce	Contained details from the July-August investigation	JP Cumming
Environmental Site Assessment: 48-52 New Town Road, New Town.	2	16 January 2019	S. Joyce	Additional soil & GW investigation information from Oct - Nov 2018.	JP Cumming
Environmental Site Assessment: 48-52 New Town Road, New Town.	3	18 April 2019	K Taylor	Amendments to the building design and planning information	JP Cumming
Environmental Site Assessment: 48-52 New Town Road, New Town.	4	21 April 2020	S Joyce	Amendments to the building design and planning information	JP Cumming
Environmental Site Assessment: 48-52 New Town Road, New Town.	5	29 October 2020	S Joyce	Amendments to the building design	JP Cumming
Environmental Site Assessment: 48-52 New Town Road, New Town.	6	5 November 2020	S Joyce	Amendments to the building design	JP Cumming
Environmental Site Assessment: 48-52 New Town Road, New Town. November 2024. Version 7	7	10 December 2024	S Joyce & M Downie	Amendments to the building design	JP Cumming
Environmental Site Assessment: 52 New Town Road, New Town. November 2024. Version 8	8	20th June 2025	S Joyce	Response to Application Reference PLN-HOB2024-0716	JP Cumming
Environmental Site Assessment: 52 New Town Road, New Town. November 2024. Version 8	9	26th June 2025	S Joyce	Response to Application Reference PLN-HOB2024-0716 Minor changes to groundwater sections	M Downie

EXECUTIVE SUMMARY

This report presents the findings from an Environmental Site Assessment (ESA) undertaken by Geo-Environmental Solutions Pty Ltd (GES) at 52 (48-50 & 52) New Town Road, New Town, Tasmania, hereby referred to as 'The Site'. GES were engaged by Swanbury Penglase Architects to conduct the original investigation in 2018. This report is Version 8 of the original report. GES has been reengaged to update the report for The House Family Office (the 'Client'). The development is described as the following:

A *proposal for a mixed-use development involving 23 residences (Multiple Dwellings) and 38 visitor accommodation units (Short-term Accommodation) which will be supported by a wide array of communal activities including a variety of recreational areas, green pavilions and gardens for use by the residents and visitors.*

The proposal also includes a café (Food Services) on the ground floor and a consulting room area (Business and Professional Services) and wellness facilities (Sport and Recreation) on the lower ground floor which will be accessible to the public. The short-term visitor accommodation is proposed to be located in the southern two wings of the proposal, excluding the penthouse dwelling which is intended to remain as residential dwelling.

GES has conducted the investigation in line with the Hobart City Council Interim Planning Scheme *Contaminated Land Assessment and Planning* requirements plus the EPA Tasmanian's soil disposal and waste transport guidelines. The Environmental Site Assessment has been prepared by a suitably qualified and experience practitioner in accordance with procedures and practices detailed in National Environmental Protection (Assessment of Site Contamination) Measure (NEPM ASC 2013) guidelines.

The objectives of this ESA were to determine, in accordance with the Hobart City Council Interim Planning Scheme, if there is any evidence the land is contaminated, whether any site contamination presents an occupational health and safety risk to workers involved in redevelopment of the site or future site users, whether any site contamination is likely to present an environmental risk from excavation conducted during development at the site. If the site is deemed to be contaminated determine whether the site is suitable for the proposed use/development and make recommendations to prepare a contamination management plan (CMP) to manage any contamination risks, provide specific remediation and/or protection measures are required to be implemented before use or excavation commences

The scope of works of this ESA was to conduct a desktop assessment, conduct an invasive soil investigation across the entire site and install groundwater monitoring wells, a total of 53 bore holes were drilled to collect 183 primary soil samples, 142 of which was analysised for contaminants of concern to a National Association of Testing Authorities (NATA) accredited laboratory to determine the presence/ absence of contamination and at what level, conducted two limited groundwater monitoring events, develop a conceptual site model (CSM) and report finings in this ESA report.

Background assessment, it is concluded that:

All buildings on the site were demolished by December 2024, photographs from site work in 2018 have been included in this report.

The geology of the site is Triassic sediments of interbedded sandstone and mudstone. The site is situated 56-60m above sea level. The north-western portion of the site is covered by a levelled grass area.

All surface waters from the site discharge into the street stormwater drainage system. The hydrogeology of the area is likely to consist of groundwater moving parallel with slope to the north towards the Maypole Creek which is approximately 1.7 km away. It is unlikely that any potential impact from the site would impact downgradient ecosystem receptors, given the spatial separation and dilution effect.

The EPA Tasmania identified one property as a host to potentially contaminating activity, it is located 100m south of the site, at 30-36 New Town Road which hosted a former Caltex Service Station. This property has been ruled out as a possible upgradient contamination source.

The following information was apparent from the listed historical aerial photographs, '*48-50 New Town Road'* hosted a service station from prior to 1957 to approximately 1970; by 1973 a new building was constructed, and it remains to this day; a total of 4 bowsers were identified in the historical aerial photographs. The site at *'52 New Town Road'* was a vacant block in 1957. By 1965 the current building plus attached warehouse buildings were constructed. There is a potential refueling bowser in the rear carpark, but it is unclear from the aerial photograph alone.

The historical aerial photographs showed that the property at *30-36 New Town Road* hosted a service station between 1965-2000. The site at 466 Elizabeth Street hosted a service station between 1965-2000. Both properties have been ruled out as a possible upgradient contamination sources.

WorkSafe Tasmania provided four (4) records relating to dangerous substances held at *'52 New Town Road'* for a UPSS including 2000 gallon underground super spirit tank with a S/E pump later referred to as a 5.4 k/l tank plus a 1150 L on-ground tank for Diesoleum (situated above the generator building). WorkSafe Tasmania provided a site plan for '*48-52 New Town Road'*. BP Australia was mentioned in several of the documents. There is no evidence in the records that confirms that the UPSS has been removed.

The Hobart City Council was contacted on the 9 July 2018. The councils register of potentially contaminated sites confirmed the following: '*48 New Town Road, operated as a "retail activity" from 1975-1989 as Tasmanian Television Ltd and COR/BP with the potential contaminant listed as Hydrocarbons.'*

Given urban setting and absence of any native vegetation, there is a distinct lack of sensitive ecological receptors in the vicinity of the site. Registered water bores are a substantial distance from the site and are not considered to be impacted by any contamination at the site.

The following areas of potential concern have been identified:

- Imported fill at the site, across the address at *52 New Town Road*.
- The front of the site at *48-50 New Town Road* where the former UPSS infrastructure is situated.

Contaminants of potential concern at the site include the following: Total Petroleum/Recoverable Hydrocarbons; Mono Aromatic Hydrocarbons: (Benzene, Toluene, Ethylbenzene, Xylene, Naphthalene); Polynuclear Aromatic Hydrocarbons; Metals.

The following investigation guideline limits were adopted for the site:

Ecosystem Receptors

- ESL A and EIL A for residential land use setting;

Human Receptors – During Site Redevelopment

- HIL A / HIL B (neighboring residents dust migration) / HSL D (construction workers and trench workers) for assessing dermal contact.
- HIL A / HIL B (neighboring residents dust migration) / HSL D (construction workers and trench workers) for dust inhalation and soil ingestion risk.
- HSL D (construction workers) for vapour intrusion risk based on commercial land use.
- Trench worker specific guidelines.

Human Receptors – Future site users

- HSL D (Basement and Lower Ground floor site users, commercial spaces) for assessing dermal contact and for dust inhalation and soil ingestion risk.
- HSL B (future residents and short stay occupants – it is assumed no access to soil onsite post site redevelopment) / HSL D (Basement and Lower Ground floor users, commercial spaces) for vapour intrusion risk based on commercial land use.
- Trench worker specific guidelines.

The following data was gathered during the soil assessment:

- There were 98 detections of hydrocarbons out of 142 samples selected for analysis.
- There were 40 samples that did not have any guideline exceedances.
- Detections for TRH, PAHs and metals were observed across the site. These results confirm multiple sources of contamination at the site, most likely sourcing from the former UPSS infrastructure and uncontrolled fill at the site.
- Data gaps exist across the site where access was limited during the invasive soil investigation. Further soil testing for soil disposal is anticipated during excavation stages of the proposed development.

Ecological Setting - Urban Residential Land Use

- Despite the large number of ecological guideline exceedances, it should be noted that there is an absence of close ecological receptors to the site.
- There were the following ESL guideline limit exceedances in an urban residential land use setting; 89 samples for Benzo(a)pyrene, six samples for TRH Fraction F2 and 17 samples for TRH Fraction F3. A total of 61 samples from 142 samples were clean and had no detections.
- There were three exceedances above the EILs residential land use guideline limits, one for copper, one for zinc, and one for lead. There were another 8 samples that had exceedances above the EILs residential land use guideline limits, however they have been discounted as a risk because the sample will be deeper than 2m below the finished floor level.

Human Health – Health Screening Levels – Dermal Contact

- There were a total of three exceedances from 142 samples selected for analysis, of dermal contact for residential land use.
- There were two samples that had exceedances above HSL A, low density residential guidelines: including BH23 2.5-2.6 and BH40 0.5-0.6 both for TRH Fraction F3 $>C_{16}$-C_{34}. There was one sample that had exceedances above HSL B, high density residential guidelines, that sample was BH40 0.5-0.6 for TRH Fraction F3 $>C_{16}$-C_{34}.
- There were no exceedances above the HSL D guidelines for commercial land use for dermal contact in any of the samples.

Human Health – Health Investigation Levels – Dust Inhalation and Soil Ingestion

- There were a total of 72 HIL A exceedances for assessing dust inhalation and soil ingestion risk to neighboring residential receptors. These exceedances included a total of 56 samples exceeded HIL A for benzo(a)pyrene, a total of 10 samples exceeded HIL A for total PAH's and a total of 7 samples exceeded HIL A for lead.
- There were a total of 30 HIL B exceedances for assessing dust inhalation and soil ingestion risk to neighboring residential receptors. These exceedances included a total of 26 samples exceeded HIL B for benzo(a)pyrene and a total of 4 samples exceeded HIL B for total PAH's.
- There were nine guideline exceedances for dust inhalation and soil ingestion for *commercial land use* HIL D for benzo(a)pyrene at the site indicating a risk to commercial workers developing the site.

Human Health – Indoor Vapour Risk

- From the soil assessment there were no guideline exceedances and no indoor vapour intrusion risk identified.

Human Health – Trench Worker

- From the soil assessment there were no guideline exceedances and no risk to trench workers identified.

The following conclusions have been made from the groundwater investigation:

- Human health: despite the elevated levels of contaminants in the groundwater, no indoor vapour risk to human health has been identified at HSL D commercial land use guidelines. HSL D commercial land use guidelines are applicable to the proposed developments as residential units will be separated from the ground floor level by basement carpark and commercial spaces. The risk of contaminated groundwater migrating to off-site residential receptors has been dismissed as there were no detections of contamination in the downgradient monitoring well, MW2.
- There were many detections of hydrocarbons (TRH fractions) in MW1 (directly downgradient of UPSS), but only low-level detections in MW2 and MW3. No free phase hydrocarbons were observed during either groundwater sampling event.
- Ecological: The groundwater results for MW1 on two occasions confirm the presence of hydrocarbons (TRH Fractions). Copper exceeded both freshwater and marine guideline limits (ANZG 2018) in MW2. Cobalt exceeded marine guideline limits (ANZG 2018) in MW1. The following PAHs exceeded both freshwater and marine guideline limits (ANZG 2018) in MW1, naphthalene, phenanthrene, anthracene, fluoranthene and benzo(a)pyrene. B(a)p accumulated in the upgradient well but not in the two downgradient wells.

The following conclusions have been made from the current investigation:

- The site assessment has confirmed the site is contaminated and a Contamination Management Plan (CMP) will be required to manage contaminated soil and groundwater at the site during site redevelopment (demolition and construction including but not limited to all earthworks).
- Once the CMP is put in place and recommendations are adhered to, the site will be suitable for the proposed use, the redevelopment of the site.
- At the time of production of this report (June 2025) it could not be determined if the UPSS infrastructure had been removed and is therefore assumed to be present. As it is a potential ongoing source for hydrocarbon contamination, the UPSS infrastructure should be decommissioned as soon as possible. It is anticipated that once the UPSS infrastructure is removed, any residual risk from hydrocarbons (TRH Fractions and naphthalene) in the groundwater will be eliminated.
- The proposed site redevelopment will involve the excavation of large volumes of fill from the site which will remove most of the contaminated material at site.
- The groundwater assessment confirmed elevated levels of hydrocarbons (TRH Fractions and naphthalene) which demonstrates that the UPSS infrastructure associated with the former service station had historic failure. Elevated levels of cobalt and copper indicated that some metals in the fill are leaching into the groundwater.
- Elevated levels of naphthalene, benzo(a)pyrene and some other metals are present in the groundwater which may pose a risk human health and the environment without adequate management.
- Elevated levels of lead and benzo(a)pyrene are present in the fill at the site and without adequate management may pose a risk to human health both onsite and offsite during development works to adjacent residents and commercial workers through dermal contact, dust inhalation and soil ingestion and may adversely impact the environment from sediment erosion into the waterways.
- In terms of soil disposal, elevated levels of barium, beryllium, lead, manganese, mercury, zinc, copper and benzo(a)pyrene and hydrocarbons have been identified and will require careful consideration when managing.

As the ESA has confirmed there is contaminated soil and groundwater at the site that poses a risk to the environment (off site) and human health (through dermal contact, dust inhalation and soil ingestion pathways) GES recommends the following work should be undertaken in relation to contamination mitigation and remediation measures:

Before Work Commences

- A Contamination Management Plan (CMP) (Version 6, reviewed at the time of production of this report) will be required to mitigate risks to ecological and human health receptors including risk posed from elevated levels of lead and benzo(a)pyrene in the soil and naphthalene, benzo(a)pyrene and some other metals in the groundwater. The CMP should include but not be limited to the following:
    - Soil management considerations including dust, wind, and water erosion in terms of human health and the environment in the Soil and Water Management Plan (SWMP).
    - Consideration to the duration of stockpile exposure and physical barriers to stockpiles plus standard building site security fencing.
    - Soil classification and management advice in accordance with Environment Protection Authority's Information Bulletin #105.
    - Management of contaminated groundwater at the site.

During Construction

- CMP All construction workers and trench workers should be informed of the site contamination during their site induction as identified within the CMP. The CMP should be made available to all contractors prior to the commencement of excavation works. The CMP will include a SWMP.

- Removal of UPSS infrastructure: there is no evidence that the UPSS infrastructure has been removed. It will require to removal in line with the Hobart City Councils planning requirements and EPA Tasmania's UPSS Decommissioning Regulations.
- Validation sampling in the area surrounding the UPSS infrastructure, in accordance with EPA Tasmania's UPSS Decommissioning Regulations.
- IB105 Classification The soil classified on site ranges from Level 1 Material (clean fill) to Level 4 Material (contaminated soil for remediation) classification. To accurately manage the excavated material for appropriate disposal, grid soil sampling was conducted. The construction company undertaking the development should be provided with these results, as this will assist with soil management on site. Additional soil sampling may be required in areas not adequately sampled in the original program.
- For all future excavated material, analysis should include leachate testing and be classified in accordance with the EPA Tasmania's Information Bulletin #105. Material should be transported by a licensed contractor to a suitable landfill facility that accepts contaminated material.

Statement of Suitability

The findings from this investigation confirm that soil and groundwater contamination is present at the site which does pose a potential risk to Human Health and the Environment. However, while the surface of the site is undisturbed there is no immediate risk to human or ecological receptors. Providing the following recommendations are implemented then the excavation and construction works will not adversely impact human health or the environment.

When the site is redeveloped and soil and groundwater is disturbed, the following site-specific management measures will be required including a Contamination Management Plan which will include a Soil and Water Management Plan. UPSS infrastructure will require removal in line with the Hobart City Councils planning requirements and EPA Tasmania's UPSS decommissioning Regulations. All excavated material will require waste classification in accordance with EPA Tasmania's IB105.

Limitations

In the 2018 soil and groundwater investigation the borehole locations and depths were restricted due to presence of buildings and underground infrastructure on the site. At some locations, access for the larger drill rig was unworkable and therefore, depths to the base of the fill were not obtained.

All findings within the report are based on the proposed site development layout presented in Section 2.2. As stipulated in PLN-HOB2024-0716 components in the design include a proposal for a mixed-use development involving 23 residence (multiple Dwelling) and 38 visitor accommodation units (short-term Accommodation. The Lower Ground floor includes a concrete car park and wellness facilities including a swimming pool, recreational areas, green pavilions and gardens for the use by residents and visitors.

If the site layout is to change, this report will need to be amended to reflect these changes.

Table of Contents

DOCUMENT CONTROL 1

EXECUTIVE SUMMARY 2

ABREVIATIONS 13

1 INTRODUCTION 15

1.1 GENERAL 15
1.2 SITE DETAILS 16
1.3 INVESTIGATION OBJECTIVES 19
1.4 SCOPE OF WORKS 19

2 PLANNING 20

2.1 ZONING 20
2.2 PROPOSED SITE DEVELOPMENT WORKS 20
2.3 INTERIM PLANNING SCHEME 20
2.3.1 PROPOSED EXCAVATION WORKS E2.6.2 P1 21

3 DESKTOP STUDY 22

3.1 SITE WALKOVER 22
3.2 SURFACE COVERINGS AND SIGNS OF CONTAMINATION 24
3.3 MRT GEOLOGY MAPPING 26
3.4 TASMANIAN EPA 26
3.5 SITE TOPOGRAPHY, DRAINAGE & HYDROGEOLOGY 28
3.6 HISTORICAL AERIAL PHOTOGRAPHY INTERPRETATION 28
3.7 PREVIOUS SITE INVESTIGATIONS 32
3.8 DANGEROUS GOODS RECORDS (WORKSAFE TASMANIA) 33
3.9 COUNCIL ENVIRONMENTAL RECORDS 33
3.10 GROUNDWATER 33
3.10.1 POTENTIAL UP-GRADIENT CONTAMINATION SOURCES 34
3.10.2 DOWNGRADIENT ECOSYSTEM RECEPTORS 34
3.10.3 REGISTERED WATER BORES 34
3.11 POTENTIAL CONTAMINATION ISSUES 35
3.11.1 AREAS OF POTENTIAL CONCERN 35
3.11.2 CONTAMINANTS OF POTENTIAL CONCERN 35

4 FIELD INVESTIGATION PROCEDURES 37

4.1 WORKS SUMMARY 37
4.2 SOIL INVESTIGATION 39
4.2.1 BOREHOLE DRILLING 39
4.2.2 SOIL SAMPLING 39
4.2.3 SOIL ANALYSIS 39
4.3 GROUNDWATER ASSESSMENT 41
4.3.1 MONITORING WELL ESTABLISHMENT 41
4.3.2 WELL DEVELOPMENT 41
4.3.3 WELL GAUGING AND SAMPLING 41
4.3.4 GROUNDWATER ANALYSIS 41

5 QUALITY CONTROL 42

5.1 FIELD 42
5.1.1 SOIL 42
5.1.2 GROUNDWATER 43
5.2 LABORATORY 43
5.2.1 SOIL 43
5.2.2 GROUNDWATER 45

6 FIELD INVESTIGATION FINDINGS 46

6.1 SOIL BORES 46
6.1.1 GEOLOGICAL INTERPRETATION 46
6.1.2 SOIL CONTAMINATION OBSERVATIONS 46
6.1.3 GRAIN CLASS INTERPRETATION 46
6.2 GROUNDWATER 50
6.2.1 AQUIFER INTERPRETATION 50
6.2.2 WELL CONSTRUCTION 50
6.2.3 GROUNDWATER GAUGING 50
6.2.4 HYDRAULIC GRADIENT AND FLOW DIRECTION 50
6.2.5 HYDRAULIC CONDUCTIVITY 52
6.2.6 GROUNDWATER FLOW RATES 52
6.2.7 GROUNDWATER PHYSIOCHEMISTRY 52
6.2.8 PSH & GROUNDWATER CONTAMINATION OBSERVATIONS 52

7 SOIL ECOLOGICAL IMPACT ASSESSMENT 53

7.1 PROTECTED ENVIRONMENTAL VALUES 53
7.2 NEPM ASC (2013) GUIDELINES 53
7.3 GUIDELINES 53
7.3.1 ECOLOGICAL SCREENING LEVELS 53
7.3.2 ECOLOGICAL INVESTIGATION LEVELS 54
7.4 FINDINGS 55
7.4.1 ECOLOGICAL SCREENING LEVELS 55
7.4.2 ECOLOGICAL INVESTIGATION LEVELS 55

8 GROUNDWATER GUIDELINES 62

8.1 SCREENING CRITERIA 62
8.1.1 DRINKING WATER 62
8.1.2 IRRIGATION 62
8.1.3 INDUSTRIAL WATER USE 62
8.1.4 STOCK WATERING 62
8.1.5 ECOSYSTEM PROTECTION 62
8.1.6 HSL'S FOR ASSESSING PETROLEUM VAPOUR INTRUSION 63
8.2 GROUNDWATER RESULTS 63
8.2.1 ECOSYSTEM 63
8.2.2 HUMAN HEALTH 64

9 SOIL HUMAN HEALTH DIRECT CONTACT ASSESSMENT 68

9.1 GUIDELINES 68
9.1.1 LAND USE CLASSIFICATION 68
9.1.2 ADOPTED LAND USE CLASSIFICATION 68

9.1.3 HEALTH INVESTIGATION & SCREENING LEVELS 68
9.2 FINDINGS 69
9.2.1 DERMAL CONTACT - PETROLEUM HYDROCARBONS 69
9.2.2 DUST INHALATION & SOIL INGESTION 69

10 INDOOR INHABITANT PVI ASSESSMENT – HSL'S 76

10.1 SELECTED MEDIA FOR ASSESSING PVI RISK 76
10.2 LAND USE CLASS 77
10.3 SOIL ASSESSMENT FINDINGS 77
10.4 GROUNDWATER ASSESSMENT FINDINGS 81
10.4.1 LNAPL CLASSIFICATION 81
10.4.2 HSL GUIDELINES 81
10.4.3 FINDINGS 81

11 TRENCH WORKER PVI ASSESSMENT – HSL'S 84

11.1 CLASSIFICATION 84
11.2 FINDINGS 84

12 SOIL DISPOSAL ASSESSSMENT 88

12.1 GUIDELINES 88
12.2 FINDINGS 88

13 CONCEPTUAL SITE MODEL 93

13.1 PRIMARY SOURCES OF CONTAMINATION 93
13.1.1 CONFIRMED PRIMARY SOURCE 93
13.1.2 POTENTIAL SECONDARY SOURCES OF CONTAMINATION – RULED OUT 93
13.2 POTENTIAL RECEPTORS 93
13.2.1 POTENTIAL HUMAN RECEPTORS 93
13.2.2 POTENTIAL ECOLOGICAL RECEPTORS 93
13.3 TRANSPORT MECHANISMS AND EXPOSURE PATHWAYS 93

14 CONCLUSIONS 97

14.1 DESKTOP ASSESSMENT 97
14.2 ADOPTED LAND USE SETTINGS 98
14.3 SOIL ASSESSMENT 98
14.3.1 ENVIRONMENT 98
14.3.2 HUMAN HEALTH 98
14.3.3 IB105 99
14.4 GROUNDWATER ASSESSMENT 99
14.5 CONCLUDING SUMMARY 99

15 RECOMMENDATIONS 100

REFERENCES 102

LIMITATIONS STATEMENT 104

APPENDIX 1 GES STAFF 105

APPENDIX 2 SURVEY PLANS FOR DEVELOPMENT APPLICATION 106

APPENDIX 3 SITE WALKOVER PHOTOGRAPHS 113

APPENDIX 4 EPA PIR 122

APPENDIX 5 HISTORICAL AERIAL PHOTOGRAPHY 124

APPENDIX 6 WORKSAFE TASMANIA - DANGEROUS GOODS RECORDS 135

APPENDIX 7 PID HIRE AND SERVICE RECORD 144

APPENDIX 8 LABORATORY CHAIN OF CUSTODY 147

APPENDIX 9 LABORATORY SAMPLE RECEIPT NOTIFICATION 183

APPENDIX 10 QUALITY ASSURANCE AND QUALITY CONTROL DOCUMENTATION 238

APPENDIX 11 BORE LOG IMAGES 568

APPENDIX 12 BOREHOLE LOGS 584

APPENDIX 13 GROUNDWATER GAUGING FORMS 641

APPENDIX 14 SOIL ANALYTICAL RESULTS - CERTIFICATE OF ANALYSIS 643

APPENDIX 15 GROUNDWATER ANALYTICAL RESULTS - CERTIFICATE OF ANALYSIS 861

Plates

PLATE 1 TANK FILL POINT – AT *48-50 NEW TOWN ROAD* (2018) 22
PLATE 2 SPATIAL RELATIONSHIP TO TANK FILL POINT TO THE BUILDING AT *48-50 NEW TOWN ROAD* (2018) 22
PLATE 3 DIESEL ENGINE OIL IN THE GENERATOR BUILDING (2018) 23
PLATE 4 52 NEW TOWN ROAD – DIESEL AST ABOVE THE GENERATOR BUILDING AT THE REAR (WESTERN BOUNDARY) OF THE SITE (2018) 23
PLATE 5 THE 1989 HISTORICAL AERIAL PHOTOGRAPH OF THE SITE AND SURROUNDING AREA. 125
PLATE 6 THE 1989: FORMER SERVICE STATION AT 30-36 NEW TOWN ROAD (100M SOUTH AND UPGRADIENT OF THE SITE) 126
PLATE 7 THE 1989: FORMER SERVICE STATION, 466 ELIZABETH STREET, NORTH HOBART (220M S & UPGRADIENT OF THE SITE) 126
PLATE 8 THE 1977 HISTORICAL AERIAL PHOTOGRAPH OF THE SITE. 127
PLATE 9 THE 1973 HISTORICAL AERIAL PHOTOGRAPH OF THE SITE. 128
PLATE 10 THE 1965 HISTORICAL AERIAL PHOTOGRAPH THE SITE AND THE SURROUNDING AREA. 129
PLATE 11 THE 1965 HISTORICAL AERIAL PHOTOGRAPH OF THE SITE. 130
PLATE 12 THE 1965 HISTORICAL AERIAL PHOTOGRAPH OF *48-50 NEW TOWN ROAD*. 131
PLATE 13 THE 1965 HISTORICAL AERIAL PHOTOGRAPH OF 30-36 NEW TOWN ROAD FORMER CALTEX SERVICE STATION. 131
PLATE 14 THE 1965 HISTORICAL AERIAL PHOTOGRAPH OF 466 ELIZABETH STREET; FORMER SERVICE STATION 132
PLATE 15 THE 1957 HISTORICAL AERIAL PHOTOGRAPH OF THE SURROUNDING AREA (30-36' & '466' SERVICE STATIONS NOT YET CONSTRUCTED). 133
PLATE 16 THE 1957 HISTORICAL AERIAL PHOTOGRAPH OF THE SITE. 133
PLATE 17 THE 1957 HISTORICAL AERIAL PHOTOGRAPH OF *48-50 NEW TOWN ROAD* (FORMER SERVICE STATION). 134
PLATE 18 THE 1946 HISTORICAL AERIAL PHOTOGRAPH OF 52 & 48-50 NEW TOWN ROAD 134

Figures

FIGURE 1 SITE LOCATION 52 (48-50 & 52) NEW TOWN ROAD, THE SITE AND SURROUNDING AREA (LIST IMAGE, 2018)..... 15
FIGURE 2 CURRENT SITE PHOTOGRAPH AT 48-50 NEW TOWN ROAD (GOOGLE EARTH IMAGE, MAY 2024 CAPTURE). 16
FIGURE 3 FORMER BUILDING AT 48-50 NEW TOWN ROAD (GOOGLE EARTH IMAGE). 16
FIGURE 4 CURRENT SITE LAYOUT (AERIAL PHOTOGRAPH LIST IMAGE, 2024), ON TWO TITLES. 17
FIGURE 5 HISTORICAL SITE LAYOUT (AERIAL PHOTOGRAPH LIST IMAGE, 2018), ON TWO TITLES. 18
FIGURE 6 COUNCIL PLANNING ZONES (2015) (LIST, 2024)..... 20
FIGURE 7 PHOTOGRAPH OF HISTORICAL SITE PLAN (DATE UNKNOWN)..... 24
FIGURE 8 CLOSE UP OF MEASUREMENTS ON THE HISTORICAL SITE PLAN..... 24
FIGURE 9 CURRENT SITE CONDITIONS VIEW LOOKING WEST (MAY 2025)..... 25
FIGURE 10 CURRENT SITE CONDITIONS VIEW LOOKING NORTH (MAY 2025)..... 25
FIGURE 11 MINERAL RESOURCES TASMANIA 1:25000 SCALE MAPPING (THE LIST). 26
FIGURE 12 EPA REGULATED PREMISES AND REGISTERED UPSS (THE LIST) 27
FIGURE 13 GOOGLE STREET VIEW OF 431 ELIZABETH STREET (MAY 2024)..... 27
FIGURE 14 INFERRED GROUNDWATER FLOW (BLUE DASHED LINE) 28
FIGURE 15 THE 1989 HISTORICAL AERIAL PHOTOGRAPH OF THE SITE AND SURROUNDING AREA. 29
FIGURE 16 THE 1965 HISTORICAL AERIAL PHOTOGRAPH THE SITE AND THE SURROUNDING AREA..... 30
FIGURE 17 THE 1965 HISTORICAL AERIAL PHOTOGRAPH OF 48-50 NEW TOWN ROAD. 31
FIGURE 18 THE 1957 HISTORICAL AERIAL PHOTOGRAPH OF THE SITE. 31
FIGURE 19 THE 1946 HISTORICAL AERIAL PHOTOGRAPH OF 52 & 48-50 NEW TOWN ROAD..... 32
FIGURE 20 CLOSEST GROUNDWATER BORES. (SOURCE THE LIST, 2018)..... 35
FIGURE 21 AREAS OF POTENTIAL CONCERN..... 36
FIGURE 22 BOREHOLE PLAN..... 38
FIGURE 23 GROUNDWATER FLOW DIRECTION 51
FIGURE 24 DIAGRAMMATIC AREAS OF POTENTIAL CONCERN..... 94
FIGURE 25 CONCEPTUAL SITE MODEL..... 95

Tables

TABLE 1 SITE DETAILS 16
TABLE 2 HISTORICAL AERIAL PHOTOGRAPH REVIEW..... 28
TABLE 3 DANGEROUS GOODS MANIFEST..... 33
TABLE 4 BORE DETAILS 35
TABLE 5 SUMMARY OF SITE INVESTIGATION WORK DATES 37
TABLE 6 SUMMARY OF SOIL SAMPLING METHODS..... 39
TABLE 7 OVERVIEW OF SOIL ANALYSIS AND QUALITY CONTROL..... 40
TABLE 8 SUMMARY OF MONITORING WELL GAUGING AND SAMPLING PROCEDURES 41
TABLE 9 OVERVIEW OF GROUNDWATER ANALYSIS AND QUALITY CONTROL 41
TABLE 10 SOIL FIELD QA/QC PROCEDURES AND COMPLIANCE 42
TABLE 11 GROUNDWATER FIELD QA/QC PROCEDURES AND COMPLIANCE..... 43
TABLE 12 SUMMARY OF SOIL LABORATORY QA/QC OUTLINES..... 43
TABLE 13 DETAILS OF SOIL LABORATORY QA/QC OUTLINES 44
TABLE 14 GROUNDWATER LABORATORY QA/QC PROCEDURES AND COMPLIANCE..... 45
TABLE 15 SUMMARY OF PID SCREENING RESULTS..... 46
TABLE 16 SUMMARY OF GRAIN CLASS BASED ON USCS CLASSIFICATION – BH01 – BH20..... 47
TABLE 17 SUMMARY OF GRAIN CLASS BASED ON USCS CLASSIFICATION – BH21 – BH40..... 48
TABLE 18 SUMMARY OF GRAIN CLASS BASED ON USCS CLASSIFICATION – BH41-BH53 49
TABLE 19 SUMMARY OF WELL CONSTRUCTION, AQUIFER DETAILS AND PHC IMPACTED SOIL DEPTHS..... 50
TABLE 20 SUMMARY OF GROUNDWATER GAUGING RESULTS – 26 NOVEMBER 2018..... 50
TABLE 21 SUMMARY OF INFERRED SITE GROUNDWATER FLOW DIRECTIONS AND RATES..... 50
TABLE 22 SUMMARY OF HYDRAULIC CONDUCTIVITY ESTIMATES 52
TABLE 23 SUMMARY OF INFERRED GROUNDWATER FLOW RATES AT THE SITE 52
TABLE 24 SUMMARY OF STABILISED GROUNDWATER PROPERTIES (26 NOVEMBER 2018 EVENT) 52
TABLE 25 SUMMARY OF SOIL INVESTIGATION LIMITS CONSIDERED AT THE SITE BASED IN NEPM ASC (2013)..... 53
TABLE 26 ADOPTED LAND USE SCENARIO FOR THE SOIL BORES..... 54
TABLE 27 CATION EXCHANGE AND CLAY CONTENT, ADOPTED FOR THE SITE 54
TABLE 28 SUMMARY OF SOIL ANALYTICAL RESULTS COMPARED WITH ECOLOGICAL SCREENING LEVEL'S ESL A – BH01-BH20 56
TABLE 29 SUMMARY OF SOIL ANALYTICAL RESULTS COMPARED WITH ECOLOGICAL SCREENING LEVEL'S ESL A – BH21-BH40 57
TABLE 30 SUMMARY OF SOIL ANALYTICAL RESULTS COMPARED WITH ECOLOGICAL SCREENING LEVEL'S ESL A – BH41-BH53 58
TABLE 31 SOIL ANALYTICAL RESULTS COMPARED AGAINST ECOLOGICAL INVESTIGATION LEVELS ESL A – BH01-BH20 59
TABLE 32 SOIL ANALYTICAL RESULTS COMPARED AGAINST ECOLOGICAL INVESTIGATION LEVELS ESL A – BH21-BH40 60

TABLE 33 SOIL ANALYTICAL RESULTS COMPARED AGAINST ECOLOGICAL INVESTIGATION LEVELS ESL A – BH41-BH53 61
TABLE 34 ENVIRONMENTAL VALUES AND USES OF GROUNDWATER REQUIRING PROTECTION (STATE POLICY ON WATER QUALITY MANAGEMENT 1997). 62
TABLE 35 GROUNDWATER ANALYTICAL RESULTS COMPARED AGAINST SELECTED FRESHWATER (95% TRIGGER) WATER QUALITY GUIDELINES – TRH AND BTEXN 65
TABLE 36 GROUNDWATER ANALYTICAL RESULTS COMPARED AGAINST SELECTED MARINE WATER (95%) WATER QUALITY GUIDELINES – TRH AND BTEXN 65
TABLE 37 GROUNDWATER ANALYTICAL RESULTS COMPARED AGAINST SELECTED FRESH WATER QUALITY GUIDELINES (95% TRIGGER) – DISSOLVED METALS 66
TABLE 38 GROUNDWATER ANALYTICAL RESULTS COMPARED AGAINST SELECTED MARINE WATER QUALITY GUIDELINES (95% TRIGGER) – DISSOLVED METALS 66
TABLE 39 GROUNDWATER ANALYTICAL RESULTS COMPARED AGAINST SELECTED FRESH WATER QUALITY GUIDELINES (95% TRIGGER) – PAHS 67
TABLE 40 GROUNDWATER ANALYTICAL RESULTS COMPARED AGAINST SELECTED MARINE WATER QUALITY GUIDELINES (95% TRIGGER) – PAHS 67
TABLE 41 SUMMARY OF LAND USE SETTING AND DENSITY FOR DETERMINING EXPOSURE RISK 68
TABLE 42 SUMMARY OF EXPOSURE PATHWAYS AND PRELIMINARY (TIER 1) METHODS FOR ASSESSING HUMAN EXPOSURE RISK 68
TABLE 43 SOIL ANALYTICAL RESULTS COMPARED AGAINST CRC CARE GUIDELINES FOR DERMAL CONTACT – BH01-BH20 70
TABLE 44 SOIL ANALYTICAL RESULTS COMPARED AGAINST CRC CARE GUIDELINES FOR DERMAL CONTACT – BH21-BH40 71
TABLE 45 SOIL ANALYTICAL RESULTS COMPARED AGAINST CRC CARE GUIDELINES FOR DERMAL CONTACT – BH41-BH45 72
TABLE 46 SOIL ANALYTICAL RESULTS COMPARED AGAINST NEPM (2013) HEALTH INVESTIGATION LIMIT GUIDELINES – BH01-BH20 73
TABLE 47 SOIL ANALYTICAL RESULTS COMPARED AGAINST NEPM (2013) HEALTH INVESTIGATION LIMIT GUIDELINES – BH21-BH40 74
TABLE 48 SOIL ANALYTICAL RESULTS COMPARED AGAINST NEPM (2013) HEALTH INVESTIGATION LIMIT GUIDELINES – BH41-BH53 75
TABLE 49 PREFERRED METHODS FOR DETERMINING SITE PVI RISK 76
TABLE 50 SOIL ANALYTICAL RESULTS COMPARED AGAINST HSL D FOR INDOOR VAPOUR RISK - BH01-BH20 78
TABLE 51 SOIL ANALYTICAL RESULTS COMPARED AGAINST HSL D FOR INDOOR VAPOUR RISK – BH21-BH40 79
TABLE 52 SOIL ANALYTICAL RESULTS COMPARED AGAINST HSL D FOR INDOOR VAPOUR RISK – BH41-BH53 80
TABLE 53 CLASSIFICATION USED TO ASSESS PETROLEUM VAPOUR INTRUSION RISK TO LOCAL RECEPTORS FROM SOIL 81
TABLE 54 SUMMARY OF GROUNDWATER SAMPLES THAT EXCEEDED THRESHOLD HSL LIMITS (<2M BGS) 82
TABLE 55 SUMMARY OF GROUNDWATER SAMPLES THAT EXCEEDED THRESHOLD HSL LIMITS (2-4M BGS) 82
TABLE 56 SUMMARY OF GROUNDWATER CONCENTRATIONS COMPARED AGAINST CRC CARE (FRIEBEL & NADEBAUM, 2011) GUIDELINES FOR ASSESSING FOR THE PRESENCE OF LNAPL 83
TABLE 57 SUMMARY OF SOIL ANALYTICAL RESULTS COMPARED AGAINST HSL'S FOR ASSESSING PVI RISK TO TRENCH WORKERS – BH01-BH20 85
TABLE 58 SUMMARY OF SOIL ANALYTICAL RESULTS COMPARED AGAINST HSL'S FOR ASSESSING PVI RISK TO TRENCH WORKERS – BH21-BH40 86
TABLE 59 SUMMARY OF SOIL ANALYTICAL RESULTS COMPARED AGAINST HSL'S FOR ASSESSING PVI RISK TO TRENCH WORKERS – BH41-BH53 87
TABLE 60 SUMMARY OF IB105 CLASSIFICATION GUIDELINES 88
TABLE 61 SOIL ANALYTICAL RESULTS COMPARED AGAINST IB105 TOTAL SOLIDS INVESTIGATION LIMITS FOR SOIL DISPOSAL – BH01-BH20 89
TABLE 62 SOIL ANALYTICAL RESULTS COMPARED AGAINST IB105 TOTAL SOLIDS INVESTIGATION LIMITS FOR SOIL DISPOSAL – BH21-BH40 PLUS GT01-GT03 90
TABLE 63 SOIL ANALYTICAL RESULTS COMPARED AGAINST IB105 LEACHATE INVESTIGATION LIMITS FOR SOIL DISPOSAL – BH21-BH40, PLUS GT01-GT03 91
TABLE 64 SOIL ANALYTICAL RESULTS COMPARED AGAINST IB105 TOTAL SOLIDS INVESTIGATION LIMITS FOR SOIL DISPOSAL – BH41-BH53 92
TABLE 65 SOIL ANALYTICAL RESULTS COMPARED AGAINST IB105 LEACHATE INVESTIGATION LIMITS FOR SOIL DISPOSAL – BH41-BH53 92
TABLE 66 SUMMARY OF POTENTIAL RECEPTORS 96
TABLE 67 IMAGES OF THE SITE IN MAY 2025 113
TABLE 68 IMAGES OF THE SITE IN 2018 114

ABREVIATIONS

ADWG	Australian Drinking Water Guidelines
AEC	Areas of Environmental Concern
AHD	Australian Height Datum
ALS	Analytical Laboratory Services
ANZECC	Australia and New Zealand Environment and Conservation Council
AWQG	Australian Water Quality Guidelines
BGS	Below Ground Surface
BH	Borehole
BTEX	Benzene Toluene Ethylbenzene Xylene
CMP	Construction Environmental Management Plan
COA	Certificate of Analysis
COC	Chain of Custody
COPC	Contaminant of Potential Concern
CRC CARE	Corporative Research Centre for Contamination Assessment and Remediation of the Environment
CSM	Conceptual Site Model
DQO	Data Quality Objectives
DWS	Depth Water Struck
EC	Electrical Conductivity
EOH	End Of Hole
EIL	Ecological Investigation Levels
ESL	Ecological Screening Levels
EPA	Environmental Protection Authority
EPN	Environmental Protection Notice
ESA	Environmental Site Assessment
GDA94	Geocentric Datum of Australia 1994
GES	Geo-Environmental Solutions Pty. Ltd.
GME	Groundwater Monitoring Event
HIL	Health Investigation Levels
HSL	Health Screening Levels
IL	Investigation Levels
IN	Investigation Notice
IP	Interface Probe
LiDAR	Light Detection And Ranging
LOR	Limits of Reporting
MCRWBA	Minimum Construction Requirements for Water Bores in Australia
MDL	Mean Detection Limit
MW	Monitoring Well
NATA	National Association of Testing Authorities
NEPM ASC	National Environmental Protection (Assessment of Site Contamination) Measure
NHMRC	National Health and Medical Research Council

NRMMC	Natural Resource Management Ministerial Council
NL	Non Limiting
NRMMC	Natural Resource Management Ministerial Council
PAH	Polynuclear Aromatic Hydrocarbons
PCP	Physico-Chemical Parameters
PEV	Protected Environmental Values
PHC	Petroleum Hydrocarbons
PID	Photo-Ionisation Detector
PPA	Preferential (PVI) Pathways Assessment
PSH	Phase Separated Hydrocarbons
PVI	Petroleum Vapour Intrusion
Redox	Reduction / Oxidation Potential
RN	Remediation Notice
SCA	Site Contamination Assessment
SCM	Site Contamination Model
SWL	Standing Water Level
TDS	Total Dissolved Solids
TOC	Top of Casing
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
USCS	Unified Soil Classification System
VME	Vapour Monitoring Event
VP	Vapour Probe
WRG	Water Resource Group

1 INTRODUCTION

1.1 General

This report presents the findings from an Environmental Site Assessment (ESA) undertaken by Geo-Environmental Solutions Pty Ltd (GES) at 52 (48-50 & 52) New Town Road, New Town, Tasmania, hereby referred to as 'The Site'. GES were engaged by Swanbury Penglase Architects to conduct the original investigation in 2018. This report is Version 8 of the original report. GES has been reengaged to update the report for The House Family Office (the 'Client'). The development is described as the following:

A proposal for a mixed-use development involving 23 residences (Multiple Dwellings) and 38 visitor accommodation units (Short-term Accommodation) which will be supported by a wide array of communal activities including a variety of recreational areas, green pavilions and gardens for use by the residents and visitors.

The proposal also includes a café (Food Services) on the ground floor and a consulting room area (Business and Professional Services) and wellness facilities (Sport and Recreation) on the lower ground floor which will be accessible to the public. The short-term visitor accommodation is proposed to be located in the southern two wings of the proposal, excluding the penthouse dwelling which is intended to remain as residential dwelling.

The site location is presented in Figure 1, a recent site photograph in Figure 2, an image of the former building on the southern portion of the site is presented in Figure 3. The current site layout aerial photograph is presented in Figure 4 and the 2018 site layout is presented in Figure 5. Version 1 of this report contained details from the July-August Investigation. Version 2 included additional soil and groundwater information from October-November 2018 investigation. It should be noted that the investigation was limited by the footprint of the existing buildings onsite thus access was restricted in these areas. This revision, Version 8 contains amended design plans and planning information. As did Version 3, 4, 5,6 and 7.

The ESA has been written in line with the Hobart City Council Interim Planning Scheme *Contaminated Land Assessment and Planning* requirements plus the Environmental Protection Authority (EPA) Tasmanian's soil disposal and waste transport guidelines.

The ESA has been prepared by a suitably qualified and experience practitioner in accordance with procedures and practices detailed in National Environmental Protection (Assessment of Site Contamination) Measure (NEPM ASC 2013) guidelines and key regulations and policies identified in the References section of this document. Personnel engaged in preparing this ESA are listed in Appendix 1 along with their relevant qualifications and years of experience.



Figure 1 Site Location 52 (48-50 & 52) New Town Road, the site and surrounding area (LIST Image, 2018).



Figure 2 Current site photograph at 48-50 New Town Road (Google Earth Image, May 2024 capture).



Figure 3 Former building at 48-50 New Town Road (Google Earth Image).

1.2 Site Details

Site details are presented in Table 1.

Table 1 Site Details

Site Address 48-52 New Town Road, New Town, Tasmania
Current Title identification details According to the Cadastral Parcels layer on the list; *48-50 New Town Road* Property ID 5517199, CT 198029/1 And *52 New Town Road* is Property ID 5517180, CT 252465/1
Current land use This site is vacant, and the former buildings have recently been demolished.
Site Total Area 7,731m^2 (both titles combined).
Current Ownership (as per current certificates of title) 52 New Town Road Pty Ltd (both titles). Postal address HEADLAND PARK UNIT 16 1110 MIDDLE HEAD RD MOSMAN NSW 2088.
Zoning Urban Mixed Use – under the Hobart Interim Planning Scheme 2015.
Local Council Hobart City Council
Proposed Site Use A proposal for a mixed-use development involving 23 residences (Multiple Dwellings) and 38 visitor accommodation units (Short-term Accommodation) which will be supported by a wide array of communal activities including a variety of recreational areas, green pavilions and gardens for use by the residents and visitors. The proposal also includes a café (Food Services) on the ground floor and a consulting room area (Business and Professional Services) and wellness facilities (Sport and Recreation) on the lower ground floor which will be accessible to the public. The short-term visitor accommodation is proposed to be located in the southern two wings of the proposal, excluding the penthouse dwelling which is intended to remain as residential dwelling.
Surrounding Land Use The site is surrounded by residential properties and zoning of these properties is mostly *Inner Residential*.



Figure 4 Current Site Layout (Aerial photograph LIST Image, 2024), on two Titles.



Figure 5 Historical Site Layout (Aerial photograph LIST Image, 2018), on two Titles.

1.3 Investigation Objectives

The objectives of this ESA were to determine:

- In accordance with the Hobart City Council Interim Planning Scheme, if there is any evidence the land is contaminated;
- Whether any site contamination presents an occupational health and safety risk to workers involved in redevelopment of the site or future site users;
- Whether any site contamination is likely to present an environmental risk from excavation conducted during development at the site;
- If the site is deemed to be contaminated:
    - Determine whether the site is suitable for the proposed use/development;
    - Make recommendations to prepare a contamination management plan (CMP) to manage any contamination risks, provide specific remediation and/or protection measures are required to be implemented before use or excavation commences

1.4 Scope of Works

The scope of works of this ESA was to:

- Conduct a Desktop Assessment including records searches from the Environmental Protection Authority (EPA) Tasmania, WorkSafe Tasmania (WST) and Hobart City Council (HCC) as well as reviewing the relevant Historical Aerial Photographs.
- Conduct an invasive soil investigation across the entire site and install groundwater monitoring wells.
- A total of 53 bore holes were drilled to collect 183 primary soil samples, 142 of which was analysised for total recoverable hydrocarbons (TRH), Benzene Toluene Ethylbenzene Xylene Naphthalene (BTEXN), Polynuclear Aromatic Hydrocarbons (PAHs) plus leachate and a suite 15 Metals to a National Association of Testing Authorities (NATA) accredited laboratory to determine the presence/ absence of contamination and at what level;
- Conducted two limited groundwater monitoring events to obtain a snapshot of current groundwater conditions down gradient of the former service station site at *48-50 New Town Road*.
- All samples were sent with quality assurance/ quality control samples for analysis.
- All analytical results were compared against relevant guidelines; and
- An ESA Report presenting the findings of the site investigation, a conceptual site model (CSM) was developed, and future contamination management recommendations have been made.

2 PLANNING

2.1 Zoning

The site is zoned Urban Mixed Use under the Hobart Interim Planning Scheme of 2015, see Figure 6. The land use surrounding the site is consistent with the zoning and includes Urban Mixed Use (grey), Inner Residential (brown), Open Space (dark green), Utilities (yellow), General residential (Red) and Recreation (bright green).



Figure 6 Council Planning Zones (2015) (LIST, 2024)

2.2 Proposed Site Development Works

A Development Application has been submitted through PlanBuild Tasmania, Application Reference PLN-HOB2024-0716. The Client have submitted the following proposal for the site:

A proposal for a mixed-use development involving 23 residences (Multiple Dwellings) and 38 visitor accommodation units (Short-term Accommodation) which will be supported by a wide array of communal activities including a variety of recreational areas, green pavilions and gardens for use by the residents and visitors.

The proposal also includes a café (Food Services) on the ground floor and a consulting room area (Business and Professional Services) and wellness facilities (Sport and Recreation) on the lower ground floor which will be accessible to the public. The short-term visitor accommodation is proposed to be located in the southern two wings of the proposal, excluding the penthouse dwelling which is intended to remain as residential dwelling.

The proposed Architects survey plans, revised on the 6th of June 2025 are presented in Appendix 2

During the site redevelopment, a large volume of material including soil, fill and bedrock will require excavation and removal. The former service station refuelling infrastructure will also require removal.

2.3 Interim Planning Scheme

The council contaminated site register suggests that potentially contaminating activities may have taken place at the site or on a neighboring site. The proposed development has therefore flagged the Interim Planning Scheme E2.0 Potentially Contaminated Land Code. The following potentially contaminating activities (IPS Table E2.2) have been identified:

- A former service station operated at 48-50 New Town Road from 1957 to 1970, then from 1975 to 1989 it operated as commercial engine and machinery repair workshop that held petroleum product or oil storage.
- Through the invasive soil testing it has been confirmed that a large quantity of uncontrolled fill is present at 52 New Town Road.

As the EPA director, or a person approved by the Director has not certified that the land is suitable for the proposed development and there is no approved plan to manage contamination and associated risk to human health or the environment, there are no acceptable solutions to the proposed development and therefore all E2.0 performance criteria relevant to the proposed development are to be addressed.

An environmental site assessment (ESA) is the principal requirement within the IPS E2.0 performance criteria. According to the IPS, the ESA report must be prepared by an suitably qualified person and define the nature, extent and levels of existing contamination and the actual or potential risk to human health or the environment, on or off the site, resulting from that contamination, prepared in accordance with the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 16 May 2013.

2.3.1 Proposed Excavation Works E2.6.2 P1

As there is proposed excavation works at the site, E2.6.2 P1 performance criteria is to be addressed. The performance criteria identify that the excavation works must not adversely impact on health and the environment, having regard to:

(a) an environmental site assessment that demonstrates there is no evidence the land is contaminated; or

(b) a plan to manage contamination and associated risk to human health and the environment that includes:

i. an environmental site assessment;

ii. any specific remediation and protection measures required to be implemented before excavation commences; and

iii. a statement that the excavation does not adversely impact on human health or the environment.

3 DESKTOP STUDY

3.1 Site Walkover

A site walkover was completed by GES staff on the 18 July 2018 and relevant images are presented in Appendix 3. Photographs relating to onsite refueling infrastructure are presented in Plate 1 through to Plate 4. Current site conditions, May 2025 can be seen on the front cover, in Figure 2 (page 16), in Figure 4 (page 17), in Figure 9 and Figure 10 (on page 25) and Table 67 in Appendix 3.



Plate 1 Tank fill point – at *48-50 New Town road* (2018)



Plate 2 Spatial relationship to tank fill point to the building at *48-50 New Town Road* (2018)



Plate 3 Diesel Engine Oil in the generator building (2018)



Plate 4 52 New Town Road – Diesel AST above the generator building at the rear (western boundary) of the site (2018)

Historical site plans were viewed during the site walkover and presented in Figure 7 and Figure 8. It is clear the plan is for *52 New Town Road* due to the shape of the site and the surrounding street network. The approximate age of this site plan is 1965 for the following reasons:

- The measurements on the site plan are in imperial units (feet),
- There is a service station at *48-50 New Town road* and
- *52 New Town Road* appears to have been filled.

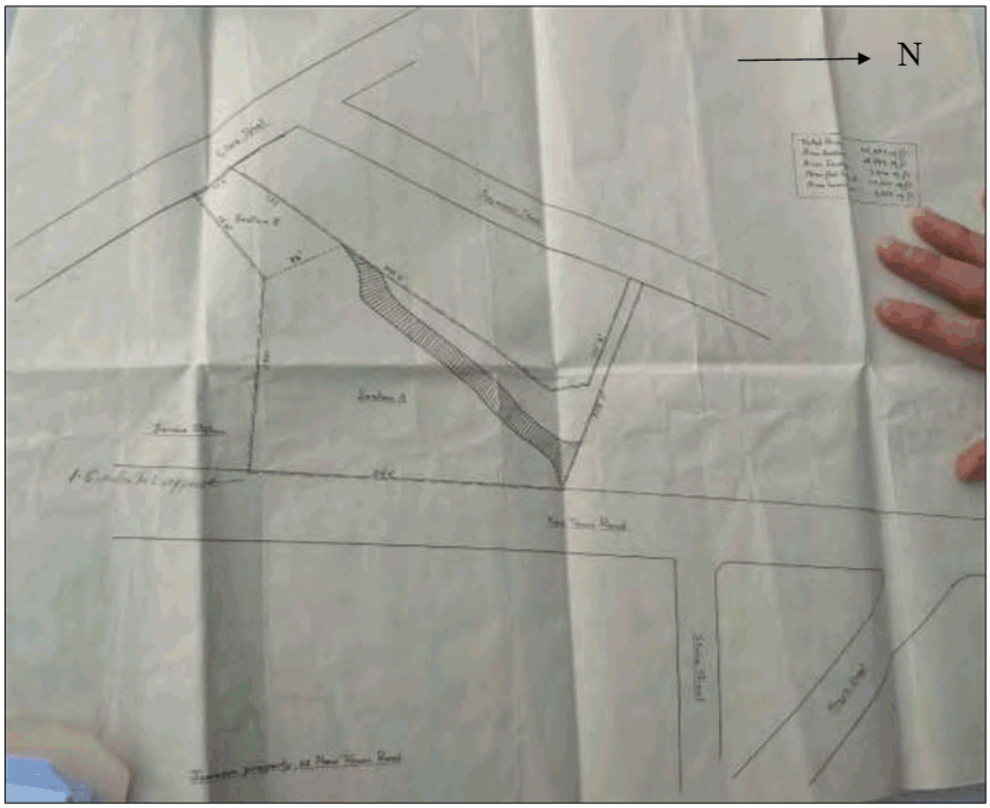


Figure 7 Photograph of historical site plan (date unknown)

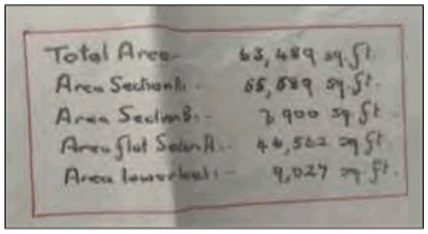


Figure 8 Close up of measurements on the historical site plan

3.2 Surface Coverings and Signs of Contamination

During the original site investigation works in 2018 the following observations were made: the surface covering at the site is a combination of grass/ garden beds, asphalt and concrete plus a number of brick office buildings, lean to sheds and warehouses. There were no signs of surface contamination such as staining or odour at the site. A site visit on the 12th of May 2025 can now confirm that building demolition works have been completed. Pictures from that site visit have been included below in Figure 9 and Figure 10.



Figure 9 Current Site Conditions view looking west (May 2025)

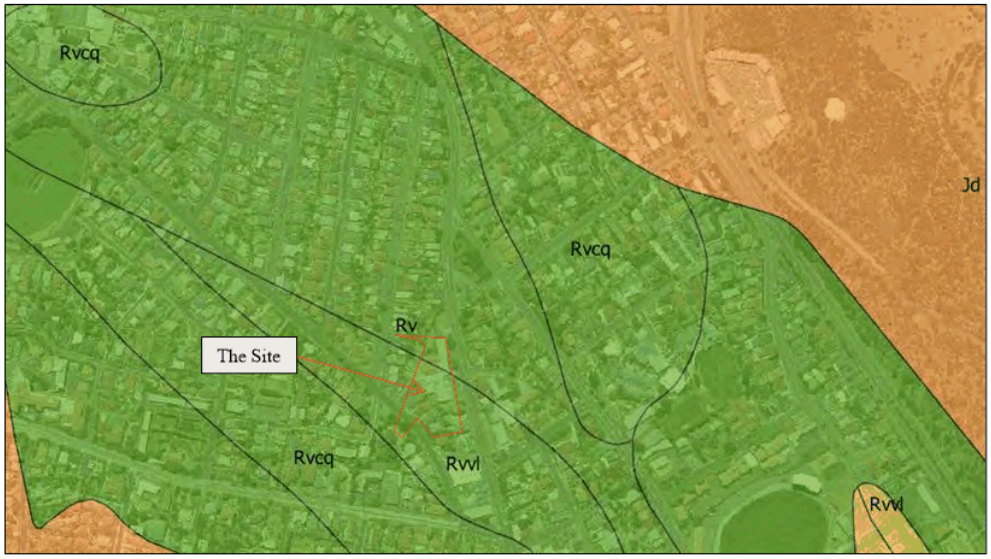


Figure 10 Current Site Conditions view looking north (May 2025)

3.3 MRT Geology Mapping

- The 1:25,000 scale geology map of Hobart (Map Number 5225), see Figure 11; indicates the site is underlain by the following Triassic sediments and sandstone geological units:
  - Map Unit Rv - Undifferentiated volcaniclastic, quartz-rich lithic and quartzose sandstone, siltstone, mudstone, carbonaceous beds and coal seams; and
  - Map Unit Rvvl - Interbedded yellow brown or grey carbonaceous siltstone, mudstone and thin to thick-bedded quartz-rich lithic arkosic sandstone, some fossil plants, common siltstone palaeosols.

The Rv unit is located to the north of the site, which covers the majority of Stage 1 development site area. The entire Stage 2 development site and the southwestern portion of Stage 1 development site is underlain by the Rvvl unit. The contact between the Rv and Rvvl map units are indicated to be located close to the boundary between stage 1 and stage 2 works, which the deposits are orientated in a north-west south-east orientation. It should be noted that the contact between the two geological units has not been mapped as a fault, only as a geological contact.



Rv – TB - Undifferentiated volcaniclastic, quartz-rich lithic and quartzose sandstone, siltstone, mudstone, carbonaceous beds and coal seams.
Rvcg – TB - Thickly- to thinly-bedded volcanic lithic sandstone, siltstone, mudstone and coal seams, fossil plants on some horizons (Newtown Coal Measures).
Rvvl TB - Interbedded yellow brown or grey carbonaceous siltstone, mudstone and thin to thick-bedded quartz-rich lithic arkosic sandstone, some fossil plants, common siltstone palaeosols.
Rvcq TB Interbedded cross-bedded white quartzose sandstone, quartz-rich lithic sandstone, siltstone and mudstone; Hobart area- upper interval with much dark grey carbonaceous mudstone, thin lenticular coal seams and fossil plants in places, elsewhere these litho
Jd Dolerite and related rocks
Rwl TB Interbedded yellow brown or grey carbonaceous siltstone, mudstone and thin to thick-bedded quartz-rich lithic arkosic sandstone, some fossil plants, common siltstone palaeosols.

Figure 11 Mineral Resources Tasmania 1:25000 Scale Mapping (The LIST).

3.4 Tasmanian EPA

A property information request (PIR) search was conducted by the EPA Tasmania and no records relating to contamination or potentially contaminating activities on the site or at adjacent properties to were identified. See Appendix 4 for the letter received from EPA Tasmania on the 31st July 2018.

One property was identified 100m south of the site and upgradient at 30-36 New Town Road which hosted a former Caltex Service Station. The EPA was notified in August 2000 that the underground storage tanks (UST's) had been removed, and the site remediation works would be completed prior to the construction of a video retail outlet. See Figure 14 for the spatial relationship between the former service station and the site.

The Environmental Protection Authority (EPA) Regulated Premises layer on The LIST was consulted in June 2025; there is one underground petroleum storage system (UPSS) which is listed as having a UPSS where decommissioning in progress (orange pin). This is the former Blue Gum Service Station at 431 which now houses an apartment building with ground floor carparking and a cafe. See the current street view in Figure 13. This site sits on a separate groundwater catchment and has been ruled out as a potential upgradient source of contamination.



Figure 12 EPA regulated premises and registered UPSS (The LIST)



Figure 13 Google Street View of 431 Elizabeth Street (May 2024)

3.5 Site Topography, Drainage & Hydrogeology

The site has been built up on fill and is gently sloping by 3° downhill to the north. Elevation of the site ranges from 60.3 m AHD to the south-east, 56.2 m AHD to the north and 57.5 m AHD to the west. Along the north-western edge of the site, the site slopes off significantly, from the edge of the fill. To the east and west of the site, the site is surfaced by concrete and asphalt forming car parking and hard stranding areas. The central and southern portion of the site was occupied by a series of office and warehouse buildings, covering 35% of the site, all of which have now been demolished. The north-western portion of the site is covered by a levelled grass area.

The hydrogeology of the area is likely to consist of groundwater moving parallel with slope to the north towards the Maypole Creek which is approximately 1.7km away. All surface waters from the site will discharge into the street stormwater drains. The inferred groundwater flow is illustrated in Figure 14.

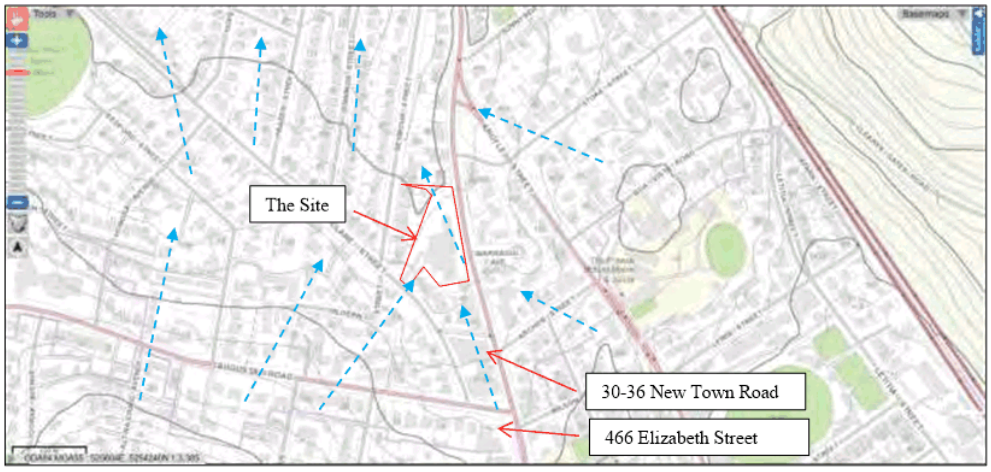


Figure 14 Inferred Groundwater Flow (blue dashed line)

3.6 Historical Aerial Photography Interpretation

The 1989, 1977, 1973, 1965,1957 and 1946 historical aerial photograph were viewed as part of this ESA, images are presented in Appendix 5. Table 2 presents a summary of alterations to the site between photo events and significant individual aerial photos are presented in Figure 15 to Figure 19.

In summary there was a service station on site which was built between 1946 and 1957 and remained on site until around 1973; there were two upgradient service stations 30-36 New Town Road and 466 Elizabeth Street from around 1965 to 2000.

Table 2 Historical Aerial Photograph Review

Photo	Observations
1989	• *'48-50 New Town Road'* unchanged. • *'52 New Town Road'* potential bowser at the rear of the building bowser **B5**?; generator building has been constructed. The site has the same building configuration as currently in 2018 except for the transmission dish that has been removed. • Service stations in proximity to the site that may have had potentially contaminating activities included: *30-36 New Town Road; former Caltex Service Station* (According to the EPA tanks were removed from the site around the year 2000) and *466 Elizabeth Street; Currently the Hill Street Grocer*.
1977	• Sites unchanged
1973	• *'48-50 New Town Road'* New building site no longer a service station – current building to this day. • *'52 New Town Road'* site unchanged
1965	• *'48-50 New Town Road'* Service station had a canopy over bowers **B2** and **B3**. Potential bowser **B4** next to the building. Staining on the ground at the rear of the service station building area of approximately 10x15m. (Borehole BH15 in the current study was the closest to this area – however the exact area is now covered by a building) • *'52 New Town Road'* existing building constructed. Potential bowser **B5**

Photo	Observations
	• Service stations upgradient present: *30-36 New Town Road; former Caltex Service Station* and *466 Elizabeth Street; Currently the Hill Street Grocer.*
1957	• *'48-50 New Town Road'* service station with three bowsers; *Bowsers **B1, B2** and **B3.*** • *'52 New Town Road' vacant block, steep drop-off from New Town Road.* • Service stations upgradient not yet constructed: *30-36 New Town Road; former Caltex Service Station* and *466 Elizabeth Street; Currently the Hill Street Grocer.*
1946	• Both sites are vacant land, some fill visible.

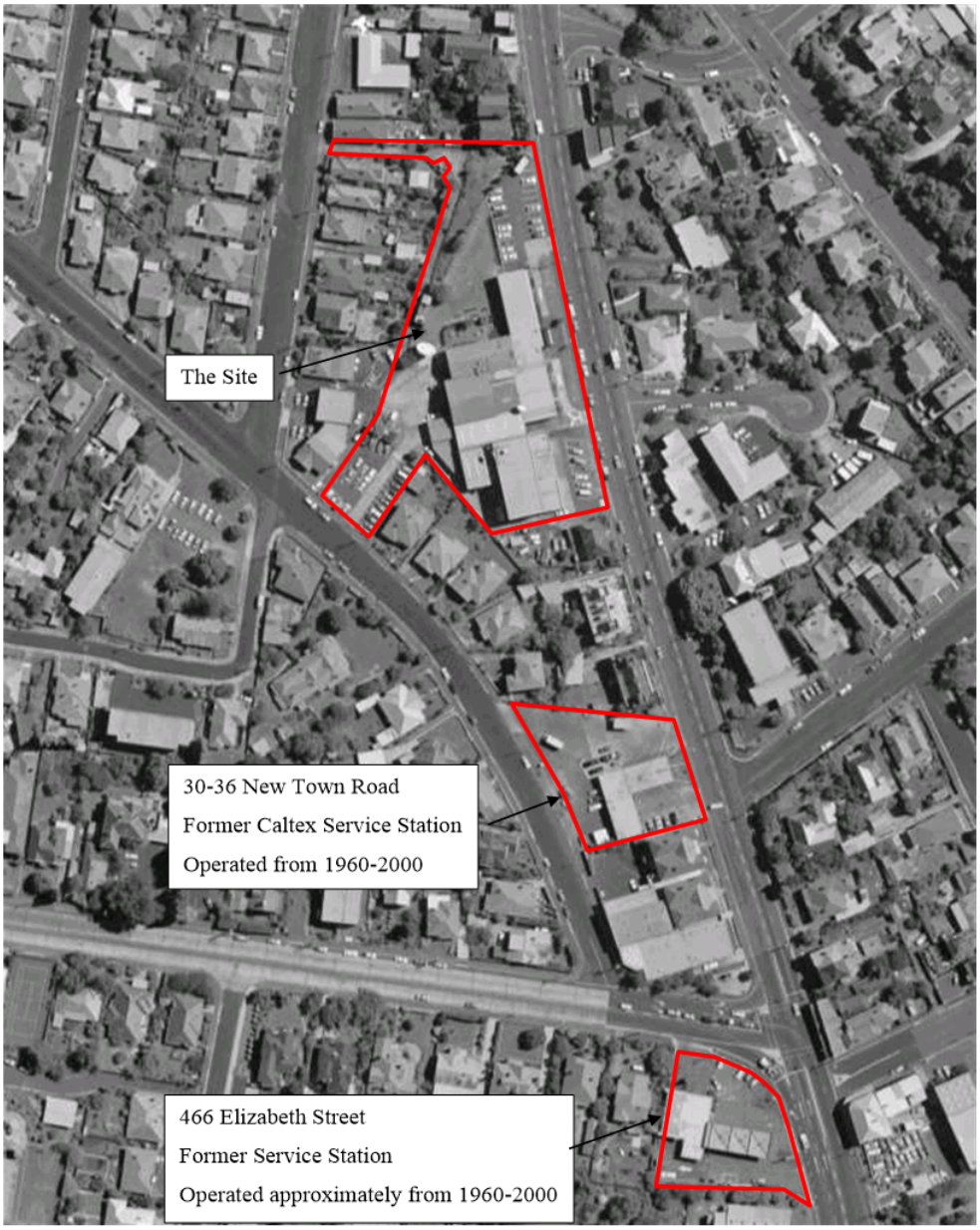


Figure 15 The 1989 Historical Aerial Photograph of the site and surrounding area.



Figure 16 The 1965 Historical Aerial Photograph the site and the surrounding area.



Figure 17 The 1965 Historical Aerial Photograph of 48-50 New Town Road.



Figure 18 The 1957 Historical Aerial Photograph of the site.



Figure 19 The 1946 Historical Aerial Photograph of 52 & 48-50 New Town Road

3.7 Previous Site Investigations

GES is not aware of any contaminated site investigations for the site or any neighboring properties except for the previous version of this report.

3.8 Dangerous Goods Records (WorkSafe Tasmania)

WorkSafe Tasmania, provided GES with Dangerous goods manifests on the 10 July 2018, the records area presented in Appendix 6 and are summarized in Table 3.

Table 3 Dangerous Goods Manifest

Photo	Details
1989	26 June 1989 – File closed for 50-52 New Town Road
1981	24 December 1981. **Application for Licence in respect of Premises for keeping of inflammable liquids or dangerous commodities.** 50-52 New Town Road, New Town. Additional storage inspection. 1x 5.4 K/L inflammable liquid Class A – ie Petrol and 14.49K/L inflammable liquid Class A – ie Petrol
1980	26 June 1980. **Record of Inspection of Installatioin** Premises of Tasmanian Television, BP Australia, approved 17 March 1980. 52 Main Road, New Town. Special conditions: Tank shall be located at least 3 m from boundary and 100 % bund to surround tank. 1x5400k/l u/g and 1x1150 L o/g tank for Diesoleum Plus proposed site plan (13 March 1980) with approximate locations including proposed generator site
1977	16 February 1977. **Application for Licence in respect of Premises for keeping of inflammable liquids or dangerous commodities.** 9.09 K/L inflammable liquid Class A – ie Petrol; 1x2000 …Signed by The Tasmanian Television Limited Secretary on 7 Feb 1977.
1976	6 July 1976. **Record of Inspection of Installatioin** (Tasmanian Telivision and BP on document to the Department of Mines. 1x 2000 u/g tank class A. 1x S/E pimp 9.09KL.
1975	3 October 1975. **Approval of Site and construction of Premises for keeping of inflammable liquids or dangerous commodities.** Install 2000 gallon super spirit connected to a S/E pump as per annotation.
1975	30 September 1975. **Site Plan** – Install 2000 gallon super spirit connected to a S/E pump. Concrete Slab to be provided tank area. Tasmanian Television Ltd. *48-52 New Town Road*, Newtown. 26 September 1975, BP Australia Limited stamp.

3.9 Council Environmental Records

The Hobart City Council was contacted on the 9th of July 2018. The Council's register of potentially contaminated sites stated the following:

> *'48 New Town Road, operated as a "retail activity" from 1975-1989 as Tasmanian Television Ltd and COR/BP with the potential contaminant listed as Hydrocarbons.'*
>
> *'It was possible as a part of these operations that they stored and sold products such as oil or petrol in cans/tins. It's more likely this was commonwealth oil refineries (COR) / BP selling these types of products. Under today's list of potentially contaminating activities this would likely fall under petroleum product or oil storage.'*

3.10 Groundwater

During the investigation, three groundwater monitoring wells were installed and labeled MW1 to MW3. The intention was that these wells could be used to collect groundwater samples and to monitor the future groundwater levels. During the investigation, the soil was observed to be wet in boreholes BH08 below 4.6 m depth, BH10 below 4.8 m depth, BH18 below 3.2 m and in geotechnical boreholes GT02 below 6.7 m depth and GT05 below 5.0 m depth. It is likely the groundwater encountered is a combination of perched groundwater within the fill and natural groundwater levels on the contact with the underlying bedrock.

3.10.1 Potential Up-Gradient Contamination Sources

Given the long urban history of the site and the surrounding area, there is the potential for up-gradient off-site contamination to be impacting the site. There are two sites that have been identified but ruled out in the CSM as potential upgradient sources, including;

- *30-36 New Town road*, a Former Caltex Service Station currently an Epic Pharmacy and Rad X. This site is approximately 100m away and is elevated on average by 7m above the investigation area. The EPA confirmed (see letter in appendix 4) that the closest site, 30-36 New Town Road, was closed in mid-1990 and the 'EPA received advice that the removal of USTs and site remediation works would be completed prior to the construction of the video retail outlet'. As there has been no additional correspondence, it can be assumed that all UPSS infrastructure was removed from 30-36 New Town Road; and
- The former service station at *466 Elizabeth street*, currently a Hill Street Grocer. This site is approximately 220m away and is elevated on average by 12m above the investigation area.

No other sources of potential upgradient contamination have been identified.

3.10.2 Downgradient Ecosystem Receptors

The closest water source and downgradient ecological receptor is Maypole Creek which is 1.7 km to the north, near Risdon Road. The hydrogeology of the area is likely to consist of groundwater moving parallel with a slope in a northerly direction.

Given urban setting and absence of any native vegetation, the vegetation community of the site according to TASVEG 3.0 is classified as Agricultural, urban and exotic vegetation with a description of (FUR) Urban areas. There are no sensitive vegetation types in the area.

There is no immediate risks to ecological receptors through groundwater movement. However, through sediment erosion there is a risk of impacted surface water and groundwater entering the stormwater system.

3.10.3 Registered Water Bores

Mineral Resources Tasmania Registered water bores locations are presented in Figure 20. The nearest registered groundwater bores are in Lenah Valley and on the eastern side of the Queens Domain. See Table 4 for bore details. The groundwater is marginally salty with a TDS value of 1800 ppm. It is improbable that the water bore would be used for drinking water purposes given the salinity. The Triassic sandstone coal units nearby are typically quite salty, and similar or higher TDS values are expected.

Given the urban setting of the site, and the unlikelihood of groundwater boring in the center of Hobart, it is incredibly unlikely that any potential contamination from the site would impact groundwater bores. Adverse impact to the quality of groundwater in bores has been disregarded.

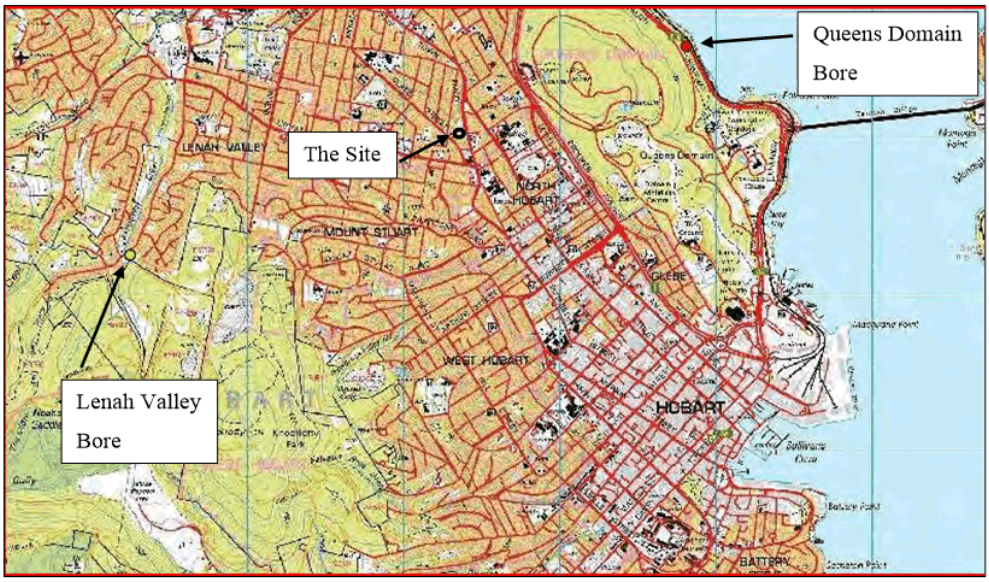


Figure 20 Closest Groundwater Bores. (source the LIST, 2018)

Table 4 Bore Details

Bore features	Lenah Valley	Queens Domain
Location in relation to site	3 km west	1.5km east
yield L/s	1-2	<0.5
depth mbgs	45-60	45-60
water quality TDS mg/L	1500-3000	1500-3000
last standing water level mBGL	5-10	unknown
operating status	capped	unknown
aquifer geology	Triassic	Jurassic dolerite

3.11 Potential Contamination Issues

3.11.1 Areas of Potential Concern

The following areas of potential concern have been identified:

- Imported fill at the site, mostly at 52 New Town Road.
- The entire title of 48-50 New Town Road as it was a former service station with UPSS infrastructure.

3.11.2 Contaminants of Potential Concern

Contaminants Of Potential Concern (COPC) encountered at the site relate to the activities mentioned above and include the following:

- Total Petroleum/Recoverable Hydrocarbons (TPH/TRH);
- Mono Aromatic hydrocarbons: Benzene, Toluene, Ethylbenzene, Xylene, Naphthalene (BTEXN);
- Polynuclear Aromatic Hydrocarbons (PAHs); and
- Metals.



Figure 21 Areas of Potential Concern

4 FIELD INVESTIGATION PROCEDURES

4.1 Works Summary

A total of fifteen site visits were conducted to complete the environmental site assessment, see details in Table 5; borehole locations are presented in Figure 22.

Borehole drilling and soil sample collection was conducted over 9 days, a total of 142 primary soil samples were selected for analysis with 9 '*duplicate*' samples and 6 '*triplicate'* samples, 9 rinsate blanks and 4 field blanks.

Groundwater sampling took place over 2 days, a total of 4 groundwater samples were selected for analysis, 2 '*duplicate*' samples and 2 '*triplicate'* samples, 1 rinsate blank and 1 field blank.

Table 5 Summary of Site Investigation Work Dates

Scope	Data	Lab Report	Details
Site Walkover	18 July 2018	-	Photographs taken, preliminary discussion of borehole location selection
Service location/ Drilling/ Sample collection	23 July 2018	EM181858 – Primary Lab ES1822218 – Secondary Lab EM1812173 – Re-batch	Sampled BH01 – BH07; 17 Primary Samples; Duplicate 1- Duplicate 3; Triplicate 1 – Triplicate 3; 1 Field; 1 Rinsate
Drilling/ Sample collection	24 July 2018	EM1811913 – Primary Lab ES1822455 – Secondary Lab EM1812174 – Re-batch	Sampled BH08 – BH12; 16 Primary Samples; Duplicate 4; Triplicate 4; Rinsate 2; Field Blank 2; Rinsate 2
Drilling/ Sample collection	25 July 2018	EM1811891 – Primary Lab EM1812175 – Re-batch	Sampled BH13 – BH19; 12 Primary Samples; Field Blank 3; Rinsate 3
Installation of Groundwater well	26 July 2018	-	MW1 was installed in borehole GT05 which was drilled by Tasmanian Drilling.
Drilling/ Sample collection	30 July 2018	EM1812116 – Primary Lab ES1822592 – Secondary Lab Hold	BH20; 2 primary Samples; Duplicate 5; Rinsate 4; Field Blank 4 Triplicate 5 - HOLD
Sampling of Groundwater well	11 September 2018	EM1814666 – Primary Lab ES1827248 – Secondary Lab	MW1, Duplicate, Triplicate; Field Blank
PAH analysis – Geotech Soil	17 October 201	EM1816786	*GT02, GT01, GT03*
Drilling/ Sample collection	24 October 2018	EM1817421 – Primary Lab EM1817821 – Rebatch	BH21-BH25; 27 Primary Samples; *Duplicate 1. Rinsate Blank 1*
Drilling/ Sample collection	29-31 October 2018	EM1817564 – Primary Lab EM1818156 – Rebatch	BH26-BH40. *Duplicate 2 – Duplicate 3. Rinsate 2 – Rinsate 4.*
Drilling/ Sample collection	5 November 2018	EM1817824 – Primary Lab EM1818266 – Rebatch ES1833261 – Secondary Lab	BH41 – BH53; 28 Primary Samples; *Rinsate 5*; *Triplicate 1 0.5-0.6*; *Triplicate 2 1.5-1.6*
Installation of Groundwater well	14-15 November 2018	No sampling.	Drilled and installed MW2 and MW3.
Sampling of Groundwater well	26 November 2018	EM1819122 – ALS 15481 - Envirolab	Sampled MW1, MW2 and MW3. Duplicate and Triplicate collected from MW2. 1x Rinsate



Figure 22 Borehole Plan

Note: BH#-Soil bores; MW# - groundwater bore and GT# - Geotechnical Hole

4.2 Soil Investigation

4.2.1 Borehole Drilling

At each of the bore locations, the following precautions were put in place to avoid disrupting underground service assets:

- Dial Before You Dig plans were obtained;
- Archers Underground Service were engaged; and
- Where practical, the first meter of the bore was cleared with a hand auger.

Concrete coring was undertaken through bitumen or concrete at each drilling location as required. A total of fifty-three (53) 65 mm diameter soil bores were drilled for assessing site geology and sampling for contamination impact. The bores were drilled by GES. There were also 5 Geotech holes drilled.

4.2.2 Soil Sampling

Soil bore soil sampling was conducted per the National Environmental Protection (Assessment of Site Contamination) Measure (NEPM ASC 2013) and AS4482 sampling guidelines. Table 6 presents a summary of the soil assessment methodology adopted at the site.

Table 6 Summary of Soil Sampling Methods

Activity	Details / Comments
Drilling Method	Soil bores were drilled: • Hand auger over the first meter to clear for services; and • Industry recognized Geoprobe direct push drilling system. The selected drilling method involved using a Geoprobe dual tube to retain wall integrity and eliminates risk of profile collapse whilst allowing extraction of 1.0 m length sample cores and allows for deployment of pre packed well systems.
Soil Logging	Logging the soil was conducted in accordance with the unified soil classification system (USCS) as detailed in AS1726 (1993).
Decontamination of Sampling Equipment	Quantum Clean Laboratory Detergent Decon 90 was used to decontaminate reusable sampling equipment (hand auger and core trays) which was triple rinsed, the final rinse was deionised water.
Soil Screening	In accordance with AS4482.2. Individual soil samples were collected from approximately at 0.5 intervals below ground surface (bgs) and/or change in geology. Collected samples were screened for volatile fractions using a Photoionisation Detector (PID). This was done by placing the samples within snap lock bags and analysing the headspace with a PID probe. GES's PID was being serviced during the first round of the investigation, a PID 3000-62 was hired from *ThermoFisher Scientific*, proof of hire is attached in in Appendix 7. A service record for GES's PID is also included in this appendix for the second round of sampling.
Laboratory Soil Sample Collection	In accordance with AS4482.2. All samples were collected using disposable nitrile gloves. Sampling was either grab sampling from the push tube core or taken directly from the hand auger. A minimum number of samples were carefully selected which would provide sufficient information to identify hydrocarbon contamination in soils.
Sample preservation	Samples were placed into a jar for laboratory analysis. Soil jars were placed in a pre-chilled cool box with ice bricks.
Sample holding times	Sample holding times were within acceptable range (based on NEPM B3-2013) from collection to extraction.

4.2.3 Soil Analysis

Primary and QC samples were submitted to Analytical Laboratory Services (ALS) Springvale Avenue in Melbourne for analysis. Triplicate samples were sent to ALS located in Smithfield, NSW. Of the 183 primary samples collected 142 were selected for analysis which included TPH/TRH, PAH, BTEX and 15 Metals. Nine duplicate and six triplicate soil samples were collected, and all underwent analysis. Chain of Custody (COC) documentation was completed and is provided in Appendix 8 and the Sample Receipt Notification (SRN) for each batch presented in Appendix 9. Table 7 presents a summary of the laboratory analyses undertaken for the soil samples. Laboratory QA/QC is presented in Appendix 10. Bore log images are presented in Appendix 11.

Table 7 Overview of Soil Analysis and Quality Control

Analytes	Primary Soil Samples	Duplicates[a]	Triplicate[b]	Rinate Blank[c]	Field Blank[d]
TPH/TRH	142	9	6	9	4
BTEX	142	9	6	9	4
PAH	142	9	6	9	4
15 Metals	142	9	6	9	4

Sampling Quality Control Standards (AS4482):
a – One (1) in twenty (20) intra laboratory split (duplicate) samples
b - One (1) in twenty (20) intra laboratory split (triplicate) samples
c - Single Rinsate Blank sample per piece of equipment per day
d - Single field sample per day recommended but not essential.

Given that a full 15 metal suite was analysed, there was requirement to assess the following soil physical properties to determine soil threshold investigation levels:

- Soil grain class (sand/silt or clay)
- % Clay content;
- Cation exchange capacity; and
- Soil pH

The soil physical properties were assessed through site assessment and chemical properties were based on knowledge of similar soil types encountered around Hobart.

4.3 Groundwater Assessment

4.3.1 Monitoring Well Establishment

Three (3) groundwater monitoring wells were installed as per Minimum Construction Requirements for Water Bores in Australia (MCRWBA 2011); MW1 on the 30th July 2018 and MW2 and MW3 on 14th and 15th November 2018. The groundwater bores were completed with a gatic cover. The full borehole construction details are presented Appendix 12. The monitoring wells were developed immediately following borehole construction.

4.3.2 Well Development

The newly installed wells were purged of silt particulates for a period of time until the sand packing became effective and the groundwater from the bore became clear.

4.3.3 Well Gauging and Sampling

Table 8 summarises the procedures for monitoring well gauging and sampling.

Table 8 Summary of Monitoring Well Gauging and Sampling Procedures

Activity	Procedure Details
Surveying	There are three groundwater monitoring wells surveyed through JSA.
Groundwater Gauging	All groundwater wells were gauged for standing water levels (SWL) from top of casing (TOC) and for the potential presence of Phase Separated Hydrocarbons (PSH) using a Solinst water/oil/air Interface Probe (IP). Despite the odor of hydrocarbons in MW1 and MW3, PSH was not detected in any of the wells on site.
Groundwater Extraction Method	Groundwater was extracted from the well using a Geoprobe peristaltic pump as the water in the well was shallower than 7m bgs.
Groundwater Purging	To ensure a representative groundwater sample could be collected, the groundwater well was purged dry using the chosen groundwater extraction method for well development. The following physiochemical parameters (PCP's) were monitored whilst purging to ensure that the aquifer and groundwater parameters had stabilised to within 10% variation of the previous reading: • Reduction / Oxidation potential (REDOX); • Temperature; • pH; and • Electrical conductivity (EC).
Decontamination Procedure	Dedicated tubing was used for the monitoring well. All reusable equipment (IP) was decontaminated using Quantum Clean Laboratory Detergent (R213) and deionized water between each monitoring event.
Sample preservation	Following groundwater purging, all groundwater samples were collected in laboratory supplied receptacles, labelled, chilled, and delivered with a COC to National Association of Testing Authorities (NATA) certified laboratories for analysis within the prescribed holding time.
Sample holding times	Sample holding times were within acceptable range (based on NEPM B3-2013) from collection to extraction.

4.3.4 Groundwater Analysis

Primary and QC samples (excluding triplicates) were submitted to Analytical Laboratory Services (ALS) Melbourne for analysis. One Triplicate samples was sent to ALS in Smithfield, New South Wales the other Triplicated was sent to Envirolab in Croydon South, Victoria. Table 9 presents a summary of the sample analysis including the QC sampling based on AS5667.1 and AS5667.11. Chain of Custody (COC) documentation was completed and is provided in Appendix 8 plus the Sample Receipt Notification (SRN) for each batch presented in Appendix 9.

Table 9 Overview of Groundwater Analysis and Quality Control

Analytes	Primary Samples	Duplicates[a]	Triplicate[b]	Rinate Blank[c]	Field Blank[d]
TPH/TRH	4	2	2	1	1
BTEX	4	2	2	1	1
PAH	4	2	2	1	1
15 Metals	4	2	2	1	-

a – One (1) in ten (10) intra laboratory split (duplicate) samples
b - One (1) in ten (10) inter laboratory split (triplicate) sample
c - Single Rinsate Blank sample per piece of equipment per day
d - Single field sample per day recommended but not essential.

5 QUALITY CONTROL

All Field and laboratory Quality Assurance and Quality Control (QA/QC) details, outputs and reports are presented in Appendix 10.

5.1 Field

It is standard to expect up to 10% error in field duplication and up to 10% laboratory error. Therefore, in theory up to 20% error can be assumed on duplicate analysis. Some variation may exist in soil and groundwater because even though all efforts are made to split samples homogeneously, fragments of materials may bias samples in certain elements.

Relative Percentage Differences (RPDs) for the duplicate and triplicate samples where applicable are calculated using the method outlined below.

The acceptance criteria used for the RPDs depend on the levels of contaminants detected and the laboratory's Method Detection Limits. The closer the levels detected are to the MDL the greater the acceptable RPD. RPDs are calculated as follows:

- RPD <50% for low level results (<20 * MDL)
- RPD <30% for medium level results (20-100 * MDL)
- RPD <15% for high level results (>100 * MDL)
- No limit applies at <2 * MDL (Method Detection Limit)

5.1.1 Soil

Field QA/QC procedures and compliance are summarised in Table 10.

Table 10 Soil Field QA/QC procedures and Compliance

QA/QC Requirement	Completed	Comments
Appropriate sampling strategy used and representative samples collected	Yes	Sampling program was undertaken in accordance with AS4482.1-2005
Appropriate and well documented sample collection, handling, logging and transportation procedures.	Yes	Appropriate and well documented
Decontamination	Yes	Appropriate decontamination such as cleaning tools before sampling and between sample locations was undertaken
Chain-of-custody documentation completed	Yes	COC were completed in accordance with NEPM Schedule B2, Section 5.4.5 and transported under strict COC procedures. The signed COC documents are included in this report, which includes the condition report on arrival of samples to the Laboratory, cross checking of sample identification and paperwork and preservation method.
Required number of duplicate/ triplicate samples collected (1:20)	Almost	8 duplicate and 8 triplicate samples were required from 142 primary samples. 9 Duplicate and 6 Triplicate samples were collected.
QA/QC samples reported method detection limits within indicated guidelines.	No	There were some noncompliance for some metals and PAHs particularly between *BH04 1.5-1.6, Duplicate 1* and *Triplicate 1* samples – this can be attributed to the dense clay medium which meant samples were not homogenous. Non-compliances were attributed to the very low yielding bore and insufficient homogenization of aliquots to obtain low RPD's between splits.
Required numbers of field and rinse blank samples collected	Yes	A total of rinse blanks and 4 fields were collected as per AS4482.1-2005.
Samples delivered to the laboratory within sample holding times and with correct preservative	Yes	All samples were sent to the laboratory within holding times and correct preservative. Samples arrived at 3.9°C, 5.6°C, 5.9 °C, 4.4 °C, 6.4°C, 4.6°C, ideally, samples should arrive at 6 °C or below.

5.1.2 Groundwater

Groundwater field QA/QC procedures and compliance are included in Table 11.

Table 11 Groundwater Field QA/QC procedures and Compliance

QA/QC Requirement	Completed	Comments
Appropriate sampling strategy used and representative samples collected	Yes	Sampling program was undertaken in accordance with AS4482.1-2005
Appropriate and well documented sample collection, handling, logging and transportation procedures.	Yes	Appropriate and well documented
Chain-of-custody documentation completed	Yes	All samples were transported under strict COC procedures and signed COC documents are included in this report.
Required number of duplicate and triplicates samples collected (1:20)	Yes	2 Primary samples and 2 duplicates and 2 triplicate samples were collected and selected for analysis.
QA/QC samples reported method detection limits within indicated guidelines.	No	In the first sampling round (11/09/2018) there were 27 triplicate noncompliance including 17 PAH's, 1 metal and 9 TRH/TPH. There were fewer (8) duplicate non-compliances including 2 PAH's & 6 TRH/TPH. In the second sampling round (26/11/2018) there were no non-compliances although selection of a non-impacted well for splits meant that reliability could not be ascertained. MW1 well will be selected in preference in future events, and a revisit may be required later in the day to sample to obtain enough volume for sampling with greater reliability between split pairs.
Required numbers of field and rinse blank samples collected	Yes	A field blank and a rinsate was collected as per the recommendations in AS4482.1-2005. All results were below laboratory limit of reporting.
Samples delivered to the laboratory within sample holding times and with correct preservative	Yes	All samples were sent to the laboratory within holding times and correct preservative. Samples arrived at 7.2 °C ideally, samples should arrive at 6 °C or below.

5.2 Laboratory

5.2.1 Soil

Soil laboratory QA/QC procedures and compliance are summarised in Table 12 and Table 13.

Table 12 Summary of Soil Laboratory QA/QC Outlines

Date	Report	Method blanks	Laboratory Control	Duplicate	Matrix Spikes	Surrogate recovery	Hold time	Quality control sample frequency
23 Jul 2018	EM1811858	✓	✓	✓	×	✓	✓	✓
	ES1822218	✓	✓	✓	×	✓	✓	✓
	EM1812173	✓	✓	✓	×	✓	✓	✓
24 Jul 2018	EM1811913	✓	✓	×	✓	✓	✓	×
	ES1822455	✓	✓	✓	✓	✓	✓	✓
	EM1812174	✓	✓	×	×	✓	✓	✓
25 Jul 2018	EM1811891	✓	✓	✓	×	✓	✓	×
	EM1812175	✓	✓	×	×	✓	✓	✓
30 Jul 2018	EM1812116	✓	✓	✓	✓	✓	✓	×
17 Oct 2018	EM1816786	✓	✓	✓	×	✓	✓	×
24 Oct 2018	EM1817421	✓	✓	×	×	×	✓	×
	EM1817821	✓	✓	✓	✓	✓	✓	×
29-31 Oct2018	EM1817564	✓	✓	×	×	✓	✓	×
	EM1818156	✓	✓	✓	✓	✓	×	×
5 Nov2018	EM1817824	✓	✓	×	×	✓	✓	×
	EM1818266	✓	✓	✓	✓	✓	✓	×
	ES1833261	✓	✓	×	✓	✓	✓	✓

Table 13 Details of Soil Laboratory QA/QC Outlines

QA/QC Requirement	Comments
All analyses NATA accredited	ALS Laboratories is NATA Accredited. Appropriate analytical methods used, in accordance with Schedule B(3) of the NEPM. Acceptable laboratory limits of reporting (LORs) adopted.
Method Blanks: zero to <Practical Quantitation Limit (PQL)	No Method Blank outliners exist for any of the QCI reports.
Laboratory Control Samples: 70% to 130% recovery for soil.	No Laboratory Control outliners exist in any of the QCI reports.
Duplicate Samples:<30% to 50% RPD.	**ES1822218** – Zinc in an anonymous sample – RPD exceeds LOR based limits. **EM1812173** – Lead and Zone in *BH03 3.03.1*– RPD exceeds LOR based limits. **EM1811913** – PAHs including Acenaphthylene, Phenanthrene and Chrysene in *BH08 1.0-1.1* – RPD exceeds LOR based limits. **EM1812174** – Lead and Zinc in two anonymous samples – RPD exceeds LOR based limits. **EM1812175** – Lead and Zinc in two anonymous samples – RPD exceeds LOR based limits. **EM1817421** – many PAH analytes had RPD exceeds LOR based limits in several samples. **EM1817564** – Fluoranthene and pyrene in BH28 1.2-1.3 – RPD exceeds LOR based limits. **EM1817824** – many PAH analytes had RPD exceeds LOR based limits in BH44 2.5-2.6. ES1833261 – Lead and manganese in Triplicate 2 1.5-1.6 – RPD exceeds LOR based limits.
Matrix spikes: 70% to 130% recovery for organics or 80%-120% recovery for inorganics	**EM1811858** – Zinc in *BH01 2.5-2.6* and Pyrene in *BH01 4.4-4.5:* MS recovery not determined, background level greater than or equal to 4x spike level. **EM1812173** – Manganese in *BH04 0.5-0.6* MS recovery not determined, background level greater than or equal to 4x spike level. Zinc *BH04 0.5-0.6* recovery less than lower data quality objective. **EM1812174** – Manganese in *anonymous sample* MS recovery not determined, background level greater than or equal to 4x spike level. Zinc in *anonymous sample* recovery less than lower data quality objective. **EM1811891** – Lead and Zinc recovery greater than upper data quality objective in sample *BH19 1.0-1.1.* Pyrene MS recovery not determined, background level greater than or equal to 4x spike level. **EM1812175** – Manganese in *anonymous sample* MS recovery not determined, background level greater than or equal to 4x spike level. Zinc in *anonymous sample* recovery less than lower data quality objective. **EM1816786** – PAH in GT01 sample, MS recovery not determined, background level greater than or equal to 4x spike level. **EM1817421** – Manganese in *BH22 3.4-3.5 sample* MS recovery not determined, background level greater than or equal to 4x spike level. **EM1817564** - Barium and Manganese in BH26 0.5-0.6 and Manganese in BH35 1.5-1.6; MS recovery not determined, background level greater than or equal to 4x spike level; Copper in BH35 1.5-1.6 Recovery was greater than upper data quality objective. **EM1817824** – Manganese in anonymous sample and BH44 1.5-1.6 plus pyrene in BH42 0.5-0.6 MS recovery not determined, background level greater than or equal to 4x spike level.
Surrogates: 70% to 130% recovery	**EM1817421** – PAH – 4-Terphenyl-d14 in BH22 1.5-1.6 recovery greater than upper data quality objective.
Analysis holding time outliers	**EM1818156** – Non-volatile Leach 14 day turnaround, 1 day over BH27 1.0-1.1 and BH28 1.2-1.3
Quality Control Sample Frequency Outliers	**EM1811858** – In soil Total Mercury by FIMS and Total Metals ICP-AES - did not meet NEPM 2013 B3 or ALS QC Standard. Water sample – laboratory duplicates and matrix spikes for laboratory control samples foe PAH/Phenols, TRH did not meet NEPM 2013 B3 or ALS QC Standard. **EM1811913** – Rinsate water sample – laboratory duplicates for laboratory control samples for PAH/Phenols, TRH or matrix spikes of PAH/Phenols did not meet NEPM 2013 B3 or ALS QC Standard. **EM1811891, EM1812116, EM1817421** – Rinsate water sample – laboratory duplicates and matrix spikes for laboratory control samples for PAH/Phenols, TRH did not meet NEPM 2013 B3 or ALS QC Standard. **EM1816786, EM1817821, EM1818156, EM1818266** – Rinsate water sample – laboratory duplicates and matrix spikes for laboratory control samples for PAH/Phenols, did not meet NEPM 2013 B3 or ALS QC Standard. **EM1817564, EM1817824**– Rinsate water sample – laboratory duplicates and matrix spikes for laboratory control samples for PAH/Phenols, TRH semi-volatile fraction did not meet NEPM 2013 B3 or ALS QC Standard.

5.2.2 Groundwater

Groundwater laboratory QA/QC procedures and compliance are summarised in Table 14.

Table 14 Groundwater Laboratory QA/QC Procedures and Compliance

QA/QC Requirement	Compliance	Comments
All analyses NATA accredited	Yes	ALS Laboratories is NATA Accredited. Appropriate analytical methods used, in accordance with Schedule B(3) of the NEPM. Acceptable laboratory limits of reporting (LORs) adopted.
Method Blanks: zero to <Practical Quantitation Limit (PQL)	Yes	There were no method blank value outliers for report EM1814666 or ES1827248.
Duplicate Samples:<30% to 50% RPD.	Yes	There were no Duplicate outliners for report EM1814666 or ES1827248.
Control Samples: 70% to 130% recovery for soil; or 80% to 120% recovery for waters;	Yes	There were no Laboratory Control outliers for report EM1814666 or ES1827248.
Matrix spikes: 70% to 130% recovery for organics or 80%-120% recovery for inorganics	No	EM1814666 - Matrix spikes for Manganese and Zinc in an anonymous sample – MS recovery not determined, background level greater than or equal to 4x spike level. There were no Matrix Spike outliners for report ES1827248.
Surrogates: 70% to 130% recovery	Yes	There were no surrogate recovery outliers for report EM1814666 or ES1827248.
Analysis holding time outliers	Yes	No hold-time outliers exist for report EM1814666 or ES1827248.
Quality Control Sample Frequency Outliers	No	In EM1814666, ES1827248 and EM1819122– laboratory duplicates and matrix spikes for PAH/Phenols and TRH did not meet NEPM 2013 B3 or ALS QC Standard.

6 FIELD INVESTIGATION FINDINGS

6.1 Soil Bores

Pictorials of each borehole location and borehole log is presented in Appendix 11 and borehole logs are presented in Appendix 12.

6.1.1 Geological Interpretation

The geology underlying the site is Triassic sediments and sandstone over laid by several meters (0.5-8.1m) of FILL. The surface covering at the site varies from concrete, asphalt to bare soil. Fill varies in composition from Sandy CLAY with traces of gravel angular to rounded siltstone with brick and charcoal fragments to Gravely Sandy CLAY with dolerite fragments. Natural soil was mostly sandy CLAY with some mottling. The natural bedrock ranged from Mudstone interbedded with Siltstone to Sandstone interbedded with Mudstone. For specific details for each borehole see Appendix 12.

6.1.2 Soil Contamination Observations

Soil samples from BH01 to BH20 were selected for hydrocarbon analyses based on PID analysis information presented in the bore logs and in Table 15. All soil samples had PID values (measured in ppm) below 7.0 which indicates that there is a low levels of volatile hydrocarbon contamination at the site, such as the presence of residual petroleum. Post the first round of sampling and analysis; it was determined that contamination was present. Therefore all additional samples collected we tested for hydrocarbons.

Table 15 Summary of PID Screening Results

Soil Bore	Highest PID Value (ppm)	Depth from (m)	Depth to (m)
BH01	0.5	1.5	1.6
BH02	0.1	0.5	0.6
BH03	0.3	3.0	3.1
BH04	0.0	All	-
BH05	0.2	4.5	4.6
BH06	0.2	0.25	0.3
BH07	6.9	0.0	0.1
BH08	0.0	All	-
BH09	5.8	1.0	1.1
BH10	0.9	5.0	5.1
BH11	1.3	2.5	2.6
BH12	3.3	0.5	0.6
BH13	0.9	0.5	0.6
BH14	3.3	0.4	0.5
BH15	1.8	0.2	0.3
BH16	1.2	0.3	0.4
BH17	1.0	1.1	1.2
BH18	1.2	2.7	2.8
BH19	1.1	2.1	2.2
BH20	0.9	0.5	0.6

6.1.3 Grain Class Interpretation

Grain size classifications are applied to all soils at the site to determine threshold screening level concentrations for hydrocarbons (and chromium) to assess soil ecological and human health risks.

Grain class threshold values are determined based on either the:

- sample grain size (in the case of ecological screening levels or chromium limits); or
- average grain class overlying the sample point (when assessing petroleum vapour screening levels).

When assessing petroleum vapour intrusion screening levels, where soil is proposed to be excavated from the site, the excavated material is excluded from the grain class averaging. The corresponding depth class from which the sample is collected is also shallowed based on the renewed basement depth.

Table 16 to Table 18 provides a summary of the grain class averages for material overlying the sample. As mentioned, most material will be excavated.

Table 16 Summary of Grain Class Based on USCS Classification – BH01 – BH20

Sample	Footing Excavation Depth^ - Red Fill Thickness^ - Green	Sample PVI Depth (m) Relative to Slab/Cut Depth	Soil Grain Size Class Averaging Above Soil Sample																Crawl Space Thickness (m)	Attenuation			Petroleum Vapour Intrusion HSL Grain Class*	SAMPLE USCS
			GW	GP	GM	GC	SW	SP	SM	SC	ML	CL	OL	MH	CH	OH	CI	Rock (R)	Existing Pavement (P)		Proposed CONCRETE (CH)	Crawl Space	Biodegradation		
BH01 1.0-1.1	1.8	<																		NA	0.1	1.0	1.0	CLAY	CI
BH01 2.5-2.6	1.8	1.1															1			NA	0.1	1.0	1.0	CLAY	CI
BH01 4.4-4.5	1.8	3.0													0.7		2.2			NA	0.1	1.0	1.0	CLAY	CI
BH02 1.0-1.1	2.2	<																		NA	0.1	1.0	1.0	CLAY	CI
BH02 2.8-2.9	2.2	1.0															0.9			NA	0.1	1.0	1.0	CLAY	CI
BH02 4.0-4.1	2.2	2.2															2.1			NA	0.1	1.0	1.0	CLAY	CI
BH03 0.5-0.6	2.1	<																		NA	0.1	1.0	1.0	CLAY	CL
BH03 2.5-2.6	2.1	0.8	0.5									0.2								NA	0.1	1.0	1.0	SAND	CL
BH03 3.9-4.0	2.1	2.2	0.5									1.6								NA	0.1	1.0	1.0	CLAY	CL
BH04 1.5-1.6	2.3	<																		NA	0.1	1.0	1.0	SAND	GW
BH04 3.0-3.1	2.3	1.2	0.4														0.7			NA	0.1	1.0	1.0	CLAY	CI
BH04 4.5-4.6	2.3	2.7	0.4														2.2			NA	0.1	1.0	1.0	CLAY	CI
BH05 1.0-1.1	2.6	<																		NA	0.1	1.0	1.0	CLAY	CI
BH05 3.0-3.1	2.6	0.8															0.7			NA	0.1	1.0	1.0	CLAY	CI
BH05 4.5-4.6	2.6	2.3															2.2			NA	0.1	1.0	1.0	CLAY	GP
BH06 0.2-0.3	2.3	<																		NA	0.1	1.0	1.0	CLAY	CI
BH07 1.0-1.1	2.5	<																		NA	0.1	1.0	1.0	CLAY	CI
BH07 2.2-2.3	2.5	0.1	0.0																	NA	0.1	1.0	1.0	CLAY	GW
BH01 1.5-1.6	1.8	<																		NA	0.1	1.0	1.0	CLAY	CI
BH01 3.5-3.6	1.8	2.1													0.5		1.5			NA	0.1	1.0	1.0	CLAY	CH
BH02 0.5-0.6	2.2	<																		NA	0.1	1.0	1.0	CLAY	CI
BH02 2.0-2.1	2.2	0.2															0.1			NA	0.1	1.0	1.0	CLAY	CI
BH03 1.0-1.1	2.1	<																		NA	0.1	1.0	1.0	SAND	GW
BH03 3.0-3.1	2.1	1.3	0.5									0.7								NA	0.1	1.0	1.0	CLAY	CL
BH04 0.5-0.6	2.3	<																		NA	0.1	1.0	1.0	CLAY	CI
BH04 2.5-2.6	2.3	0.7	0.4														0.2			NA	0.1	1.0	1.0	SAND	CI
BH04 3.5-3.6	2.3	1.7	0.4														1.2			NA	0.1	1.0	1.0	CLAY	CI
BH05 2.0-2.1	2.6	<																		NA	0.1	1.0	1.0	CLAY	CI
BH05 4.0-4.1	2.6	1.8															1.7			NA	0.1	1.0	1.0	CLAY	CI
BH08_1.0-1.1	2.8	<																		NA	0.1	1.0	1.0	CLAY	CI
BH08_2.0-2.1	2.8	<																		NA	0.1	1.0	1.0	CLAY	CI
BH08_2.5-2.6	2.8	0.1															0			NA	0.1	1.0	1.0	CLAY	CI
BH08_4.5-4.6	2.8	2.1															2			NA	0.1	1.0	1.0	CLAY	CI
BH09_1.0-1.1	3.9	<																		NA	0.1	1.0	1.0	CLAY	CI
BH09_2.5-2.6	3.9	<																		NA	0.1	1.0	1.0	CLAY	CI
BH09_4.5-4.6	3.9	1.1															1			NA	0.1	1.0	1.0	CLAY	CI
BH09_6.0-6.1	3.9	2.6															2.5			NA	0.1	1.0	1.0	CLAY	CI
BH10_1.0-1.1	4.6	<																		NA	0.1	1.0	1.0	CLAY	CI
BH10_3.0-3.1	4.6	<																		NA	0.1	1.0	1.0	CLAY	CI
BH10_5.0-5.1	4.6	0.9									0.8									NA	0.1	1.0	1.0	SILT	ML
BH11_1.0-1.1	4.9	<																		NA	0.1	1.0	1.0	CLAY	CI
BH11_2.0-2.1	4.9	<																		NA	0.1	1.0	1.0	CLAY	CI
BH11_2.5-2.6	4.9	<																		NA	0.1	1.0	1.0	CLAY	CI
BH11_3.3-3.4	4.9	<																		NA	0.1	1.0	1.0	CLAY	R
BH12_1.0-1.1	4.6	<																		NA	0.1	1.0	1.0	CLAY	CI
BH12_2.0-2.1	4.6	<																		NA	0.1	1.0	1.0	CLAY	CI
BH12_2.5-2.6	4.6	<																		NA	0.1	1.0	1.0	CLAY	CI
BH12_3.5-3.6	4.6	<																		NA	0.1	1.0	1.0	CLAY	CI
BH13 1.0-1.1	5.5	<																		NA	0.1	1.0	1.0	CLAY	CH
BH13 1.5-1.6	5.5	<																		NA	0.1	1.0	1.0	CLAY	CH
BH13 2.0-2.1	5.5	<																		NA	0.1	1.0	1.0	CLAY	CH
BH14 0.4-0.5	2.8	<																		NA	0.1	1.0	1.0	CLAY	R
BH15 0.55-0.65	2.8	<																		NA	0.1	1.0	1.0	CLAY	R
BH16 0.3-0.4	2.8	<																		NA	0.1	1.0	1.0	CLAY	GC
BH17 0.5-0.6	2.6	<																		NA	0.1	1.0	1.0	CLAY	CH
BH17 1.1-1.2	2.6	<																		NA	0.1	1.0	1.0	CLAY	R
BH18 0.5-0.6	2.8	<																		NA	0.1	1.0	1.0	CLAY	CI
BH18 1.5-1.6	2.8	<																		NA	0.1	1.0	1.0	CLAY	CI
BH18 2.5-2.6	2.8	0.2															0.1			NA	0.1	1.0	1.0	CLAY	CI
BH18 2.7-2.8	2.8	0.4															0.3			NA	0.1	1.0	1.0	CLAY	CI
BH18 3.1-3.2	2.8	0.8															0.7			NA	0.1	1.0	1.0	CLAY	CI
BH18 3.5-3.6	2.8	1.2															1.1			NA	0.1	1.0	1.0	CLAY	CI
BH19 1.0-1.1	2.7	<																		NA	0.1	1.0	1.0	CLAY	CI
BH19 2.1-2.2	2.7	<																		NA	0.1	1.0	1.0	CLAY	R
BH20 0.5-0.6	2.8	<																		NA	0.1	1.0	1.0	CLAY	CH
BH20 1.0-1.1	2.8	<																		NA	0.1	1.0	1.0	CLAY	CH

Footnote:
* Grain class is modified based on proposed building construction: concrete is interpreted to have similar vapour intrusion properties to clay and is therefore designated as CLAY within the grain size averaging assessment; backfill is inferred to comprise of gravel (GW)
< Sample has been collected from above the proposed excavation (base of slab or proposed ground level) and is not relevant in the PVI risk assessment
^ In this case, a 1 m excavation depth below FFL is inferred. Excavation depths are approximate and may vary due to change in services depths or overall building/footing construction design.

Table 17 Summary of Grain Class Based on USCS Classification – BH21 – BH40

Sample	Footing Excavation Depth^ - Red Fill Thickness^ - Green	Sample PVI Depth (m) Relative to Slab/Cut Depth	Soil Grain Size Class Averaging Above Soil Sample																Attenuation			Petroleum Vapour Intrusion HSL Grain Class*	SAMPLE USCS
			GW	GP	GM	GC	SW	SP	SM	SC	ML	CL	OL	MH	CH	OH	CI	Rock (R)	Existing Pavement (P)	Crawl Space Thickness (m)	Proposed CONCRETE (CH)	Crawl Space	Biodegradation		
BH21 0.5-0.6	1.8	<																		NA	0.1	1.0	1.0	CLAY	CL
BH21 1.5-1.6	1.8	<																		NA	0.1	1.0	1.0	CLAY	CI
BH21 2.5-2.6	1.8	1.1															1			NA	0.1	1.0	1.0	CLAY	CI
BH21 3.5-3.6	1.8	2.1															2			NA	0.1	1.0	1.0	CLAY	CI
BH21 4.5-4.6	1.8	3.1															3			NA	0.1	1.0	1.0	CLAY	CI
BH21 5.5-5.6	1.8	4.1															4			NA	0.1	1.0	1.0	CLAY	CI
BH22 0.5-0.6	1.9	<																		NA	0.1	1.0	1.0	CLAY	CI
BH22 1.5-1.6	1.9	<																		NA	0.1	1.0	1.0	CLAY	CH
BH22 2.5-2.6	1.9	1.0				0.6									0.3					NA	0.1	1.0	1.0	SAND	GC
BH22 3.4-3.5	1.9	1.9				1.5									0.3					NA	0.1	1.0	1.0	SAND	GC
BH23 0.5-0.6	2.4	<																		NA	0.1	1.0	1.0	CLAY	GC
BH23 1.5-1.6	2.4	<																		NA	0.1	1.0	1.0	CLAY	CI
BH23 2.5-2.6	2.4	0.5				0.3											0.1			NA	0.1	1.0	1.0	SAND	CI
BH23 3.5-3.6	2.4	1.5				0.3											1.1			NA	0.1	1.0	1.0	CLAY	CI
BH23 4.5-4.6	2.4	2.5				0.3											2.1			NA	0.1	1.0	1.0	CLAY	CI
BH23 5.5-5.6	2.4	3.5				0.3											3.1			NA	0.1	1.0	1.0	CLAY	CI
BH24 0.5-0.6	2.3	<																		NA	0.1	1.0	1.0	CLAY	GC
BH24 1.5-1.6	2.3	<																		NA	0.1	1.0	1.0	CLAY	CI
BH24 2.5-2.6	2.3	0.6															0.5			NA	0.1	1.0	1.0	CLAY	CI
BH24 3.3-3.4	2.3	1.4															1.3			NA	0.1	1.0	1.0	CLAY	CI
BH25 0.5-0.6	2.6	<																		NA	0.1	1.0	1.0	CLAY	GC
BH25 1.5-1.6	2.6	<																		NA	0.1	1.0	1.0	CLAY	CI
BH25 2.5-2.6	2.6	0.3															0.2			NA	0.1	1.0	1.0	CLAY	CI
BH25 3.5-3.6	2.6	1.3															1.2			NA	0.1	1.0	1.0	CLAY	CI
BH25 4.5-4.6	2.6	2.3															2.2			NA	0.1	1.0	1.0	CLAY	CI
BH25 5.5-5.6	2.6	3.3															3.2			NA	0.1	1.0	1.0	CLAY	CI
BH26 0.1-0.2	2.6	<																		NA	0.1	1.0	1.0	CLAY	GC
BH26 0.5-0.6	2.6	<																		NA	0.1	1.0	1.0	CLAY	CH
BH27 0.1-0.2	2.7	<																		NA	0.1	1.0	1.0	CLAY	P
BH27 0.5-0.6	2.7	<																		NA	0.1	1.0	1.0	CLAY	P
BH27 1.0-1.1	2.7	<																		NA	0.1	1.0	1.0	CLAY	GW
BH27 1.5-1.6	2.7	<																		NA	0.1	1.0	1.0	CLAY	CI
BH27 1.9-2.0	2.7	<																		NA	0.1	1.0	1.0	CLAY	R
BH28 0.1-0.2	3.0	<																		NA	0.1	1.0	1.0	CLAY	CI
BH28 0.5-0.6	3.0	<																		NA	0.1	1.0	1.0	CLAY	CI
BH28 1.0-1.1	3.0	<																		NA	0.1	1.0	1.0	CLAY	CI
BH28 1.2-1.3	3.0	<																		NA	0.1	1.0	1.0	CLAY	ML
BH29 0.5-0.6	4.7	<																		NA	0.1	1.0	1.0	CLAY	CI
BH29 1.5-1.6	4.7	<																		NA	0.1	1.0	1.0	CLAY	CI
BH29 2.1-2.2	4.7	<																		NA	0.1	1.0	1.0	CLAY	R
BH30 0.3-0.4	3.4	<																		NA	0.1	1.0	1.0	CLAY	R
BH31 0.5-0.6	5.5	<																		NA	0.1	1.0	1.0	CLAY	CI
BH31 1.5-1.6	5.5	<																		NA	0.1	1.0	1.0	CLAY	R
BH32 0.5-0.6	5.8	<																		NA	0.1	1.0	1.0	CLAY	CI
BH33 0.5-0.6	4.3	<																		NA	0.1	1.0	1.0	CLAY	CH
BH34 0.5-0.6	4.4	<																		NA	0.1	1.0	1.0	CLAY	CI
BH35 0.5-0.6	2.4	<																		NA	0.1	1.0	1.0	CLAY	CI
BH35 1.5-1.6	2.4	<																		NA	0.1	1.0	1.0	CLAY	CI
BH36 0.5-0.6	2.8	<																		NA	0.1	1.0	1.0	CLAY	CI
BH37 0.5-0.6	2.8	<																		NA	0.1	1.0	1.0	CLAY	CI
BH37 1.5-1.6	2.8	<																		NA	0.1	1.0	1.0	CLAY	CI
BH37 2.5-2.6	2.8	0.5															0.4			NA	0.1	1.0	1.0	CLAY	CI
BH37 3.5-3.6	2.8	1.5										0.7					0.7			NA	0.1	1.0	1.0	CLAY	CL
BH38 0.5-0.6	2.8	<																		NA	0.1	1.0	1.0	CLAY	CI
BH38 1.5-1.6	2.8	<																		NA	0.1	1.0	1.0	CLAY	CI
BH38 2.5-2.6	2.8	0.5									0.1						0.3			NA	0.1	1.0	1.0	CLAY	CH
BH39 0.5-0.6	3.5	<																		NA	0.1	1.0	1.0	CLAY	CI
BH39 1.5-1.6	3.5	<																		NA	0.1	1.0	1.0	SAND	GC
BH39 2.5-2.6	3.5	<																		NA	0.1	1.0	1.0	SAND	GC
BH40 0.5-0.6	4.1	<																		NA	0.1	1.0	1.0	SAND	GC
BH40 1.5-1.6	4.1	<																		NA	0.1	1.0	1.0	SAND	GC
BH40 2.5-2.6	4.1	<																		NA	0.1	1.0	1.0	SAND	GC
BH40 3.5-3.6	4.1	<																		NA	0.1	1.0	1.0	SAND	GC
BH51 0.5-0.6	2.9	<																		NA	0.1	1.0	1.0	CLAY	CI
BH51 1.5-1.6	2.9	<																		NA	0.1	1.0	1.0	CLAY	CI

Footnote:
* Grain class is modified based on proposed building construction: concrete is interpreted to have similar vapour intrusion properties to clay and is therefore designated as CLAY within the grain size averaging assessment; backfill is inferred to comprise of gravel (GW)
< Sample has been collected from above the proposed excavation (base of slab or proposed ground level) and is not relevant in the PVI risk assessment
^ In this case, a 1 m excavation depth below FFL is inferred. Excavation depths are approximate and may vary due to change in services depths or overall building/footing construction design.

Table 18 Summary of Grain Class Based on USCS Classification – BH41-BH53

Sample	Footing Excavation Depth^ - Red Fill Thickness^ - Green	Sample PVI Depth (m) Relative to Slab/Cut Depth	Soil Grain Size Class Averaging Above Soil Sample																	Attenuation			Petroleum Vapour Intrusion HSL Grain Class*	SAMPLE USCS
			GW	GP	GM	GC	SW	SP	SM	SC	ML	CL	OL	MH	CH	OH	CI	Rock (R)	Existing Pavement (P)	Crawl Space Thickness (m)	Proposed CONCRETE (CH)	Crawl Space	Biodegradation	
BH41 0.5-0.6	2.8	<																		NA	0.1	1.0	1.0	CLAY	GC
BH42 0.5-0.6	5.0	<																		NA	0.1	1.0	1.0	CLAY	CI
BH42 1.5-1.6	5.0	<																		NA	0.1	1.0	1.0	CLAY	CI
BH42 2.5-2.6	5.0	<																		NA	0.1	1.0	1.0	CLAY	CI
BH43 0.5-0.6	3.5	<																		NA	0.1	1.0	1.0	CLAY	CI
BH43 1.5-1.6	3.5	<																		NA	0.1	1.0	1.0	CLAY	CI
BH43 2.5-2.6	3.5	<																		NA	0.1	1.0	1.0	CLAY	CI
BH43 3.5-3.6	3.5	0.8															0.7			NA	0.1	1.0	1.0	CLAY	CI
BH44 0.5-0.6	4.0	<																		NA	0.1	1.0	1.0	CLAY	CI
BH44 1.5-1.6	4.0	<				0.3														NA	0.1	1.0	1.0	SAND	GC
BH44 2.5-2.6	4.0	<				0.3														NA	0.1	1.0	1.0	SAND	GC
BH44 3.5-3.6	4.0	0.4				0.3														NA	0.1	1.0	1.0	SAND	GC
BH45 0.5-0.6	2.8	<																		NA	0.1	1.0	1.0	CLAY	CI
BH46 0.5-0.6	2.8	<																		NA	0.1	1.0	1.0	CLAY	CI
BH47 0.5-0.6	2.9	<																		NA	0.1	1.0	1.0	CLAY	CI
BH47 1.5-1.6	2.9	<																		NA	0.1	1.0	1.0	CLAY	CI
BH48 0.5-0.6	2.9	<																		NA	0.1	1.0	1.0	CLAY	CI
BH48 1.5-1.6	2.9	<																		NA	0.1	1.0	1.0	CLAY	CI
BH49 0.5-0.6	2.9	<																		NA	0.1	1.0	1.0	CLAY	CI
BH49 1.5-1.6	2.9	<																		NA	0.1	1.0	1.0	CLAY	CI
BH50 0.5-0.6	2.9	<																		NA	0.1	1.0	1.0	CLAY	CI
BH50 1.5-1.6	2.9	<																		NA	0.1	1.0	1.0	CLAY	CI
BH51 0.5-0.6	2.9	<																		NA	0.1	1.0	1.0	CLAY	CI
BH51 1.5-1.6	2.9	<																		NA	0.1	1.0	1.0	CLAY	CI
BH52 0.5-0.6	2.9	<																		NA	0.1	1.0	1.0	CLAY	CI
BH52 1.5-1.6	2.9	<																		NA	0.1	1.0	1.0	CLAY	CI
BH53 0.5-0.6	2.9	<																		NA	0.1	1.0	1.0	CLAY	CI
BH53 1.5-1.6	2.9	<																		NA	0.1	1.0	1.0	CLAY	CI

Footnote:
* Grain class is modified based on proposed building construction: concrete is interpreted to have similar vapour intrusion properties to clay and is therefore designated as CLAY within the grain size averaging assessment; backfill is inferred to comprise of gravel (GW)
< Sample has been collected from above the proposed excavation (base of slab or proposed ground level) and is not relevant in the PVI risk assessment
^ In this case, a 1 m excavation depth below FFL is inferred. Excavation depths are approximate and may vary due to change in services depths or overall building/footing construction design.

6.2 Groundwater

6.2.1 Aquifer Interpretation

Based on the three Geotec boreholes drilled at the site, see GES 2018; the site is underlaid by mudstone and sandstone bedrock.

6.2.2 Well Construction

Table 19 presents a summary of the groundwater monitoring wells construction details. The dominant aquifer encountered at the site consists of imported fill overlying sandstone/mudstone units.

Table 19 Summary of Well Construction, Aquifer Details and PHC Impacted Soil Depths

Well	Borehole Number	Date Installed	DWS (m)	Top of Screen (m)	Bottom of Screen (m)	Depth of highest PID reading	Aquifer Lithology at DWS
MW1	GT05 (Geotech hole)	26/07/2018	3.33	2.0	11.5	4.5-4.6: 0.5ppm	0.0-7.7 Fill 7.7-11.5 Mudstone interbedded with Siltstone
MW2	-	14-15 Nov 18	2.8	1.5	3.2	-	0.0-2.8 Fill 2.8-3.2 Mudstone interbedded with Siltstone
MW3	-	14-15 Nov 18	0.5	3.0	15.0	-	0.0-0.2 Fill 0.2-15 Mudstone interbedded with Siltstone

6.2.3 Groundwater Gauging

Field results from the groundwater gauging are presented in Appendix 13. Groundwater depths for the gauging event are presented in Table 20. PSH was not detected (gauged) any of the wells. The finished floor level is proposed to be 55.35 m AHD which is below the groundwater level in MW1 at 55.8m, above groundwater in MW2 at 55.2 m AHD and below the groundwater height in MW3 at 58.6 m AHD. Groundwater is pressured within the rock at depth and may not expel. On the other hand, there is a possibility that there is a perched aquifer within the fill material which may expel water (most likely from the base of the fill).

Table 20 Summary of Groundwater Gauging Results – 26 November 2018

Monitoring Well	MW1	MW2	MW3
Well Depth (m)	11.5	3.2	15.0
Top of Casing (TOC) Height (m AHD)	59.0m AHD	57.6m AHD	58.6m AHD
Groundwater Depth from TOC (m)	3.22	2.39	0
Groundwater Elevation (m AHD)	55.8	55.2	58.6
PSH Thickness (mm)	0	0	0

6.2.4 Hydraulic Gradient and Flow Direction

Field results from the groundwater gauging are presented in Appendix 13. Groundwater depths and groundwater contours for the gauging event are presented in Figure 23.

The groundwater flow direction is inferred to be to the north and the hydraulic gradient is determined to be approximately 6.6% as per Table 21.

Table 21 Summary of Inferred Site Groundwater Flow Directions and Rates

Groundwater flow direction from the site	
Hydraulic Gradient Calculations	
Upgradient Groundwater Elevation	58.5 m AHD contour
Downgradient Groundwater Elevation	55.5 m AHD contour
Distance Between Upgradient and Downgradient Points	45 m
Hydraulic Gradient	6.6 %



Figure 23 Groundwater Flow Direction

6.2.5 Hydraulic Conductivity

Hydraulic conductivity estimates from desktop calculations are presented in Table 20. It is anticipated that the hydraulic conductivity of the individual units; sandstone, mudstone and siltstone a will vary across the site (Freeze & Cherry 1979).

Table 22 Summary of Hydraulic Conductivity Estimates

Lithology	Estimated K
Sandstone	3.65 to 36.5
Siltstone	0.036
Mudstone	0.0036

6.2.6 Groundwater Flow Rates

As with the hydraulic conductivity, the groundwater flow rates are expected to vary between the units ranging from 1-10m in the sandstone and less than a metre in the siltstone and mudstone. A detailed transmissivity analysis has not been conducted but Table 23 will provide approximate flow rates.

Table 23 Summary of Inferred Groundwater Flow Rates at the Site

Aquifer	Hydraulic Conductivity (m/year)	Hydraulic Gradient	Effective Porosity	Flow rate (m/year)
	K	i_h	δ	$(K \times i_h) / δ$
Sandstone	3.65 to 36.5	0.066	0.25	1.0-10
Siltstone	0.036	0.066	0.25	0.01
Mudstone	0.0036	0.066	0.25	0.001

6.2.7 Groundwater Physiochemistry

Two purge volumes were obtained from MW1 and MW2 before the wells were purged dry. Three purge volumes were obtained from MW3. Groundwater physiochemical parameters were collected whilst purging and a representative value for the aquifer is presented in Table 24.

Table 24 Summary of Stabilised Groundwater Properties (26 November 2018 Event)

Parameter	MW1	MW2	MW3	Comment
Temp (°C)	15.8	14.4	15.1	Typical temperature for groundwater within southern Tasmania at this particular time of year.
pH	7.9	8.0	7.2	Indicates alkaline pH conditions of the groundwater.
Redox (mV)	60	60	70	Indicates oxidising REDOX conditions indicating a favourable environment for hydrocarbon breakdown. It also shows that there is only a minimal amount of contamination present.
EC (µs/cm)	2450	1870	2720	Indicates saline conditions and not suitable for drinking.

6.2.8 PSH & Groundwater Contamination Observations

The following groundwater observations were made during the groundwater sampling events:

- The groundwater had a slight hydrocarbon odour in MW1 and MW3.
- The groundwater was turbid in water from all wells, especially MW1.
- The groundwater was brown / grey from MW1; yellowish brown from MW2 and yellow grey from MW3.
- Phase separated hydrocarbons (PSH) was not observed in any of the groundwater wells during the GMEs.
- MW1 was purged dry at 11 litres (L), MW2 was purged dry at 3L and MW3 had 4.8 L of water removed.

7 SOIL ECOLOGICAL IMPACT ASSESSMENT

7.1 Protected Environmental Values

The requirement for protecting soil from contaminated activities in Tasmania is managed under the Environmental Management and Pollution Control Act 1994 (EMPCA) which states in Part 5A:

(2) An area of land is a contaminated site if –

(a) there is in, on or under that area of land a pollutant in a concentration that –

(i) is above the background concentration; and

(ii) is causing or is likely to be causing serious or material environmental harm or environmental nuisance, or is likely to cause serious or material environmental harm or environmental nuisance in the future if not appropriately managed;

Potential soil impact at the site is assessed through application of the following environmental investigation guidelines.

7.2 NEPM ASC (2013) Guidelines

The following ecological investigation guidelines are to be addressed to assess acceptable levels of risk to terrestrial ecosystems:

- NEPM ASC 2013: Ecological Investigation Levels (EILs) – have been developed for selected metal and organic substances. EILs depend on specific soil and physicochemical properties and land use scenarios and generally apply to the top two (2) metres of the soil profile (NEPM ASC 2013);
- NEPM ASC 2013: Ecological Screening Levels (ESLs) – have been developed for selected petroleum hydrocarbon compounds and total petroleum hydrocarbon fractions. ESL's broadly apply to coarse- and fine-grained soils and various land use scenarios within the top two (2) metres of the soil profile.

Soil analytical results are compared against Ecological Screening Levels (ESL's) and Ecological Investigation Levels (EIL's) limits presented in Table 25.

Table 25 Summary of Soil Investigation Limits Considered at the Site based in NEPM ASC (2013)

Investigation Levels (IL)	Analytes Investigated						
	Hydrocarbons				Metals		DDT
	BTEX	TRH (F1 to F4)	Benzo(a) pyrene (PAH)	Naphthalene (PAH)	Zn, Cu, Cr(III), Ni & As	Lead	
ESL's	Analysed	Analysed	Analysed				
EIL's				Analysed	Analysed	Analysed	Not Analysed

7.3 Guidelines

7.3.1 Ecological Screening Levels

The following compounds were compared against NEPM (2013) Ecological Screening Levels (ESL's):

- BTEX;
- F1 to F4 TRH; and
- Benzo(a)pyrene

Selection of ESL threshold investigation limits are set out in the NEPM (2013) guidelines and require classification of the soil according to:

- Land use sensitivity:
  - Areas of ecological significance
  - Urban residential and public open space; and

    - Commercial and industrial.
- Dominant particle size passing through a 2 mm sieve into:
    - Coarse – sand sizes and greater; and
    - Fine – clay and silt sizes.

Adopted NEPM (2013) soil and land use classifications are presented in the results tables.

7.3.2 Ecological Investigation Levels

The following compounds were compared against Environmental Investigation Levels:

- Lead;
- Nickel;
- Chromium;
- Zinc;
- Copper;
- Arsenic; and
- Naphthalene.

There was a requirement to classify the soil according to physicochemical properties given that the above listed compounds. Adopted physicochemical parameters are presented in the results tables.

Selection of EIL threshold investigation limits are set out in the NEPM ASC (2013) guidelines and require classification of the soil per specific soil and physicochemical properties which are presented in the results tables. The adopted land use scenarios presented in Table 26. Groundwater pH at the site is between 7 and 8 therefore the inferred pH value applied for the site is 7.5.

Table 26 Adopted Land Use Scenario for the Soil Bores

Land Use Scenario	Applicable Soil Bores
Areas of Ecological Significance	
Urban Residential & Public Open Space	*Guidelines for Urban Residential were applied to all borehole samples because the site is surrounded by residential properties and the site has the potential for residential land use due to the current zoning.*
Commercial & Industrial	*Guidelines for Commercial and Industrial land use were applied to all borehole samples because the Lower Ground Floor is allocated for a car park and commercial use. There are likely to be workers involved in future site redevelopment and ongoing trench worker requirements.*

Based on a preliminary assessment of site soil conditions, the following physicochemical properties are applied to assess guideline EILs:

- Clay content consistent with field observations
- A soil pH and cation exchange capacity (CEC) consistent with Table 27.

Table 27 Cation Exchange and Clay content, Adopted For the Site

Soil Physicochemical Properties Adopted for The Site

USCS	Clay %	CEC	pH
R	100	10	7.5
GW	0	10	7.5
GP	0	10	7.5
GM	10	15	7.5
GC	30	20	7.5
SW	0	10	7.5
SP	0	10	7.5
SM	10	15	7.5
SC	20	20	7.5
ML	30	20	7.5
CL	100	35	7.5
OL	50	35	7.5
MH	30	35	7.5
CH	100	45	7.5
OH	100	60	7.5
PT	100	80	7.5
P	0	0	7.5
CL	100	35	7.5
CI	100	35	7.5

7.4 Findings

7.4.1 Ecological Screening Levels

Laboratory analytical results for soil are presented in Appendix 14. Table 28 to Table 30 compare soil analytical results against relevant NEPM ASC (2013) ESLs guideline limits for residential land use. Concentrations which exceed laboratory limits of reporting (LOR) are highlighted in bold, ESL exceedances are highlighted with a coloured cell, samples within a potential excavation zone for any future potential excavations are marked with an X and samples with a strike line through are greater than 2m below the proposed finished floor level (FFL).

There were the following exceedances above the ESLs guideline limits for residential land use for samples shallower than 2m below the FFL:

- A total of 89 samples had ESL exceedances for Benzo(a)pyrene; 4 additional samples had laboratory detections but were below guideline limits.
- A total of six samples had ESL exceedances for TRH Fraction F2; three additional samples had laboratory detections but were below guideline limits.
- A total of 17 samples had ESL exceedances for TRH Fraction F3; 49 additional samples had laboratory detections but were below guideline limits.
- A total of 31 samples had detections of TRH Fraction F4 above laboratory LOR and there were no guideline exceedances for F4.
- There were no detections for TRH Fraction F1 or BTEX.
- A total of 61 samples from 142 samples were clean and had no detections.

7.4.2 Ecological Investigation Levels

Laboratory analytical results are presented in Appendix 14. Table 31 to Table 33 compare all soil analytical results against relevant ecological investigation limits (EIL's) for residential land use. Concentrations which exceeded laboratory LOR are detailed in the table, EIL exceedances are highlighted with a colored cell and samples within the proposed excavation zone are marked with an X. The inferred pH value applied for the soil at the site is 7.5.

There were three samples that had exceedances above the EILs residential land use guideline limits including BH01 2.6-2.6 (zinc), BH18 2.7-2.8 (lead) and BH23 3.5-3.6 (copper). There were another 8 samples that had exceedances above the EILs residential land use guideline limits, however they have been discounted as a risk because the sample will be deeper than 2m below the finished floor level.

Table 28 Summary of Soil Analytical Results Compared with Ecological Screening Level's ESL A – BH01-BH20

NEPM Ecological Screening Levels for Soil				BTEX				PAH	TRH			
Bold - Indicates LOR Exceedances X - Indicates Sample has been Excavated				Benzene	Toluene	Ethylbenzene	Xylenes	Benzo(a)pyrene	F1 (C6 - C10)	F2 (>C10 - C16)	F3 (>C16 - C34)	F4 (>C34 - C40)
Colour Shading - Indicates ESL Exceedances: >1 x, * 2-5 x, ** 5-20 x, *** 20-50 x, **** >50 x												
Sample ID	Sample Date	Soil Texture Class (fine /coarse)	Land Use	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
				LOR 0.2	LOR 0.5	LOR 0.5	LOR 0.5	LOR 0.5	LOR 10	LOR 50	LOR 100	LOR 100
BH01 1.0-1.1 X	23/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**0.6**	<10	<50	<100	<100
BH01 2.5-2.6	23/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**5.1****	<10	<50	**370**	<100
~~BH01 4.4-4.5~~	~~23/7/18~~	~~F~~	~~URBAN~~	~~<0.2~~	~~<0.5~~	~~<0.5~~	~~<0.5~~	~~**17.4*****~~	~~<10~~	~~<50~~	~~**1030**~~	~~**200**~~
BH02 1.0-1.1 X	23/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**0.6**	<10	<50	<100	<100
BH02 2.8-2.9	23/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH02 4.0-4.1	23/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH03 0.5-0.6 X	23/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**1.4**	<10	<50	<100	<100
BH03 2.5-2.6	23/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**7.8****	<10	<50	**480**	<100
BH03 3.9-4.0	23/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**8.9****	<10	<50	**700**	**100**
BH04 1.5-1.6 X	23/7/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	**25.6*****	<10	<50	**1190***	**300**
BH04 3.0-3.1	23/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**1.7***	<10	<50	<100	<100
BH04 4.5-4.6	23/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**1.5***	<10	<50	<100	<100
BH05 1.0-1.1 X	23/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH05 3.0-3.1	23/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**1.9***	<10	<50	**120**	<100
BH05 4.5-4.6	23/7/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	**3.9****	<10	<50	**170**	<100
BH06 0.2-0.3 X	23/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**1.7***	<10	<50	**120**	<100
BH07 1.0-1.1 X	23/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH07 2.2-2.3 X	23/7/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH01 1.5-1.6 X	23/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH01 3.5-3.6	23/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**12.7****	<10	<50	**740**	<100
BH02 0.5-0.6 X	23/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**1.8***	<10	<50	**120**	<100
BH02 2.0-2.1 X	23/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH03 1.0-1.1 X	23/7/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	**0.9**	<10	<50	<100	<100
BH03 3.0-3.1	23/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**17.5*****	<10	<50	**1110**	**150**
BH04 0.5-0.6	23/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**4.7****	<10	<50	**280**	<100
BH04 2.5-2.6	23/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH04 3.5-3.6	23/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**1**	<10	<50	<100	<100
BH05 2.0-2.1	23/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**4.3****	<10	<50	**240**	<100
BH05 4.0-4.1	23/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**4.9****	<10	<50	**440**	**100**
BH08_1.0-1.1	24/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**25.5*****	<10	<50	**1840**	**300**
BH08_2.0-2.1	24/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**1.5***	<10	<50	<100	<100
BH08_2.5-2.6	24/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH08_4.5-4.6	24/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH09_1.0-1.1	24/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**16.6*****	<10	<50	**1420**	**280**
BH09_2.5-2.6	24/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**1**	<10	<50	<100	<100
BH09_4.5-4.6	24/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**22.8*****	<10	<50	**1300**	**190**
BH09_6.0-6.1	24/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**0.7**	<10	<50	<100	<100
BH10_1.0-1.1	24/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH10_3.0-3.1	24/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**1**	<10	<50	<100	<100
BH10_5.0-5.1	24/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH11_1.0-1.1	24/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**4****	<10	<50	**480**	**150**
BH11_2.0-2.1	24/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**5.5****	<10	<50	**480**	<100
BH11_2.5-2.6	24/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**1.9***	<10	<50	**120**	<100
BH11_3.3-3.4 X	24/7/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH12_1.0-1.1 X	24/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**1.2**	<10	<50	<100	<100
BH12_2.0-2.1 X	24/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH12_2.5-2.6	24/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH12_3.5-3.6	24/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH13 1.0-1.1	25/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**29.8*****	<10	**220**	**2760***	**410**
BH13 1.5-1.6	25/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**0.8**	<10	<50	<100	<100
BH13 2.0-2.1	25/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**0.8**	<10	<50	<100	<100
BH14 0.4-0.5	25/7/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	**140**	**2710****	**760**
BH15 0.55-0.65	25/7/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH16 0.3-0.4	25/7/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH17 0.5-0.6	25/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**89.1******	<10	**160**	**4160***	**1070**
BH17 1.1-1.2	25/7/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH18 0.5-0.6	25/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**0.5**	<10	<50	<100	<100
BH18 1.5-1.6	25/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**3.4***	<10	<50	**400**	**120**
BH18 2.5-2.6	25/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH18 2.7-2.8	25/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**1.6***	<10	<50	**180**	<100
BH18 3.1-3.2	25/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**1.3**	<10	<50	**120**	<100
BH18 3.5-3.6	25/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH19 1.0-1.1	25/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH19 2.1-2.2	25/7/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH20 0.5-0.6	30/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**1.1**	<10	<50	**120**	<100
BH20 1.0-1.1	30/7/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100

Table 29 Summary of Soil Analytical Results Compared with Ecological Screening Level's ESL A – BH21-BH40

NEPM Ecological Screening Levels for Soil				BTEX				PAH	TRH			
Bold - Indicates LOR Exceedances X - Indicates Sample has been Excavated Colour Shading - Indicates ESL Exceedances: >1 x, * 2-5 x, ** 5-20 x, *** 20-50 x, **** >50 x				Benzene	Toluene	Ethylbenzene	Xylenes	Benzo(a)pyrene	F1 (C6 - C10)	F2 (>C10 - C16)	F3 (>C16 - C34)	F4 (>C34 - C40)
Sample ID	Sample Date	Soil Texture Class (fine /coarse)	Land Use	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
				LOR 0.2	LOR 0.5	LOR 0.5	LOR 0.5	LOR 0.5	LOR 10	LOR 50	LOR 100	LOR 100
BH21 0.5-0.6 X	24/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**14.3*** **	<10	<50	**760**	**230**
BH21 1.5-1.6 X	24/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**0.8**	<10	<50	**230**	**130**
BH21 2.5-2.6	24/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**1.9***	<10	<50	<100	<100
BH21 3.5-3.6	24/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**0.6**	<10	<50	<100	<100
~~BH21 4.5-4.6~~	~~24/10/18~~	~~F~~	~~URBAN~~	~~<0.2~~	~~<0.5~~	~~<0.5~~	~~<0.5~~	~~**6.1****~~	~~<10~~	~~<50~~	~~**170**~~	~~**<100**~~
~~BH21 5.5-5.6~~	~~24/10/18~~	~~F~~	~~URBAN~~	~~<0.2~~	~~<0.5~~	~~<0.5~~	~~<0.5~~	~~**4.6****~~	~~<10~~	~~<50~~	~~**160**~~	~~**<100**~~
BH22 0.5-0.6 X	24/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**4.1****	<10	<50	**180**	<100
BH22 1.5-1.6 X	24/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH22 2.5-2.6	24/10/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH22 3.4-3.5	24/10/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH23 0.5-0.6 X	24/10/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	**6.7****	<10	<50	**540**	**180**
BH23 1.5-1.6 X	24/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**3.8****	<10	<50	**150**	<100
BH23 2.5-2.6	24/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**166****	<10	**190**	**5070***	**760**
BH23 3.5-3.6	24/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**2.5***	<10	<50	**470**	<100
~~BH23 4.5-4.6~~	~~24/10/18~~	~~F~~	~~URBAN~~	~~<0.2~~	~~<0.5~~	~~<0.5~~	~~<0.5~~	~~**2.2***~~	~~<10~~	~~<50~~	~~**<100**~~	~~**<100**~~
~~BH23 5.5-5.6~~	~~24/10/18~~	~~F~~	~~URBAN~~	~~<0.2~~	~~<0.5~~	~~<0.5~~	~~<0.5~~	~~**45.2******~~	~~<10~~	~~**60**~~	~~**2170**~~	~~**410**~~
BH24 0.5-0.6 X	24/10/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	**4.8****	<10	<50	**220**	<100
BH24 1.5-1.6 X	24/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH24 2.5-2.6	24/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH24 3.3-3.4	24/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**0.7**	<10	<50	<100	<100
BH25 0.5-0.6 X	24/10/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	**0.9**	<10	<50	<100	<100
BH25 1.5-1.6 X	24/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH25 2.5-2.6 X	24/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH25 3.5-3.6	24/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**2.2***	<10	<50	**250**	<100
~~BH25 4.5-4.6~~	~~24/10/18~~	~~F~~	~~URBAN~~	~~<0.2~~	~~<0.5~~	~~<0.5~~	~~<0.5~~	~~**14.9******~~	~~<10~~	~~<50~~	~~**690**~~	~~**130**~~
BH25 5.5-5.6	24/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH26 0.1-0.2	29/10/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH26 0.5-0.6	29/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH27 0.1-0.2	29/10/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	**1.1**	<10	<50	<100	<100
BH27 0.5-0.6	29/10/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH27 1.0-1.1	29/10/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	**5.6****	<10	<50	**280**	<100
BH27 1.5-1.6	29/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH27 1.9-2.0	29/10/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH28 0.1-0.2	29/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH28 0.5-0.6	29/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**1.2**	<10	<50	<100	<100
BH28 1.0-1.1	29/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH28 1.2-1.3	29/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**7.3****	<10	<50	**480**	<100
BH29 0.5-0.6	30/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**4.6****	<10	<50	**390**	<100
BH29 1.5-1.6	30/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH29 2.1-2.2	30/10/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH30 0.3-0.4	30/10/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH31 0.5-0.6	30/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH31 1.5-1.6	30/10/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH32 0.5-0.6 X	30/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**1.1**	<10	<50	<100	<100
BH33 0.5-0.6 X	30/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH34 0.5-0.6 X	30/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH35 0.5-0.6	30/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**2.7***	<10	<50	**230**	<100
BH35 1.5-1.6	30/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**1.6***	<10	<50	**130**	<100
BH36 0.5-0.6	31/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH37 0.5-0.6	31/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**6.8****	<10	<50	**400**	**100**
BH37 1.5-1.6	31/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**7.4****	<10	<50	**370**	<100
BH37 2.5-2.6	31/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**2***	<10	<50	**160**	<100
BH37 3.5-3.6	31/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**3***	<10	<50	**160**	<100
BH38 0.5-0.6	31/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**1.3**	<10	<50	<100	<100
BH38 1.5-1.6	31/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**0.7**	<10	<50	<100	<100
BH38 2.5-2.6	31/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH39 0.5-0.6	31/10/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH39 1.5-1.6	31/10/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	**2.2***	<10	<50	**110**	<100
BH39 2.5-2.6	31/10/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	**19*****	<10	<50	**960***	**220**
BH40 0.5-0.6	31/10/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	**76.6********	<10	**270***	**6330*****	**1050**
BH40 1.5-1.6	31/10/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	**37.4********	<10	**100**	**2120****	**400**
BH40 2.5-2.6	31/10/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	**1.6***	<10	<50	**140**	<100
BH40 3.5-3.6	31/10/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	**59.6********	<10	**180**	**3640****	**640**

Table 30 Summary of Soil Analytical Results Compared with Ecological Screening Level's ESL A – BH41-BH53

NEPM Ecological Screening Levels for Soil				BTEX				PAH	TRH			
Bold - Indicates LOR Exceedances X - Indicates Sample has been Excavated Colour Shading - Indicates ESL Exceedances: >1 x, * 2-5 x, ** 5-20 x, *** 20-50 x, **** >50 x				Benzene	Toluene	Ethylbenzene	Xylenes	Benzo(a)pyrene	F1 (C6 - C10)	F2 (>C10 - C16)	F3 (>C16 - C34)	F4 (>C34 - C40)
Sample ID	Sample Date	Soil Texture Class (fine /coarse)	Land Use	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
				LOR 0.2	LOR 0.5	LOR 0.5	LOR 0.5	LOR 0.5	LOR 10	LOR 50	LOR 100	LOR 100
BH41 0.5-0.6 X	5/11/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH42 0.5-0.6 X	5/11/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**18.9*** **	<10	<50	**1150**	**220**
BH42 1.5-1.6 X	5/11/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**66.4**** **	<10	**60**	**3020***	**570**
BH42 2.5-2.6 X	5/11/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH43 0.5-0.6 X	5/11/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**3.8****	<10	<50	**170**	<100
BH43 1.5-1.6 X	5/11/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**13.4****	<10	<50	**580**	**120**
BH43 2.5-2.6 X	5/11/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**4.1****	<10	<50	**190**	<100
BH43 3.5-3.6	5/11/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**12****	<10	<50	**470**	<100
BH44 0.5-0.6 X	5/11/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**5.1****	<10	<50	**330**	<100
BH44 1.5-1.6 X	5/11/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	**33*****	<10	<50	**1500***	**320**
BH44 2.5-2.6 X	5/11/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	**21.6*****	<10	<50	**1480***	**320**
BH44 3.5-3.6 X	5/11/18	C	URBAN	<0.2	<0.5	<0.5	<0.5	**60.3******	<10	**60**	**2990****	**530**
BH45 0.5-0.6 X	5/11/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**8.2****	<10	<50	**350**	<100
BH46 0.5-0.6 X	5/11/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**3.7****	<10	<50	**220**	<100
BH47 0.5-0.6 X	5/11/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**6****	<10	<50	**350**	**110**
BH47 1.5-1.6 X	5/11/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**8.3****	<10	<50	**610**	**120**
BH48 0.5-0.6 X	5/11/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**7.7****	<10	<50	**450**	**150**
BH48 1.5-1.6 X	5/11/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**14.3*****	<10	<50	**1150**	**450**
BH49 0.5-0.6 X	5/11/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**1.1**	<10	<50	<100	<100
BH49 1.5-1.6 X	5/11/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**0.9**	<10	<50	<100	<100
BH50 0.5-0.6 X	5/11/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH50 1.5-1.6 X	5/11/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH51 0.5-0.6 X	5/11/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**1.3**	<10	<50	<100	<100
BH51 1.5-1.6 X	5/11/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	**9.4****	<10	<50	**370**	<100
BH52 0.5-0.6 X	5/11/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH52 1.5-1.6 X	5/11/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH53 0.5-0.6 X	5/11/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH53 1.5-1.6 X	5/11/18	F	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100

Table 31 Soil Analytical Results Compared Against Ecological Investigation Levels ESL A – BH01-BH20

NEPM Ecological Investigation Levels for Soil														
Bold - Indicates LOR Exceedances X - Indicates Sample Within Inferred Excavation														
Colour Shading - Indicates EIL Exceedances: >1 x, * 2-5 x, ** 5-20 x, *** 20-50 x, **** >50 x														
Sample ID	Sample Date	EIL Land Use Sensitivity Class	Soil CEC (cmol/kg)	Soil pH	Soil Texture Class (fine /coarse)	Copper (CEC)	Copper (pH)	Nickel	Zinc	Chromium III	Lead	Arsenic	Naphthalene
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
BH01 1.0-1.1 X	23/7/18	URBAN	35	7.5 (3)	F	8	8	7	45	8	35	<5	<1
BH01 2.5-2.6	23/7/18	URBAN	35	7.5 (3)	F	15	15	8	1100	10	25	<5	<1
BH01 4.4-4.5	23/7/18	URBAN	35	7.5 (3)	F	54	54	12	66	6	52	6	<1
BH02 1.0-1.1 X	23/7/18	URBAN	35	7.5 (3)	F	46	46	13	132	10	162	<5	<1
BH02 2.8-2.9	23/7/18	URBAN	35	7.5 (3)	F	12	12	12	71	16	56	<5	<1
BH02 4.0-4.1	23/7/18	URBAN	35	7.5 (3)	F	54	54	22	35	22	7	<5	<1
BH03 0.5-0.6 X	23/7/18	URBAN	35	7.5 (3)	F	24	24	16	118	13	502	5	<1
BH03 2.5-2.6	23/7/18	URBAN	35	7.5 (3)	F	28	28	7	40	3	12	<5	<1
BH03 3.9-4.0	23/7/18	URBAN	35	7.5 (3)	F	25	25	16	44	12	14	<5	<1
BH04 1.5-1.6 X	23/7/18	URBAN	10	7.5 (3)	C	35	35	14	113	14	128	<5	<1
BH04 3.0-3.1	23/7/18	URBAN	35	7.5 (3)	F	35	35	14	127	14	217	<5	<1
BH04 4.5-4.6	23/7/18	URBAN	35	7.5 (3)	F	28	28	27	184	12	136	<5	<1
BH05 1.0-1.1 X	23/7/18	URBAN	35	7.5 (3)	F	7	7	11	244	8	21	<5	<1
BH05 3.0-3.1	23/7/18	URBAN	35	7.5 (3)	F	44	44	22	322	15	94	<5	<1
BH05 4.5-4.6	23/7/18	URBAN	10	7.5 (3)	C	32	32	14	102	8	122	<5	<1
BH06 0.2-0.3 X	23/7/18	URBAN	35	7.5 (3)	F	30	30	12	168	10	174	<5	<1
BH07 1.0-1.1 X	23/7/18	URBAN	35	7.5 (3)	F	20	20	13	161	11	80	<5	<1
BH07 2.2-2.3 X	23/7/18	URBAN	10	7.5 (3)	C	17	17	7	70	8	120	<5	<1
BH01 1.5-1.6 X	23/7/18	URBAN	35	7.5 (3)	F	8	8	12	64	15	28	5	<1
BH01 3.5-3.6	23/7/18	URBAN	45	7.5 (3)	F	29	29	12	60	8	23	<5	<1
BH02 0.5-0.6 X	23/7/18	URBAN	35	7.5 (3)	F	37	37	12	221	24	349	5	<1
BH02 2.0-2.1 X	23/7/18	URBAN	35	7.5 (3)	F	11	11	13	62	12	82	<5	<1
BH03 1.0-1.1 X	23/7/18	URBAN	10	7.5 (3)	C	44	44	17	176	19	93	6	<1
BH03 3.0-3.1	23/7/18	URBAN	35	7.5 (3)	F	52	52	9	573	5	218	<5	<1
BH04 0.5-0.6	23/7/18	URBAN	35	7.5 (3)	F	35	35	17	236	14	56	<5	<1
BH04 2.5-2.6	23/7/18	URBAN	35	7.5 (3)	F	25	25	50	74	12	37	<5	<1
BH04 3.5-3.6	23/7/18	URBAN	35	7.5 (3)	F	26	26	23	130	10	76	<5	<1
BH05 2.0-2.1	23/7/18	URBAN	35	7.5 (3)	F	36	36	14	111	12	120	<5	<1
BH05 4.0-4.1	23/7/18	URBAN	35	7.5 (3)	F	40	40	13	280	9	221	<5	<1
BH08_1.0-1.1	24/7/18	URBAN	35	7.5 (3)	F	40	40	9	42	6	25	<5	<1
BH08_2.0-2.1	24/7/18	URBAN	35	7.5 (3)	F	18	18	7	12	10	7	<5	<1
BH08_2.5-2.6	24/7/18	URBAN	35	7.5 (3)	F	30	30	12	20	13	29	<5	<1
BH08_4.5-4.6	24/7/18	URBAN	35	7.5 (3)	F	<5	<5	14	31	11	13	5	<1
BH09_1.0-1.1	24/7/18	URBAN	35	7.5 (3)	F	33	33	10	40	7	16	<5	<1
BH09_2.5-2.6	24/7/18	URBAN	35	7.5 (3)	F	20	20	10	30	7	24	<5	<1
BH09_4.5-4.6	24/7/18	URBAN	35	7.5 (3)	F	31	31	5	23	4	15	<5	<1
BH09_6.0-6.1	24/7/18	URBAN	35	7.5 (3)	F	29	29	15	170	13	289	6	<1
BH10_1.0-1.1	24/7/18	URBAN	35	7.5 (3)	F	56	56	13	47	<2	37	<5	<1
BH10_3.0-3.1	24/7/18	URBAN	35	7.5 (3)	F	90	90	11	123	9	114	<5	<1
BH10_5.0-5.1	24/7/18	URBAN	20	7.5 (3)	F	7	7	12	34	8	14	<5	<1
BH11_1.0-1.1	24/7/18	URBAN	35	7.5 (3)	F	55	55	11	105	8	60	7	<1
BH11_2.0-2.1	24/7/18	URBAN	35	7.5 (3)	F	17	17	20	61	8	14	<5	<1
BH11_2.5-2.6	24/7/18	URBAN	35	7.5 (3)	F	84	84	10	321	11	256	<5	<1
BH11_3.3-3.4 X	24/7/18	URBAN	10	7.5 (3)	C	7	7	47	44	17	15	13	<1
BH12_1.0-1.1 X	24/7/18	URBAN	35	7.5 (3)	F	26	26	9	125	9	49	<5	<1
BH12_2.0-2.1 X	24/7/18	URBAN	35	7.5 (3)	F	24	24	13	50	11	24	<5	<1
BH12_2.5-2.6	24/7/18	URBAN	35	7.5 (3)	F	77	77	7	32	3	9	<5	<1
BH12_3.5-3.6	24/7/18	URBAN	35	7.5 (3)	F	33	33	9	50	7	72	<5	<1
BH13 1.0-1.1	25/7/18	URBAN	45	7.5 (3)	F	51	51	11	44	11	779	5	2
BH13 1.5-1.6	25/7/18	URBAN	45	7.5 (3)	F	44	44	12	41	8	128	<5	<1
BH13 2.0-2.1	25/7/18	URBAN	45	7.5 (3)	F	9	9	13	33	22	30	11	<1
BH14 0.4-0.5	25/7/18	URBAN	10	7.5 (3)	C	10	10	11	32	8	16	5	<1
BH15 0.55-0.65	25/7/18	URBAN	10	7.5 (3)	C	17	17	42	82	14	14	6	<1
BH16 0.3-0.4	25/7/18	URBAN	20	7.5 (3)	C	69	69	10	42	7	7	<5	<1
BH17 0.5-0.6	25/7/18	URBAN	45	7.5 (3)	F	40	40	14	107	12	62	<5	<1
BH17 1.1-1.2	25/7/18	URBAN	10	7.5 (3)	C	9	9	33	57	12	17	12	<1
BH18 0.5-0.6	25/7/18	URBAN	35	7.5 (3)	F	22	22	14	72	14	46	<5	<1
BH18 1.5-1.6	25/7/18	URBAN	35	7.5 (3)	F	35	35	22	242	15	123	5	<1
BH18 2.5-2.6	25/7/18	URBAN	35	7.5 (3)	F	60	60	28	103	34	7	<5	<1
BH18 2.7-2.8	25/7/18	URBAN	35	7.5 (3)	F	136	136	23	593	17	1160	<5	<1
BH18 3.1-3.2	25/7/18	URBAN	35	7.5 (3)	F	96	96	15	293	16	479	5	<1
BH18 3.5-3.6	25/7/18	URBAN	35	7.5 (3)	F	<5	<5	19	27	11	11	6	<1
BH19 1.0-1.1	25/7/18	URBAN	35	7.5 (3)	F	58	58	5	66	4	56	<5	<1
BH19 2.1-2.2	25/7/18	URBAN	10	7.5 (3)	C	10	10	19	33	15	10	6	<1
BH20 0.5-0.6	30/7/18	URBAN	45	7.5 (3)	F	23	23	7	40	9	18	<5	<1
BH20 1.0-1.1	30/7/18	URBAN	45	7.5 (3)	F	25	25	11	117	13	114	<5	<1

pH Designation:
1) Using 0.01M CaCl2 extract. Rayment, G.E. and Lyons, D.J. (2011). "Soil Chemical Methods – Australasia". 495+20 pp. CSIRO Publishing, Melbourne.
2) pHF (1:5). Adjusted by subtracting 0.75 with +/- 0.25 error to calibrate to the CaCl2 method (per comm. ALS Brisbane Acid Sulphate Soils Laboratory). Methods in accordance with Ahern, C.R., Stone Y., and Blunden B. (1998b). 'Acid Sulfate Soils Assessment Guidelines'. Acid Sulfate Soils Management Advisory Committee, Wollongbar, NSW, Australia.
3) Classified in accordance with parent material typical soil pH as per the Tasmanian soils database
NOTE samples deeper than 2m below finished floor level have been highlighted but the analyte not shown as the result has been discounted as a risk to ecological receptors.

Table 32 Soil Analytical Results Compared Against Ecological Investigation Levels ESL A – BH21-BH40

NEPM Ecological Investigation Levels for Soil														
Bold - Indicates LOR Exceedances X - Indicates Sample Within Inferred Excavation														
Colour Shading - Indicates EIL Exceedances: >1 x, * 2-5 x, ** 5-20 x, *** 20-50 x, **** >50 x														
Sample ID	Sample Date	EIL Land Use Sensitivity Class	Soil CEC (cmol/kg)	Soil pH	Soil Texture Class (fine /coarse)	Copper (CEC)	Copper (pH)	Nickel	Zinc	Chromium III	Lead	Arsenic	Naphthalene
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
BH21 0.5-0.6 X	24/10/18	URBAN	35	7.5 (3)	F	172	172	16	41	15	27	<5	<1
BH21 1.5-1.6 X	24/10/18	URBAN	35	7.5 (3)	F	11	11	7	57	8	77	<5	<1
BH21 2.5-2.6	24/10/18	URBAN	35	7.5 (3)	F	94	94	6	42	<2	11	<5	<1
BH21 3.5-3.6	24/10/18	URBAN	35	7.5 (3)	F	78	78	12	32	4	5	<5	<1
BH21 4.5-4.6	24/10/18	URBAN	35	7.5 (3)	F	82	82	15	46	9	17	<5	<1
BH21 5.5-5.6	24/10/18	URBAN	35	7.5 (3)	F	70	70	10	81	6	32	<5	<1
BH22 0.5-0.6 X	24/10/18	URBAN	35	7.5 (3)	F	30	30	20	122	12	90	<5	<1
BH22 1.5-1.6 X	24/10/18	URBAN	45	7.5 (3)	F	48	48	16	48	14	32	<5	<1
BH22 2.5-2.6	24/10/18	URBAN	20	7.5 (3)	C	58	58	24	37	25	<5	<5	<1
BH22 3.4-3.5	24/10/18	URBAN	20	7.5 (3)	C	57	57	25	44	24	12	<5	<1
BH23 0.5-0.6 X	24/10/18	URBAN	20	7.5 (3)	C	56	56	24	116	16	141	6	<1
BH23 1.5-1.6 X	24/10/18	URBAN	35	7.5 (3)	F	41	41	22	302	17	175	<5	<1
BH23 2.5-2.6	24/10/18	URBAN	35	7.5 (3)	F	39	39	11	123	10	220	<5	<1
BH23 3.5-3.6	24/10/18	URBAN	35	7.5 (3)	F	2410**	2410*	13	208	10	186	<5	<1
BH23 4.5-4.6	24/10/18	URBAN	35	7.5 (3)	F	18	18	21	63	11	16	5	<1
BH23 5.5-5.6	24/10/18	URBAN	35	7.5 (3)	F	39	39	16	134	11	42	9	<1
BH24 0.5-0.6 X	24/10/18	URBAN	20	7.5 (3)	C	21	21	16	120	12	70	<5	<1
BH24 1.5-1.6 X	24/10/18	URBAN	35	7.5 (3)	F	15	15	13	51	19	31	<5	<1
BH24 2.5-2.6	24/10/18	URBAN	35	7.5 (3)	F	16	16	20	56	24	22	<5	<1
BH24 3.3-3.4	24/10/18	URBAN	35	7.5 (3)	F	42	42	22	220	17	212	<5	<1
BH25 0.5-0.6 X	24/10/18	URBAN	20	7.5 (3)	C	25	25	15	114	8	49	<5	<1
BH25 1.5-1.6 X	24/10/18	URBAN	35	7.5 (3)	F	40	40	20	33	16	8	<5	<1
BH25 2.5-2.6 X	24/10/18	URBAN	35	7.5 (3)	F	29	29	12	38	8	50	<5	<1
BH25 3.5-3.6	24/10/18	URBAN	35	7.5 (3)	F	26	26	18	134	12	138	<5	<1
BH25 4.5-4.6	24/10/18	URBAN	35	7.5 (3)	F	43	43	19	215	12	460	<5	<1
BH25 5.5-5.6	24/10/18	URBAN	35	7.5 (3)	F	<5	<5	<2	<5	4	6	<5	<1
BH26 0.1-0.2	29/10/18	URBAN	20	7.5 (3)	C	23	23	4	30	6	14	<5	<1
BH26 0.5-0.6	29/10/18	URBAN	45	7.5 (3)	F	11	11	42	52	16	17	16	<1
BH27 0.1-0.2	29/10/18	URBAN	0	7.5 (3)	C	46	46	6	59	6	28	<5	<1
BH27 0.5-0.6	29/10/18	URBAN	0	7.5 (3)	C	21	21	15	80	17	43	21	<1
BH27 1.0-1.1	29/10/18	URBAN	10	7.5 (3)	C	38	38	18	75	9	278	<5	<1
BH27 1.5-1.6	29/10/18	URBAN	35	7.5 (3)	F	6	6	34	32	14	10	14	<1
BH27 1.9-2.0	29/10/18	URBAN	10	7.5 (3)	C	7	7	38	53	20	12	14	<1
BH28 0.1-0.2	29/10/18	URBAN	35	7.5 (3)	F	<5	<5	3	12	8	6	<5	<1
BH28 0.5-0.6	29/10/18	URBAN	35	7.5 (3)	F	21	21	20	72	18	34	<5	<1
BH28 1.0-1.1	29/10/18	URBAN	35	7.5 (3)	F	<5	<5	6	43	12	12	<5	<1
BH28 1.2-1.3	29/10/18	URBAN	20	7.5 (3)	F	18	18	9	456	8	81	<5	<1
BH29 0.5-0.6	30/10/18	URBAN	35	7.5 (3)	F	43	43	14	112	8	70	<5	<1
BH29 1.5-1.6	30/10/18	URBAN	35	7.5 (3)	F	25	25	10	86	11	78	<5	<1
BH29 2.1-2.2	30/10/18	URBAN	10	7.5 (3)	C	6	6	11	23	10	10	<5	<1
BH30 0.3-0.4	30/10/18	URBAN	10	7.5 (3)	C	23	23	16	100	12	53	<5	<1
BH31 0.5-0.6	30/10/18	URBAN	35	7.5 (3)	F	9	9	13	61	12	19	7	<1
BH31 1.5-1.6	30/10/18	URBAN	10	7.5 (3)	C	7	7	28	58	13	12	6	<1
BH32 0.5-0.6 X	30/10/18	URBAN	35	7.5 (3)	F	13	13	13	36	14	21	<5	<1
BH33 0.5-0.6 X	30/10/18	URBAN	45	7.5 (3)	F	6	6	6	20	9	15	<5	<1
BH34 0.5-0.6 X	30/10/18	URBAN	35	7.5 (3)	F	6	6	10	16	15	10	<5	<1
BH35 0.5-0.6	30/10/18	URBAN	35	7.5 (3)	F	32	32	12	163	12	152	<5	<1
BH35 1.5-1.6	30/10/18	URBAN	35	7.5 (3)	F	44	44	17	130	11	82	<5	<1
BH36 0.5-0.6	31/10/18	URBAN	35	7.5 (3)	F	40	40	17	40	17	10	<5	<1
BH37 0.5-0.6	31/10/18	URBAN	35	7.5 (3)	F	67	67	14	367	13	231	13	<1
BH37 1.5-1.6	31/10/18	URBAN	35	7.5 (3)	F	30	30	11	73	14	42	<5	2
BH37 2.5-2.6	31/10/18	URBAN	35	7.5 (3)	F	9	9	16	40	25	53	9	<1
BH37 3.5-3.6	31/10/18	URBAN	35	7.5 (3)	F	11	11	15	44	15	18	<5	<1
BH38 0.5-0.6	31/10/18	URBAN	35	7.5 (3)	F	13	13	13	45	14	57	<5	<1
BH38 1.5-1.6	31/10/18	URBAN	35	7.5 (3)	F	14	14	13	108	9	89	<5	<1
BH38 2.5-2.6	31/10/18	URBAN	45	7.5 (3)	F	14	14	14	40	14	14	<5	<1
BH39 0.5-0.6	31/10/18	URBAN	35	7.5 (3)	F	18	18	16	47	13	42	<5	<1
BH39 1.5-1.6	31/10/18	URBAN	20	7.5 (3)	C	24	24	9	71	15	36	<5	<1
BH39 2.5-2.6	31/10/18	URBAN	20	7.5 (3)	C	198	198	10	227	8	359	<5	<1
BH40 0.5-0.6	31/10/18	URBAN	20	7.5 (3)	C	60	60	12	34	6	12	<5	<1
BH40 1.5-1.6	31/10/18	URBAN	20	7.5 (3)	C	70	70	14	62	6	46	<5	<1
BH40 2.5-2.6	31/10/18	URBAN	20	7.5 (3)	C	14	14	17	60	9	15	<5	<1
BH40 3.5-3.6	31/10/18	URBAN	20	7.5 (3)	C	51	51	14	51	9	22	<5	<1
BH51 0.5-0.6 X	5/11/18	URBAN	35	7.5 (3)	F	10	10	15	51	12	31	<5	<1
BH51 1.5-1.6 X	5/11/18	URBAN	35	7.5 (3)	F	20	20	11	76	9	101	<5	<1

pH Designation:
1) Using 0.01M CaCl2 extract. Rayment, G.E. and Lyons, D.J. (2011). "Soil Chemical Methods – Australasia". 495+20 pp. CSIRO Publishing, Melbourne.
2) pHF (1:5). Adjusted by subtracting 0.75 with +/- 0.25 error to calibrate to the CaCl2 method (per comm. ALS Brisbane Acid Sulphate Soils Laboratory). Methods in accordance with Ahern, C.R., Stone Y., and Blunden B. (1998b). 'Acid Sulfate Soils Assessment Guidelines'. Acid Sulfate Soils Management Advisory Committee, Wollongbar, NSW, Australia.
3) Classified in accordance with parent material typical soil pH as per the Tasmanian soils database
NOTE samples deeper than 2m below finished floor level have been highlighted but the analyte not shown as the result has been discounted as a risk to ecological receptors.

Table 33 Soil Analytical Results Compared Against Ecological Investigation Levels ESL A – BH41-BH53

NEPM Ecological Investigation Levels for Soil **Bold - Indicates LOR Exceedances** X - Indicates Sample Within Inferred Excavation Colour Shading - Indicates ESL Exceedances: >1 x, * 2-5 x, ** 5-20 x, *** 20-50 x, **** >50 x														
Sample ID	Sample Date	EIL Land Use Sensitivity Class	Soil CEC (cmolc/kg)	Soil pH	Soil Texture Class (fine/coarse)	Copper (CEC)	Copper (pH)	Nickel	Zinc	Chromium III	Lead	Arsenic	Naphthalene
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
BH41 0.5-0.6 X	5/11/18	COM/IND	20	7.5 (3)	C	75	75	15	32	6	9	<5	<1
BH42 0.5-0.6 X	5/11/18	COM/IND	35	7.5 (3)	F	38	38	13	39	7	17	<5	<1
BH42 1.5-1.6 X	5/11/18	COM/IND	35	7.5 (3)	F	45	45	18	62	6	13	<5	<1
BH42 2.5-2.6 X	5/11/18	COM/IND	35	7.5 (3)	F	30	30	12	45	8	84	<5	<1
BH43 0.5-0.6 X	5/11/18	COM/IND	35	7.5 (3)	F	35	35	7	95	6	67	<5	<1
BH43 1.5-1.6 X	5/11/18	COM/IND	35	7.5 (3)	F	21	21	13	36	9	11	<5	<1
BH43 2.5-2.6 X	5/11/18	COM/IND	35	7.5 (3)	F	21	21	12	37	9	110	<5	3
BH43 3.5-3.6 X	5/11/18	COM/IND	35	7.5 (3)	F	78	78	10	53	4	23	<5	<1
BH44 0.5-0.6 X	5/11/18	COM/IND	35	7.5 (3)	F	6	6	12	41	12	16	<5	<1
BH44 1.5-1.6 X	5/11/18	COM/IND	20	7.5 (3)	C	68	68	11	39	5	18	<5	<1
BH44 2.5-2.6 X	5/11/18	COM/IND	20	7.5 (3)	C	61	61	10	33	5	29	<5	<1
BH44 3.5-3.6 X	5/11/18	COM/IND	20	7.5 (3)	C	52	52	10	43	6	34	<5	<1
BH45 0.5-0.6 X	5/11/18	COM/IND	35	7.5 (3)	F	66	66	13	134	11	83	<5	<1
BH46 0.5-0.6 X	5/11/18	COM/IND	35	7.5 (3)	F	187	187	20	221	17	223	7	<1
BH47 0.5-0.6 X	5/11/18	COM/IND	35	7.5 (3)	F	41	41	18	373	9	179	<5	<1
BH47 1.5-1.6 X	5/11/18	COM/IND	35	7.5 (3)	F	50	50	20	77	16	24	<5	<1
BH48 0.5-0.6 X	5/11/18	COM/IND	35	7.5 (3)	F	95	95	17	265	7	154	<5	<1
BH48 1.5-1.6 X	5/11/18	COM/IND	35	7.5 (3)	F	59	59	12	254	10	180	<5	<1
BH49 0.5-0.6 X	5/11/18	COM/IND	35	7.5 (3)	F	39	39	23	65	38	26	8	<1
BH49 1.5-1.6 X	5/11/18	COM/IND	35	7.5 (3)	F	11	11	25	77	12	22	<5	<1
BH50 0.5-0.6 X	5/11/18	COM/IND	35	7.5 (3)	F	20	20	22	67	19	25	<5	<1
BH50 1.5-1.6 X	5/11/18	COM/IND	35	7.5 (3)	F	13	13	16	47	10	17	5	<1
BH51 0.5-0.6 X	5/11/18	COM/IND	35	7.5 (3)	F	10	10	15	51	12	31	<5	<1
BH51 1.5-1.6 X	5/11/18	COM/IND	35	7.5 (3)	F	20	20	11	76	9	101	<5	<1
BH52 0.5-0.6 X	5/11/18	COM/IND	35	7.5 (3)	F	21	21	26	61	32	18	6	<1
BH52 1.5-1.6 X	5/11/18	COM/IND	35	7.5 (3)	F	17	17	17	57	15	18	6	<1
BH53 0.5-0.6 X	5/11/18	COM/IND	35	7.5 (3)	F	28	28	32	70	16	25	<5	<1
BH53 1.5-1.6 X	5/11/18	COM/IND	35	7.5 (3)	F	16	16	7	30	12	49	<5	<1

pH Designation:

1) Using 0.01M CaCl2 extract. Rayment, G.E. and Lyons, D.J. (2011). "Soil Chemical Methods – Australasia". 495+20 pp. CSIRO Publishing, Melbourne.
2) pHF (1:5). Adjusted by subtracting 0.75 with +/- 0.25 error to calibrate to the CaCl2 method (per comm. ALS Brisbane Acid Sulphate Soils Laboratory). Methods in accordance with Ahern, C.R., Stone Y., and Blunden B. (1998b). 'Acid Sulfate Soils Assessment Guidelines'. Acid Sulfate Soils Management Advisory Committee, Wollongbar, NSW, Australia.
3) Classified in accordance with parent material typical soil pH as per the Tasmanian soils database

NOTE samples deeper than 2m below finished floor level have been highlighted but the analyte not shown as the result has been discounted as a risk to ecological receptors.

8 GROUNDWATER GUIDELINES

8.1 Screening Criteria

The State Policy on Water Quality Management 1997 defines a range of PEV's on the basis of groundwater salinity. Groundwater electrical conductivity (EC) is used as a basis in which to assess total dissolved solid (TDS) concentrations at the site through a conservative ratio of 1 mg/L TDS to 0.75 µS/cm EC.

Groundwater PEV's were explored to assess potential receptors at risk.

The average EC at the site 2347 µS/cm which approximately translates to a TDS concentration average value of 1760 mg/L.

Groundwater beneath the site generally falls within Category B when classified according to the State Policy. The environmental values requiring protection are presented in Table 34.

Table 34 Environmental Values and Uses of Groundwater Requiring Protection (State Policy on Water Quality Management 1997).

Protected Environmental Value	PEV Based on TDS Concentrations (mg/L)			
	A	B	C	D
	Less than 1000	1000 – 3500	3500 – 13000	Greater than 13000
Drinking Water	*			
Irrigation	*	*		
Industry	*	*	*	
Stock Watering	*	*	*	
Ecosystem Protection	*	*	*	*

Note: Blue Shading Indicates Protected Environmental Value Requirement

8.1.1 Drinking Water

The aquifer is not considered of drinking water quality given the Category B salinity (exceeding 1000 mg/L). The groundwater is therefore not considered a PEV which needs to compare against Tier 1 screening criteria.

8.1.2 Irrigation

Given the urban setting and the development of an extensive reticulated water supply network the potential for groundwater extraction for crop irrigation and groundwater drawdown within the possible extent of groundwater impacts is considered highly unlikely. The PEV for crop irrigation has not been considered in this instance.

8.1.3 Industrial Water Use

As the applicable criteria for industrial water use are highly specific to the type of process, criteria for possible future industrial water use at the site have not been included.

8.1.4 Stock Watering

The potential for groundwater extraction for stock watering within the nearby area is considered low. The PEV for stock irrigation has therefore not been considered in this instance.

8.1.5 Ecosystem Protection

It is considered unlikely that groundwater impacts would extend to the nearest receiving waters of Maypole Creek which is 1.7 km to the north, however stormwater impacts need to be considered given the proposed excavation will be below the water table. Groundwater is compared against ANZG 2018 ecosystem protection guidelines for 95% protection of Freshwater Ecosystems have been adopted in this instance given the 'moderately' disturbed nature of the Maypole Creek and the River Derwent. The River Derwent is approximately 2 km from the site so ANZG 2018 ecosystem protection guidelines for 95% protection of Marine water Ecosystems has also been adopted.

8.1.6 HSL's for Assessing Petroleum Vapour Intrusion

Health Screening Levels (HSLs) for vapour intrusion are provided in Table 1A(4) of Schedule B1 of the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended April 2013 (NEPC, 2013) (the NEPM).

The NEPM groundwater HSLs provide an initial screening assessment for potential health risks via vapour intrusion to users of land overlying petroleum hydrocarbon impacted groundwater. This investigation concerns the following:

- Proposed commercial building with basement carpark, consulting room and wellness facility, HSL D NEPM HSL screening criteria have been adopted;

Screening level guidelines for assessing petroleum vapour intrusion from groundwater into shallow trenches (less than 1 m BGS) are non-limiting given that the derived groundwater HSL exceeds the water solubility limit (Friebel, E & Nadebaum, P., 2011).

The following classes have been applied to the site to derive an appropriate screening level for assessing petroleum vapour intrusion risk from groundwater:

- Sand grain size – the most conservative particle size has been applied due to the variation in material observed at the site and to account for preferential pathways; and
- A groundwater depth class of 2 to <4 m BGS;
- For the proposed development, Commercial D land use class (for proposed basement and ground level commercial land use);

8.2 Groundwater Results

Groundwater was sampled from three monitoring wells. Current groundwater analytical results are compared against selected water quality screening levels and are presented in Table 35 to Table 40; and the laboratory certificates are presented in Appendix 13.

8.2.1 Ecosystem

The following can be summarised from the findings of the current groundwater analytical data:

- There were many detections of hydrocarbons (TRH fractions) but no guideline exceedances in MW2 and MW3 and no free phase hydrocarbons observed during the groundwater sampling events.
- Copper exceeded both freshwater and marine guideline limits (ANZG 2018) in MW2. Cobalt exceeded marine guideline limits (ANZG 2018) in MW1.
- The following PAHs exceeded both freshwater and marine guideline limits (ANZG 2018) in MW1, naphthalene, phenanthrene, anthracene, fluoranthene and benzo(a)pyrene. B(a)p accumulated in the upgradient well but not in the two downgradient wells.
- Typically, benzo(a)pyrene is not particularly soluble in water, with high concentrations explained by the presence of naphthalene (potentially sourcing from the diesel) which increases the mobility of benzo(a)pyrene in water (CRC CARE Tech Report 39). Benzo(a)pyrene concentrations in MW1 exceed low reliability freshwater and marine ecosystem values of 0.2 ug/L by between 1335 to 6250 times in MW1 (CRC CARE Tech Report 39).
- The laboratory extraction method for Naphthalene varies between the techniques for BTEXN verses PAHs; there is a variation in the analytical results. The outcome of this variation is that this that there was an analyte exceeded guideline limits in the PAH suite but not the BTEXN method. This variation is attributed to the sediment content of the water column which in this instance was substantial and the preservative verses no preservative in the sampling bottles. As a conservative approach exceedance will be considered as the actual analytical result.

8.2.2 Human Health

Drinking water human health risk has been dismissed in section 8.1.1 due to groundwater salinity levels, however it is noted that direct contact with groundwater by construction workers may be plausible during the construction phase of the site development. Benzo(a)pyrene concentrations in MW1 (at between 267ug/L and 1250ug/L) exceed drinking water guidelines (ADWG 2013) limit of 0.01ug/L by between 26,700 and 125,000 times the limit. This highlights the importance of adequate PPE when handling this groundwater. Petroleum Vapour Intrusion risk from groundwater contamination is assessed in Section 10.4.

Table 35 Groundwater Analytical Results Compared Against Selected Freshwater (95% Trigger) Water Quality Guidelines – TRH and BTEXN

Fresh Water (95% Trigger) ANZG (2018)		Benzene	Toluene	Ethyl-benzene	Xylene			BTEX	Napthalene	TRH Carbon Chain Fractions							Dilsolved Lead
					M, P	O	Total	Total		6 - 10	F1	>10 - 16	>16 - 34	>34 - 40	>10 - 40	F2	
UNITS		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
LOR		1	2	2	2	2	2	1	5	20	20	100	100	100	100	100	0.001
Investigation Limit		950	180	80	275	350			16								0.0034
Date Collected	**Water Sample ID**																
11/09/2018	MW1	<1	<2	<2	<2	<2	<2	<1	6	<20	<20	2540	62300	13200	78000	2530	<0.001
26/11/2018	MW1	<1	<2	<2	<2	<2	<2	<1	<5	20	20	470	11100	2450	14000	470	0.002
26/11/2018	MW2	<1	<2	<2	<2	<2	<2	<1	<5	<20	<20	<100	<100	<100	<100	<100	<0.001
26/11/2018	MW3	<1	<2	<2	<2	<2	<2	<1	<5	<20	<20	<100	2730	230	2960	<100	<0.001

Table 36 Groundwater Analytical Results Compared Against Selected Marine water (95%) Water Quality Guidelines – TRH and BTEXN

ANZG (2018) Marine Water (95% trigger)		Benzene	Toluene	Ethyl-benzene	Xylene			BTEX	Napthalene	TRH Carbon Chain Fractions							Dilsolved Lead
					M, P	O	Total	Total		6 - 10	F1	>10 - 16	>16 - 34	>34 - 40	>10 - 40	F2	
UNITS		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
LOR		1	2	2	2	2	2	1	5	20	20	100	100	100	100	100	0.001
Investigation Limit		700	180	80	80				70								0.004
Date Collected	**Water Sample ID**																
11/09/2018	MW1	<1	<2	<2	<2	<2	<2	<1	6	<20	<20	2540	62300	13200	78000	2530	<0.001
26/11/2018	MW1	<1	<2	<2	<2	<2	<2	<1	<5	20	20	470	11100	2450	14000	470	0.002
26/11/2018	MW2	<1	<2	<2	<2	<2	<2	<1	<5	<20	<20	<100	<100	<100	<100	<100	<0.001
26/11/2018	MW3	<1	<2	<2	<2	<2	<2	<1	<5	<20	<20	<100	2730	230	2960	<100	<0.001

Table 37 Groundwater Analytical Results Compared Against Selected Fresh Water Quality Guidelines (95% trigger) – Dissolved Metals

Fresh Water (95% Trigger) ANZG (2018)		Disolvd Metals														
		Arsenic	Beryllium	Barium	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Nickel	Selenium	Vanadium	Zinc	Boron	Mercury
	UNITS	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	LOR	0.001	0.001	0.001	0.0001	0.001	0.001	0.001	0.001	0.001	0.001	0.01	0.01	0.005	0.05	0.0001
Investigation Limit		0.024			0.0002			0.0014	0.0034	1.9	0.011	0.011		0.008	0.37	0.0006
Date Collected	**Water Sample ID**															
11/09/2018	MW1	0.002	<0.001	0.068	<0.0001	<0.001	0.001	<0.001	<0.001	0.476	0.003	<0.01	<0.01	<0.005	<0.05	<0.0001
26/11/2018	MW1	0.002	<0.001	0.125	<0.0001	<0.001	0.002	0.001	0.002	0.883	0.002	<0.01	<0.01	<0.005	0.07	<0.0001
26/11/2018	MW2	0.002	<0.001	0.037	<0.0001	0.002	<0.001	0.003	<0.001	0.165	0.001	<0.01	<0.01	<0.005	0.07	<0.0001
26/11/2018	MW3	<0.001	<0.001	0.039	<0.0001	<0.001	<0.001	<0.001	<0.001	0.167	<0.001	<0.01	<0.01	<0.005	<0.05	<0.0001

Table 38 Groundwater Analytical Results Compared Against Selected Marine Water Quality Guidelines (95% trigger) – Dissolved Metals

ANZG (2018) Marine Water (95% trigger)		Dissolved Metals														
		Arsenic	Beryllium	Barium	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Nickel	Selenium	Vanadium	Zinc	Boron	Mercury
UNITS		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR		0.001	0.001	0.001	0.0001	0.001	0.001	0.001	0.001	0.001	0.001	0.01	0.01	0.005	0.05	0.0001
Investigation Limit					0.0055	0.0274	0.001	0.0013	0.0044		0.07		0.1	0.015		0.0004
Date Collected	**Water Sample ID**															
11/09/2018	MW1	0.002	<0.001	0.068	<0.0001	<0.001	0.001	<0.001	<0.001	0.476	0.003	<0.01	<0.01	<0.005	<0.05	<0.0001
26/11/2018	MW1	0.002	<0.001	0.125	<0.0001	<0.001	0.002	0.001	0.002	0.883	0.002	<0.01	<0.01	<0.005	0.07	<0.0001
26/11/2018	MW2	0.002	<0.001	0.037	<0.0001	0.002	<0.001	0.003	<0.001	0.165	0.001	<0.01	<0.01	<0.005	0.07	<0.0001
26/11/2018	MW3	<0.001	<0.001	0.039	<0.0001	<0.001	<0.001	<0.001	<0.001	0.167	<0.001	<0.01	<0.01	<0.005	<0.05	<0.0001

Table 39 Groundwater Analytical Results Compared Against Selected Fresh Water Quality Guidelines (95% trigger) – PAHs

Fresh Water (95% Trigger) ANZG (2018)		Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benz(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1.2.3.cd)pyrene	Dibenz(a.h)anthracene	Benzo(g.h.i)perylene	PAH Sum	Benzo(a)pyrene TEQ (WHO)
UNITS		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR		1	1	1	1	1	1	1	1	1	1	1	1	0.5	1	1	1	0.5	0.5
Investigation Limit		16				2	0.4	1.4						0.2					
Date Collected	Water Sample ID																		
11/09/2018	MW1	112	339	43	157	1070	464	1390	1540	678	571	910	264	875	393	145	464	9420	1250
26/11/2018	MW1	27.5	56.3	8.4	32.3	265	105	386	459	197	176	205	66.6	186	77.6	23.7	96.8	2370	267
26/11/2018	MW2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<0.5	<0.5
26/11/2018	MW3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<0.5	<0.5

Table 40 Groundwater Analytical Results Compared Against Selected Marine Water Quality Guidelines (95% trigger) – PAHs

ANZG (2018) Marine Water (95% trigger)		Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benz(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1.2.3.cd)pyrene	Dibenz(a.h)anthracene	Benzo(g.h.i)perylene	Sum of polycyclic aromatic hydrocarbons	Benzo(a)pyrene TEQ (WHO)
UNITS		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR		1	1	1	1	1	1	1	1	1	1	1	1	0.5	1	1	1	0.5	0.5
Investigation Limit		70				2	0.4	1.4						0.2					
Date Collected	Water Sample ID																		
11/09/2018	MW1	112	339	43	157	1070	464	1390	1540	678	571	910	264	875	393	145	464	9420	1250
26/11/2018	MW1	27.5	56.3	8.4	32.3	265	105	386	459	197	176	205	66.6	186	77.6	23.7	96.8	2370	267
26/11/2018	MW2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<0.5	<0.5
26/11/2018	MW3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<0.5	<0.5

9 SOIL HUMAN HEALTH DIRECT CONTACT ASSESSMENT

9.1 Guidelines

Guidelines presented herein are based on potential exposure of human receptors to soil impact which may include:

- Trench workers repairing or building services (typically to 1 m bgs). This classification is not dependent on the land use class.
- Onsite inhabitants which may be exposed to potential shallow soil impact in non-paved areas of the site; and
- Onsite excavation works which may include swimming pool (up to 3 m bgs); basement carparks; and deep foundations.

9.1.1 Land Use Classification

The NEPM (2013) guidelines have been referenced to ensure that the correct land use and density category has been adopted for the site and the surrounding properties (where applicable). As per NEPM (2013) guidelines, the adopted land use class is dependent on the building density and the opportunity for soil access by site occupants (exposure to potentially impacted soil). Aspects needing to be considered include:

- Whether the site is of sensitive land use such as a childcare center, preschool, primary school or aged care facility in which case land use Class A is applicable;
- The percentage of paved area to determine direct contact exposure risk and therefore classification as low or high density; and
- Classification based on residential, recreational or commercial/industrial setting.

9.1.2 Adopted Land Use Classification

The adopted land use class is presented in Table 41. Land use class is based on the opportunity for soil access as per NEPM (2013) guidelines. A land use class of D has been applied to areas on site with little opportunity for access to impacted soil.

Table 41 Summary of Land Use Setting and Density for Determining Exposure Risk

Soil Bores	Any Future Construction Phase	Location	Hypothetical Land Use	Pathway	Land Use Class
All soil	During	Onsite	Future Construction worker and trench workers	ALL	D and trench worker specific
	During	Offsite	Residential	ALL	A & B neighbors
	Post	Onsite	Future Commercial Workers (Lower Ground) & Trench workers	ALL	D and trench worker specific
	Post	Onsite	Future Residential	ALL	B (no direct access to soil or groundwater)

DC – Dermal Contact - Trench Worker Guidelines (CRC CARE 2013)
DI – Dust Inhalation - HIL Guidelines (NEPM ASC 2013)
SI – Soil Ingestion - HIL Guidelines (NEPM ASC 2013)
ALL – All of above

9.1.3 Health Investigation & Screening Levels

The main exposure pathways and methods for assessing short term heath risk from contaminated soils are presented in Table 42. Vapour inhalation risk is addressed in Section 10 of this report.

Table 42 Summary of Exposure Pathways and Preliminary (Tier 1) Methods for Assessing Human Exposure Risk

Exposure Scenario	Contaminant Type	Tier 1 Assessment Method	Reference
Vapour Inhalation (Petroleum Vapour Intrusion – PVI)	Petroleum Hydrocarbons	HSLs (addressed in PVI section)	CRC CARE (Friebel & Nadebaum, 2011)
Dermal Contact		HSLs	
Dust Inhalation	Metals, PAHs Organochlorides, Phenols, Herbicides Other Pesticides	Health Investigation Levels (HILs)	NEPM ASC (2013)
Soil Ingestion			

PVI – Petroleum Vapour Intrusion

9.2 Findings

9.2.1 Dermal Contact - Petroleum Hydrocarbons

Laboratory analytical results are presented in Appendix 12. Table 43 Table 45 presents soil hydrocarbon analytical results compared to CRC CARE (Friebel & Nadebaum, 2011) HSL guidelines for assessing dermal contact risk. Concentrations which exceed laboratory LOR are highlighted in bold, and HSL exceedances are highlighted with a colored cell indicating the highest HSL land used class exceeded and samples within the proposed excavation zone are marked with an X.

HSL A Low Density Residential (for neighboring properties) There were two samples that had exceedances above HSL A, low density residential guidelines: including BH23 2.5-2.6 and BH40 0.5-0.6 both for TRH Fraction F3 $>C_{16}$-C_{34}.

HSL B High Density Residential (for neighboring properties) There was one sample that had exceedances above HSL B, high density residential guidelines, that sample was BH40 0.5-0.6 for TRH Fraction F3 $>C_{16}$-C_{34}.

HSL D Commercial / Industrial land use (for site development and post development phases) There were no exceedances above the HSL D guidelines for commercial land use for dermal contact in any of the samples.

There were 98 detections of hydrocarbons out of 142 samples sent for analysis.

9.2.2 Dust Inhalation & Soil Ingestion

Laboratory analytical results are presented in Appendix 12. Soil analytical results are compared against combined dust inhalation and soil ingestion risk is assessed through the application of NEPM (2013) Health Investigation Levels (HILs) for exposure to soil contaminants are presented in Table 46 to Table 48.

Concentrations which exceeded laboratory LOR are highlighted in bold except for the metals, and HIL exceedances are highlighted with a colored cell indicating the highest HIL land used class exceeded and samples within the proposed excavation zone are marked with an X.

HIL A Low Density Residential There were a total of 72 HIL A exceedances for assessing dust inhalation and soil ingestion risk to neighboring residential receptors. These exceedances included:

- A total of 56 samples exceeded HIL A for benzo(a)pyrene
- A total of 10 samples exceeded HIL A for total PAH's and
- A total of 7 samples exceeded HIL A for lead.

Soil ingestion and dust inhalation risk to offsite residents during the site redevelopment works has been detected. Mitigation measures will need to be put into place to ensure contaminated soil is not transposed offsite through any means.

HIL B High Density Residential There were a total of 30 HIL B exceedances for assessing dust inhalation and soil ingestion risk to neighboring residential receptors. These exceedances included:

- A total of 26 samples exceeded HIL B for benzo(a)pyrene.
- A total of 4 samples exceeded HIL B for total PAH's.

HIL D Commercial / Industrial There were nine guideline exceedances for benzo(a)pyrene for dust inhalation and soil ingestion for *commercial land use* HIL D at the site indicating a risk to commercial workers developing the site.

Following development of the site, although there is limited opportunity for access to soil, measures will need to be put in place to ensure there are adequate separation barriers to the underlying soil as will be outlined in the CMP document.

Table 43 Soil Analytical Results Compared Against CRC CARE Guidelines for Dermal Contact – BH01-BH20

CRC CARE Health Screening Level Dermal Contact Hazard from Soil Hydrocarbons'		EP080: BTEXN					EP080/071: TRH			
		Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	C6 - C10 Fraction	>C10 - C16 Fraction	>C16 - C34 Fraction	>C34 - C40 Fraction
Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR		0.2	0.5	0.5	0.5	1	10	50	100	100
HSL A Low Density Residential		100	14000	4500	12000	1400	4400	3300	4500	6300
HSL B High Density Residential		140	21000	5900	17000	2200	5600	4200	5800	8100
HSL D Commercial/Industrial		430	99000	27000	81000	11000	26000	20000	27000	38000
Intrusive Maintenance Worker		1100	120000	85000	130000	29000	82000	62000	85000	120000
Date	Sample									
23/07/2018	BH01 1.0-1.1 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
23/07/2018	BH01 2.5-2.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**370**	<100
23/07/2018	BH01 4.4-4.5	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**1030**	**200**
23/07/2018	BH02 1.0-1.1 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
23/07/2018	BH02 2.8-2.9	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
23/07/2018	BH02 4.0-4.1	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
23/07/2018	BH03 0.5-0.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
23/07/2018	BH03 2.5-2.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**480**	<100
23/07/2018	BH03 3.9-4.0	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**700**	**100**
23/07/2018	BH04 1.5-1.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**1190**	**300**
23/07/2018	BH04 3.0-3.1	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
23/07/2018	BH04 4.5-4.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
23/07/2018	BH05 1.0-1.1 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
23/07/2018	BH05 3.0-3.1	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**120**	<100
23/07/2018	BH05 4.5-4.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**170**	<100
23/07/2018	BH06 0.2-0.3 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**120**	<100
23/07/2018	BH07 1.0-1.1 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
23/07/2018	BH07 2.2-2.3 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
23/07/2018	BH01 1.5-1.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
23/07/2018	BH01 3.5-3.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**740**	<100
23/07/2018	BH02 0.5-0.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**120**	<100
23/07/2018	BH02 2.0-2.1 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
23/07/2018	BH03 1.0-1.1 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
23/07/2018	BH03 3.0-3.1	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**1110**	**150**
23/07/2018	BH04 0.5-0.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**280**	<100
23/07/2018	BH04 2.5-2.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
23/07/2018	BH04 3.5-3.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
23/07/2018	BH05 2.0-2.1	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**240**	<100
23/07/2018	BH05 4.0-4.1	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**440**	**100**
24/07/2018	BH08_1.0-1.1	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**1840**	**300**
24/07/2018	BH08_2.0-2.1	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
24/07/2018	BH08_2.5-2.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
24/07/2018	BH08_4.5-4.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
24/07/2018	BH09_1.0-1.1	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**1420**	**280**
24/07/2018	BH09_2.5-2.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
24/07/2018	BH09_4.5-4.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**1300**	**190**
24/07/2018	BH09_6.0-6.1	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
24/07/2018	BH10_1.0-1.1	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
24/07/2018	BH10_3.0-3.1	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
24/07/2018	BH10_5.0-5.1	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
24/07/2018	BH11_1.0-1.1	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**480**	**150**
24/07/2018	BH11_2.0-2.1	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**480**	<100
24/07/2018	BH11_2.5-2.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**120**	<100
24/07/2018	BH11_3.3-3.4 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
24/07/2018	BH12_1.0-1.1 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
24/07/2018	BH12_2.0-2.1 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
24/07/2018	BH12_2.5-2.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
24/07/2018	BH12_3.5-3.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
25/07/2018	BH13 1.0-1.1	<0.2	<0.5	<0.5	<0.5	**2**	<10	**220**	**2760**	**410**
25/07/2018	BH13 1.5-1.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
25/07/2018	BH13 2.0-2.1	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
25/07/2018	BH14 0.4-0.5	<0.2	<0.5	<0.5	<0.5	<1	<10	**140**	**2710**	**760**
25/07/2018	BH15 0.55-0.65	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
25/07/2018	BH16 0.3-0.4	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
25/07/2018	BH17 0.5-0.6	<0.2	<0.5	<0.5	<0.5	<1	<10	**160**	**4160**	**1070**
25/07/2018	BH17 1.1-1.2	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
25/07/2018	BH18 0.5-0.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
25/07/2018	BH18 1.5-1.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**400**	**120**
25/07/2018	BH18 2.5-2.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
25/07/2018	BH18 2.7-2.8	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**180**	<100
25/07/2018	BH18 3.1-3.2	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**120**	<100
25/07/2018	BH18 3.5-3.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
25/07/2018	BH19 1.0-1.1	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
25/07/2018	BH19 2.1-2.2	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
30/07/2018	BH20 0.5-0.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**120**	<100
30/07/2018	BH20 1.0-1.1	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100

Table 44 Soil Analytical Results Compared Against CRC CARE Guidelines for Dermal Contact – BH21-BH40

CRC CARE Health Screening Level Dermal Contact Hazard from Soil Hydrocarbons'		EP080: BTEXN					EP080/071: TRH			
		Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	C6 - C10 Fraction	>C10 - C16 Fraction	>C16 - C34 Fraction	>C34 - C40 Fraction
Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR		0.2	0.5	0.5	0.5	1	10	50	100	100
HSL A Low Density Residential		100	14000	4500	12000	1400	4400	3300	4500	6300
HSL B High Density Residential		140	21000	5900	17000	2200	5600	4200	5800	8100
HSL D Commercial/Industrial		430	99000	27000	81000	11000	26000	20000	27000	38000
Intrusive Maintenance Worker		1100	120000	85000	130000	29000	82000	62000	85000	120000
Date	Sample									
24/10/2018	BH21 0.5-0.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**760**	**230**
24/10/2018	BH21 1.5-1.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**230**	**130**
24/10/2018	BH21 2.5-2.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
24/10/2018	BH21 3.5-3.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
24/10/2018	BH21 4.5-4.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**170**	<100
24/10/2018	BH21 5.5-5.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**160**	<100
24/10/2018	BH22 0.5-0.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**180**	<100
24/10/2018	BH22 1.5-1.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
24/10/2018	BH22 2.5-2.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
24/10/2018	BH22 3.4-3.5	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
24/10/2018	BH23 0.5-0.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**540**	**180**
24/10/2018	BH23 1.5-1.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**150**	<100
24/10/2018	BH23 2.5-2.6	<0.2	<0.5	<0.5	<0.5	<1	<10	**190**	**5070**	**760**
24/10/2018	BH23 3.5-3.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**470**	<100
24/10/2018	BH23 4.5-4.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
24/10/2018	BH23 5.5-5.6	<0.2	<0.5	<0.5	<0.5	<1	<10	**60**	**2170**	**410**
24/10/2018	BH24 0.5-0.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**220**	<100
24/10/2018	BH24 1.5-1.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
24/10/2018	BH24 2.5-2.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
24/10/2018	BH24 3.3-3.4	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
24/10/2018	BH25 0.5-0.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
24/10/2018	BH25 1.5-1.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
24/10/2018	BH25 2.5-2.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
24/10/2018	BH25 3.5-3.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**250**	<100
24/10/2018	BH25 4.5-4.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**690**	**130**
24/10/2018	BH25 5.5-5.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
29/10/2018	BH26 0.1-0.2	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
29/10/2018	BH26 0.5-0.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
29/10/2018	BH27 0.1-0.2	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
29/10/2018	BH27 0.5-0.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
29/10/2018	BH27 1.0-1.1	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**280**	<100
29/10/2018	BH27 1.5-1.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
29/10/2018	BH27 1.9-2.0	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
29/10/2018	BH28 0.1-0.2	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
29/10/2018	BH28 0.5-0.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
29/10/2018	BH28 1.0-1.1	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
29/10/2018	BH28 1.2-1.3	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**480**	<100
30/10/2018	BH29 0.5-0.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**390**	<100
30/10/2018	BH29 1.5-1.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
30/10/2018	BH29 2.1-2.2	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
30/10/2018	BH30 0.3-0.4	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
30/10/2018	BH31 0.5-0.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
30/10/2018	BH31 1.5-1.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
30/10/2018	BH32 0.5-0.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
30/10/2018	BH33 0.5-0.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
30/10/2018	BH34 0.5-0.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
30/10/2018	BH35 0.5-0.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**230**	<100
30/10/2018	BH35 1.5-1.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**130**	<100
31/10/2018	BH36 0.5-0.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2018	BH37 0.5-0.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**400**	**100**
31/10/2018	BH37 1.5-1.6	<0.2	<0.5	<0.5	<0.5	**2**	<10	<50	**370**	<100
31/10/2018	BH37 2.5-2.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**160**	<100
31/10/2018	BH37 3.5-3.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**160**	<100
31/10/2018	BH38 0.5-0.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2018	BH38 1.5-1.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2018	BH38 2.5-2.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2018	BH39 0.5-0.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2018	BH39 1.5-1.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**110**	<100
31/10/2018	BH39 2.5-2.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**960**	**220**
31/10/2018	BH40 0.5-0.6	<0.2	<0.5	<0.5	<0.5	<1	<10	**270**	**6330**	**1050**
31/10/2018	BH40 1.5-1.6	<0.2	<0.5	<0.5	<0.5	<1	<10	**100**	**2120**	**400**
31/10/2018	BH40 2.5-2.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**140**	<100
31/10/2018	BH40 3.5-3.6	<0.2	<0.5	<0.5	<0.5	<1	<10	**180**	**3640**	**640**

Table 45 Soil Analytical Results Compared Against CRC CARE Guidelines for Dermal Contact – BH41-BH45

CRC CARE Health Screening Level Dermal Contact Hazard from Soil Hydrocarbons'		EP080: BTEXN					EP080/071: TRH			
		Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	C6 - C10 Fraction	>C10 - C16 Fraction	>C16 - C34 Fraction	>C34 - C40 Fraction
Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR		0.2	0.5	0.5	0.5	1	10	50	100	100
HSL A Low Density Residential		100	14000	4500	12000	1400	4400	3300	4500	6300
HSL B High Density Residential		140	21000	5900	17000	2200	5600	4200	5800	8100
HSL D Commercial/Industrial		430	99000	27000	81000	11000	26000	20000	27000	38000
Intrusive Maintenance Worker		1100	120000	85000	130000	29000	82000	62000	85000	120000
Date	Sample									
5/11/2018	BH41 0.5-0.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
5/11/2018	BH42 0.5-0.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**1150**	**220**
5/11/2018	BH42 1.5-1.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	**60**	**3020**	**570**
5/11/2018	BH42 2.5-2.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
5/11/2018	BH43 0.5-0.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**170**	<100
5/11/2018	BH43 1.5-1.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**580**	**120**
5/11/2018	BH43 2.5-2.6 X	<0.2	<0.5	<0.5	<0.5	**3**	<10	<50	**190**	<100
5/11/2018	BH43 3.5-3.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**470**	<100
5/11/2018	BH44 0.5-0.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**330**	<100
5/11/2018	BH44 1.5-1.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**1500**	**320**
5/11/2018	BH44 2.5-2.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**1480**	**320**
5/11/2018	BH44 3.5-3.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	**60**	**2990**	**530**
5/11/2018	BH45 0.5-0.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**350**	<100
5/11/2018	BH46 0.5-0.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**220**	<100
5/11/2018	BH47 0.5-0.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**350**	**110**
5/11/2018	BH47 1.5-1.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**610**	**120**
5/11/2018	BH48 0.5-0.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**450**	**150**
5/11/2018	BH48 1.5-1.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**1150**	**450**
5/11/2018	BH49 0.5-0.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
5/11/2018	BH49 1.5-1.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
5/11/2018	BH50 0.5-0.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
5/11/2018	BH50 1.5-1.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
5/11/2018	BH51 0.5-0.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
5/11/2018	BH51 1.5-1.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**370**	<100
5/11/2018	BH52 0.5-0.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
5/11/2018	BH52 1.5-1.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
5/11/2018	BH53 0.5-0.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
5/11/2018	BH53 1.5-1.6 X	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100

Table 46 Soil Analytical Results Compared Against NEPM (2013) Health Investigation Limit Guidelines – BH01-BH20

Bold - Indicates LOR Exceedance in Non Metalic Compounds		EA055: Moisture Content															Total Recoverable Mercury by FIMS	EP075(SIM)B: Polynuclear Aromatic Hydrocarbons																	
NEPM Health Investigation Levels (HIL's) **Dust Inhalation and Soil Ingestion Assessment** X - Indicates Sample Within Proposed Excavation Zone		Moisture Content	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium Total	Cobalt	Copper	Lead	Manganese	Nickel	Selenium	Vanadium	Zinc	Mercury	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benz(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)anthracene	Benzo(g,h,i)perylene	PAHs	Benzo(a)pyrene TEQ (WHO)
Units		%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR		1	50	1	2	2	5	5	5	2	5	5	2	5	5	5	0.1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
HIL A Low Density Residential	☑ HIL A		100		60	4500	20		100	6000	300	3800	400	200		7400	40																300	3
HIL B Medium/High Density Residential	☑ HIL B		500		90	40000	150		800	30000	1200	14000	1200	1400		60000	120																400	4
HIL D Commercial/Industrial	☑ HIL D		3000		500	300000	900		4000	240000	1500	60000	6000	10000		400000	730																4000	40
Sample date	Sample ID																																	
23/07/2018	BH01 1.0-1.1 X	18.3	<5	50	<1	<50	<1	8	5	8	35	82	7	<5	21	45	<0.1	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	1.5	1.6	0.7	0.6	0.8	<0.5	0.6	<0.5	<0.5	<0.5	7	0.8
23/07/2018	BH01 2.5-2.6	13.5	<5	30	<1	<50	<1	10	5	15	25	25	8	<5	39	1100	<0.1	<0.5	1.5	<0.5	0.8	9.7	2.6	14.9	15.0	6.8	6.2	6.2	2.9	5.1	2.5	0.7	2.9	78	7.7
23/07/2018	BH01 4.4-4.5	15.3	6	50	<1	<50	<1	6	11	54	52	846	12	<5	51	66	1	1.2	4.0	<0.5	0.6	7.9	2.9	20.8	25.1	14.7	14.4	19.6	8.2	17.4	7.0	2.0	8.5	152	24
23/07/2018	BH02 1.0-1.1 X	12.3	<5	440	<1	<50	<1	10	13	46	162	236	13	<5	19	132	0.4	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	1.5	1.6	0.7	0.7	0.9	<0.5	0.6	<0.5	<0.5	<0.5	7	0.8
23/07/2018	BH02 2.8-2.9	17.7	<5	730	1	<50	<1	16	13	12	56	63	12	<5	28	71	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
23/07/2018	BH02 4.0-4.1	21.6	<5	220	1	<50	<1	22	26	54	7	99	22	<5	103	35	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
23/07/2018	BH03 0.5-0.6 X	18	5	140	<1	<50	<1	13	14	24	502	578	16	<5	41	118	0.1	<0.5	<0.5	<0.5	<0.5	1.3	<0.5	3.4	3.7	1.7	1.4	1.6	0.7	1.4	0.8	<0.5	1.0	17	1.9
23/07/2018	BH03 2.5-2.6	8.6	<5	260	<1	<50	<1	3	10	28	12	105	7	<5	43	40	<0.1	<0.5	2.1	<0.5	<0.5	5.7	2.1	13.5	15.4	8.0	7.5	8.9	3.2	7.8	3.7	1.1	4.7	84	11
23/07/2018	BH03 3.9-4.0	14.7	<5	70	<1	<50	<1	12	11	25	14	261	16	<5	42	44	<0.1	0.6	3.2	<0.5	1.3	16.7	4.4	18.8	21.1	10.6	9.8	9.8	3.5	8.9	4.0	1.2	5.0	119	13
23/07/2018	BH04 1.5-1.6 X	10.3	<5	130	<1	<50	<1	14	10	35	128	301	14	<5	43	113	0.2	<0.5	2.1	2.3	3.4	37.0	10.7	55.9	52.6	20.2	18.8	28.8	9.6	25.6	15.6	3.4	20.0	306	37
23/07/2018	BH04 3.0-3.1	6.1	<5	170	<1	<50	<1	14	11	35	217	224	14	<5	30	127	0.1	<0.5	<0.5	<0.5	<0.5	2.2	0.6	3.9	3.9	1.5	1.4	2.1	0.7	1.7	1.1	<0.5	1.6	21	2.3
23/07/2018	BH04 4.5-4.6	10	<5	180	<1	<50	<1	12	14	28	136	1040	27	<5	14	184	0.1	<0.5	<0.5	<0.5	1.1	<0.5	2.8	3.2	1.6	1.4	1.8	0.7	1.5	0.9	<0.5	1.1	16	2
23/07/2018	BH05 1.0-1.1 X	19.9	<5	60	<1	<50	<1	8	7	7	21	78	11	<5	16	244	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	1.1	0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3	<0.5
23/07/2018	BH05 3.0-3.1	11.1	<5	120	<1	<50	<1	2	15	21	44	94	179	22	<5	23	522	0.1	<0.5	<0.5	<0.5	1.7	0.6	3.9	4.3	2.2	2.0	2.1	1.1	1.9	1.0	<0.5	1.2	22	2.6
23/07/2018	BH05 4.5-4.6	15	<5	100	<1	<50	<1	8	17	32	122	199	14	<5	54	102	0.2	<0.5	<0.5	0.5	0.6	8.1	2.5	11.7	11.2	4.2	3.8	4.7	1.7	3.9	2.3	<0.5	3.0	58	5.2
23/07/2018	BH06 0.2-0.3 X	16.9	<5	150	<1	<50	<1	10	10	30	174	253	12	<5	27	168	0.4	<0.5	<0.5	<0.5	<0.5	2.5	0.7	4.2	4.5	1.9	1.8	2.1	0.9	1.7	0.9	<0.5	1.2	22	2.5
23/07/2018	BH07 1.0-1.1 X	16.6	<5	230	<1	<50	<1	11	11	20	80	173	13	<5	25	161	0.1	<0.5	<0.5	<0.5	<0.5	<0.5	1.0	1.1	0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3	<0.5
23/07/2018	BH07 2.2-2.3 X	9.1	<5	260	<1	<50	<1	8	9	17	120	309	7	<5	25	70	0.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
23/07/2018	BH01 1.5-1.6 X	20.1	5	40	<1	<50	<1	15	9	8	28	223	12	<5	25	84	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
23/07/2018	BH01 3.5-3.6	17.6	<5	20	<1	<50	<1	8	14	29	23	277	12	<5	31	60	<0.1	0.7	3.1	<0.5	0.9	12.2	3.5	20.0	22.6	11.9	10.2	14.2	4.2	12.7	5.8	1.8	7.3	131	18
23/07/2018	BH02 0.5-0.6 X	14.3	5	1880	<1	<50	<1	24	10	37	349	297	12	<5	40	221	1.2	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	2.4	2.8	1.7	1.2	2.0	0.8	1.8	1.0	<0.5	1.2	16	2.4
23/07/2018	BH02 2.0-2.1 X	16.9	<5	340	1	<50	<1	12	16	11	82	125	13	<5	22	62	0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
23/07/2018	BH03 1.0-1.1 X	22.1	6	140	<1	<50	<1	19	16	44	93	308	17	<5	63	176	0.1	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	1.5	1.6	1.0	0.7	1.1	<0.5	0.9	0.5	<0.5	0.7	9	1.2
23/07/2018	BH03 3.0-3.1	7.2	<5	80	<1	<50	<1	5	10	52	218	263	9	<5	59	573	<0.1	1.3	6.7	<0.5	1.9	23.3	5.8	34.8	35.6	18.1	14.6	19.2	6.3	17.5	7.8	2.5	9.3	205	25
23/07/2018	BH04 0.5-0.6	13.8	<5	110	<1	<50	<1	14	18	35	56	276	17	<5	39	236	0.1	<0.5	1.0	<0.5	0.6	7.4	1.9	11.6	11.4	5.1	3.7	5.5	1.8	4.7	2.3	0.6	2.9	61	6.8
23/07/2018	BH04 2.5-2.6	14.1	<5	320	<1	<50	<1	12	24	25	37	576	50	<5	52	74	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
23/07/2018	BH04 3.5-3.6	10.3	<5	140	<1	<50	<1	10	17	26	76	441	23	<5	11	130	<0.1	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	1.8	1.9	1.1	0.7	1.1	<0.5	1.0	<0.5	<0.5	0.6	9	1.2
23/07/2018	BH05 2.0-2.1	12.3	<5	140	<1	<50	<1	12	19	36	120	206	14	<5	43	111	0.3	<0.5	1.0	<0.5	0.5	8.6	1.7	11.0	10.6	4.6	3.1	5.0	1.6	4.3	2.2	<0.5	3.0	57	5.7
23/07/2018	BH05 4.0-4.1	11.2	<5	150	<1	<50	<1	9	12	40	221	269	13	<5	26	280	0.3	<0.5	1.3	<0.5	<0.5	4.9	1.4	9.4	9.7	4.7	4.1	6.1	1.9	4.9	2.5	0.6	3.2	55	7.1
24/07/2018	BH08_1.0-1.1	16.3	<5	50	<1	<50	<1	6	8	40	25	211	9	<5	32	42	<0.1	1.1	8.7	0.6	3.1	39.3	9.3	45.6	50.7	24.8	28.6	26.3	9.1	25.5	12.0	3.3	14.9	301	36
24/07/2018	BH08_2.0-2.1	13.3	<5	60	<1	<50	<1	10	6	18	7	69	7	<5	41	12	<0.1	<0.5	<0.5	<0.5	1.1	<0.5	2.1	2.5	1.6	1.1	1.8	0.5	1.5	0.7	<0.5	0.9	14	2
24/07/2018	BH08_2.5-2.6	15.9	<5	80	<1	<50	<1	13	13	30	29	210	12	<5	84	20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
24/07/2018	BH08_4.5-4.6	20	5	90	<1	<50	<1	11	39	<5	13	171	14	<5	17	31	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
24/07/2018	BH09_1.0-1.1	7.9	<5	50	<1	<50	<1	7	8	33	16	257	10	<5	23	40	<0.1	1.0	4.6	<0.5	0.7	11.4	4.1	23.2	25.4	15.3	14.3	16.8	6.7	16.6	8.1	2.3	10.1	161	24
24/07/2018	BH09_2.5-2.6	9.6	<5	50	<1	<50	<1	7	7	20	24	377	10	<5	23	30	<0.1	<0.5	<0.5	<0.5	<0.5	1.4	<0.5	1.8	2.0	1.0	1.0	1.2	<0.5	1.0	0.5	<0.5	0.6	11	1.3
24/07/2018	BH09_4.5-4.6	20.9	<5	40	<1	<50	<1	4	7	31	15	92	5	<5	49	23	<0.1	2.8	7.8	0.9	5.9	38.7	11.6	38.6	41.9	21.1	19.6	22.3	7.4	22.8	10.4	2.9	13.1	268	32
24/07/2018	BH09_6.0-6.1	21.1	6	120	<1	<50	<1	13	11	29	289	120	15	<5	24	170	0.7	<0.5	<0.5	<0.5	<0.5	1.7	0.5	1.6	1.7	0.8	0.7	0.8	<0.5	0.7	<0.5	<0.5	<0.5	9	0.9
24/07/2018	BH10_1.0-1.1	19.4	<5	140	<1	<50	<1	<2	30	56	37	408	13	<5	67	47	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
24/07/2018	BH10_3.0-3.1	21.2	<5	140	<1	<50	<1	9	9	90	114	462	11	<5	52	123	0.8	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	1.4	1.8	0.9	0.9	1.2	<0.5	1.2	0.5	<0.5	0.7	9	1.3
24/07/2018	BH10_5.0-5.1	17.8	<5	70	<1	<50	<1	8	16	7	14	325	12	<5	19	54	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
24/07/2018	BH11_1.0-1.1	22.3	7	120	<1	<50	<1	8	12	55	80	202	11	<5	39	105	0.1	<0.5	0.7	<0.5	<0.5	2.7	0.8	7.0	7.4	3.6	3.7	4.8	1.5	4.0	2.4	0.6	3.0	42	5.9
24/07/2018	BH11_2.0-2.1	17.4	<5	100	2	<50	<1	8	27	17	14	294	20	<5	19	61	<0.1	<0.5	0.9	<0.5	<0.5	5.0	1.5	11.5	12.3	5.8	5.0	6.5	1.9	5.5	2.4	0.7	3.0	62	7.9
24/07/2018	BH11_2.5-2.6	27.4	<5	180	<1	<50	<1	11	7	84	256	510	10	<5	32	321	0.8	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	2.4	2.7	1.6	1.6	2.4	0.8	1.9	1.0	<0.5	1.5	17	2.5
24/07/2018	BH11_3.3-3.4 X	19	13	160	2	<50	<1	17	42	7	15	1630	47	<5	30	44	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
24/07/2018	BH12_1.0-1.1 X	19.9	<5	110	<1	<50	<1	9	9	26	49	116	9	<5	17	125	<0.1	<0.5	<0.5	<0.5	<0.5	1.8	<0.5	2.9	3.0	1.2	1.3	1.4	0.6	1.2	0.6	<0.5	0.7	15	1.6
24/07/2018	BH12_2.0-2.1 X	19.3	<5	100	<1	<50	<1	11	12	24	24	448	13	<5	34	50	<0.1	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	1.0	1.0	0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	4	<0.5
24/07/2018	BH12_2.5-2.6	20.8	<5	120	<1	<50	<1	3	43	77	9	281	7	<5	147	32	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
24/07/2018	BH12_3.5-3.6	21.6	<5	90	<1	<50	<1	7	8	33	72	236	9	<5	31	50	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
25/07/2018	BH13 1.0-1.1	8.8	5	80	<1	<50	<1	11	10	51	779	296	11	<5	40	44	0.4	4.0	16.8	2.2	8.6	101.0	22.0	80.3	83.6	37.5	34.5	34.8	10.0	29.8	12.3	4.3	14.7	496	44
25/07/2018	BH13 1.5-1.6	12.4	<5	90	<1	<50	<1	8	10	44	128	252	12	<5	46	41	0.2	<0.5	<0.5	<0.5	<0.5	1.8	<0.5	1.9	2.0	0.9	0.8	1.0	<0.5	0.8	<0.5	<0.5	<0.5	9	1
25/07/2018	BH13 2.0-2.1	11.8	11	100	1	<50	<1	22	16	9	30	552	13	<5	28	33	<0.1	<0.5	<0.5	<0.5	<0.5	2.0	<0.5	2.0	2.2	1.0	0.8	1.0	<0.5	0.8	<0.5	<0.5	0.5	10	1
25/07/2018	BH14 0.4-0.5	15.8	5	100	<1	<50	<1	8	11	10	16	1030	11	<5	18	32	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	<0.5
25/07/2018	BH15 0.55-0.65	9.8	6	20	1	<50	<1	14	28	17	14	830	42	<5	20	82	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
25/07/2018	BH16 0.3-0.4	11	<5	20	<1	<50	<1	7	11	69	7	381	10	<5	53	42	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
25/07/2018	BH17 0.5-0.6	22.3	<5	100	<1	<50	<1	12	9	40	62	167	14	<5	37	107	<0.1	1.8	3.4	24.4	31.8	218.0	63.4	250.0	216.0	76.3	68.3	100.0	30.0	89.1	49.6	11.4	57.4	1290	127
25/07/2018	BH17 1.1-1.2	9.4	12	1620	1	<50	<1	12	18	9	17	111	33	<5	15	57	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
25/07/2018	BH18 0.5-0.6	16.6	<5	120	<1	<50	<1	14	13	22	46	239	14	<5	38	72	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	1.0	0.6	<0.5	0.6	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	4	0.6
25/07/2018	BH18 1.5-1.6	19.4	5	170	<1	<50	<1	15	18	35	123	242	22	<5	36	242	0.4	<0.5	0.6	<0.5	<0.5	2.9	0.9	5.8	6.0	2.6	2.5	3.9	1.1	3.4	2.1	<0.5	2.6	34	4.4
25/07/2018	BH18 2.5-2.6	32.9	<5	80	<1	<50	<1	34	29	60	7	517	28	<5	113	103	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
25/07/2018	BH18 2.7-2.8	29.5	<5	310	<1	<50	<1	17	12	136	1160	199	23	<5	54	593	4.5	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	2.3	2.6	1.3	1.2	2.0	0.7	1.6	1.0	<0.5	1.2	15	2.1
25/07/2018	BH18 3.1-3.2	22.7	5	180	<1	<50	<1	16	10	96	476	194	15	<5	39	293	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.8	2.0	1.3	0.8	1.8	0.6	1.3	0.7	<0.5	1.0	11	1.7
25/07/2018	BH18 3.5-3.6	18.6	6	130	1	<50	<1	11	18	<5	11	256	19	<5	24	27	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
25/07/2018	BH19 1.0-1.1	20.8	<5	150	<1	<50	<1	4	11	58	56	178	5	<5	70	66	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	<0.5
25/07/2018	BH19 2.1-2.2	17	6	80	1	<50	<1	15	14	10	10	108	19	<5	24	33	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
30/07/2018	BH20 0.5-0.6	14.4	<5	40	<1	<50	<1	9	4	23	18	91	7	<5	33	40	<0.1	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	1.8	2.0	1.0	1.0	1.3	<0.5	1.1	0.5	<0.5	0.7	10	1.4
30/07/2018	BH20 1.0-1.1	19.8	<5	120	<1	<50	<1	13	9	25	114	212	11	<5	34	117	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2	<0.5

Environmental Site Assessment (V9) 52 New Town Road, New Town. June 2025.

Table 47 Soil Analytical Results Compared Against NEPM (2013) Health Investigation Limit Guidelines – BH21-BH40

Bold - Indicates LOR Exceedance in Non Metalic Compounds		EA055: Moisture Content															Total Recoverable Mercury by FIMS	EP075(SIM)B: Polynuclear Aromatic Hydrocarbons																		
NEPM Health Investigation Levels (HIL's) Dust Inhalation and Soil Ingestion Assessment X - Indicates Sample Within Proposed Excavation Zone		Moisture Content	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium Total	Cobalt	Copper	Lead	Manganese	Nickel	Selenium	Vanadium	Zinc	Mercury	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benz[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-cd]pyrene	Dibenz[a,h]anthracene	Benzo[g,h,i]perylene	PAHs	Benzo[a]pyrene TEQ (WHO)
Units		%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR		1	50	1	2	2	5	5	5	2	5	5	2	5	5	5	0.1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
HIL A Low Density Residential	HIL A		100		60	4500	20		100	6000	300	3800	400	200		7400	40																	300	3
HIL B Medium/High Density Residen	HIL B		500		90	40000	150		600	30000	1200	14000	1200	1400		60000	120																	400	4
HIL D Commerial/Industrial	HIL D		3000		500	300000	900		4000	240000	1500	60000	6000	10000		400000	730																	4000	40
Sample date	Sample ID																																		
24/10/2018	BH21 0.5-0.6 X	15.2	<5	50	<1	<50	<1	15	11	172	27	168	16	<5	47	41	<0.1	<0.5	1.5	0.7	0.9	12.8	3.6	26.9	25.2	10.6	10.1	16.3	5.8	14.3	8.6	1.7	11.5	150	20
24/10/2018	BH21 1.5-1.6 X	18.4	<5	70	<1	<50	<1	8	6	11	77	128	7	<5	18	57	<0.1	<0.5	<0.5	<0.5	<0.5	0.5	1.2	1.4	0.6	0.6	0.9	<0.5	0.8	<0.5	<0.5	0.6	6	1
24/10/2018	BH21 2.5-2.6	9.7	<5	50	<1	<50	<1	<2	19	94	11	465	6	<5	69	42	<0.1	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	2.0	2.6	1.5	1.4	2.1	0.7	1.9	0.9	<0.5	1.2	15	2.4
24/10/2018	BH21 3.5-3.6	15.3	<5	40	<1	<50	<1	4	19	78	5	436	12	<5	128	32	0.1	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	0.6	0.9	<0.5	<0.5	0.6	<0.5	0.6	<0.5	<0.5	<0.5	3	0.7
24/10/2018	BH21 4.5-4.6	21.8	<5	70	<1	<50	<1	9	26	82	17	478	15	<5	115	46	<0.1	<0.5	0.9	<0.5	<0.5	0.7	<0.5	5.2	7.0	3.9	3.9	6.0	2.5	6.1	2.8	0.9	3.5	43	8.6
24/10/2018	BH21 5.5-5.6	14.8	<5	60	<1	<50	<1	6	17	70	32	355	10	<5	71	81	<0.1	<0.5	0.8	<0.5	<0.5	2.7	0.9	6.4	7.4	3.7	3.7	5.1	2.1	4.6	2.1	0.7	2.7	43	6.7
24/10/2018	BH22 0.5-0.6 X	10.6	<5	150	<1	<50	<1	12	20	30	90	243	20	<5	44	122	0.2	<0.5	0.7	<0.5	<0.5	3.9	1.0	7.9	8.0	3.4	3.1	4.7	1.8	4.1	2.3	0.8	3.0	45	6
24/10/2018	BH22 1.5-1.6 X	19.9	<5	90	<1	<50	<1	14	24	48	32	256	16	<5	89	48	0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	<0.5
24/10/2018	BH22 2.5-2.6	17.4	<5	90	<1	<50	<1	25	23	58	<5	350	24	<5	119	37	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
24/10/2018	BH22 3.4-3.5	13	<5	80	<1	<50	<1	24	18	57	12	428	25	<5	87	44	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2	<0.5
24/10/2018	BH23 0.5-0.6 X	14.8	6	130	<1	<50	<1	16	12	56	141	298	24	<5	41	116	0.2	<0.5	1.2	0.6	0.9	8.7	2.2	15.0	12.9	5.1	5.0	8.0	2.9	6.7	4.1	1.0	5.4	78	9.8
24/10/2018	BH23 1.5-1.6 X	11.7	<5	150	<1	<50	<1	17	12	41	175	310	22	<5	27	302	0.2	<0.5	<0.5	0.6	0.6	6.0	1.6	7.7	7.5	3.1	2.8	4.4	1.5	3.8	2.1	0.6	2.7	45	5.6
24/10/2018	BH23 2.5-2.6	10.8	<5	100	<1	<50	<1	10	10	39	220	180	11	<5	34	123	0.1	<2.4	9.1	32.2	29.0	295.0	132.0	360.0	334.0	133.0	127.0	186.0	75.2	166.0	81.9	19.3	100.0	2080	235
24/10/2018	BH23 3.5-3.6	26.1	<5	3730	<1	<50	<1	10	21	2410	186	405	13	<5	92	208	0.1	<0.5	0.6	<0.5	<0.5	2.4	0.6	4.8	4.8	1.9	2.0	3.0	1.2	2.5	1.4	<0.5	1.8	27	3.3
24/10/2018	BH23 4.5-4.6	12.8	5	140	1	<50	<1	11	18	18	16	1090	21	<5	22	63	<0.1	<0.5	0.6	<0.5	<0.5	1.4	0.5	3.6	4.2	2.1	2.0	2.4	1.0	2.2	1.0	<0.5	1.2	22	2.9
24/10/2018	BH23 5.5-5.6	14.4	9	80	<1	<50	<1	11	13	39	42	630	16	<5	35	154	0.1	2.6	10.5	2.2	5.3	58.0	20.3	70.6	73.8	34.8	36.4	49.5	17.1	45.2	17.6	6.2	22.3	472	64
24/10/2018	BH24 0.5-0.6 X	8.9	<5	100	<1	<50	<1	12	11	21	70	227	16	<5	28	120	0.1	<0.5	1.0	<0.5	<0.5	6.0	1.6	9.2	9.1	4.2	3.9	5.2	2.2	4.8	2.3	0.8	2.8	53	6.8
24/10/2018	BH24 1.5-1.6 X	10.7	<5	160	<1	<50	<1	19	9	15	31	222	13	<5	47	51	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	<0.5
24/10/2018	BH24 2.5-2.6	12.6	<5	170	<1	<50	<1	24	14	16	22	455	20	<5	56	56	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
24/10/2018	BH24 3.3-3.4	11.8	<5	200	1	<50	<1	17	19	42	212	518	22	<5	29	220	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	1.3	0.6	0.5	0.8	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	5	0.8
24/10/2018	BH25 0.5-0.6 X	15.3	<5	210	<1	<50	<1	8	16	25	49	305	15	<5	33	114	<0.1	<0.5	<0.5	<0.5	<0.5	3.4	0.8	3.1	3.0	0.9	1.0	1.1	0.5	0.9	<0.5	<0.5	0.6	15	1.2
24/10/2018	BH25 1.5-1.6 X	17.2	<5	80	<1	<50	<1	16	25	40	8	142	20	<5	82	33	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
24/10/2018	BH25 2.5-2.6 X	15	<5	160	2	<50	<1	8	57	29	50	165	12	<5	61	38	0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
24/10/2018	BH25 3.5-3.6	12.7	<5	160	<1	<50	<1	12	20	26	138	210	18	<5	22	134	0.4	<0.5	0.6	<0.5	<0.5	2.4	0.7	4.1	4.6	2.2	2.0	2.6	1.2	2.2	1.0	<0.5	1.2	25	2.9
24/10/2018	BH25 4.5-4.6	15.2	<5	170	<1	<50	<1	12	17	43	460	372	19	<5	33	215	0.3	<0.5	2.7	1.0	1.6	14.4	4.1	26.2	27.4	12.9	11.4	16.0	5.5	14.9	5.9	1.2	7.4	153	20
24/10/2018	BH25 5.5-5.6	16.7	<5	20	<1	<50	<1	4	<2	<5	6	28	<2	<5	<5	<5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
29/10/2018	BH26 0.1-0.2	13.3	<5	30	<1	<50	<1	9	4	23	14	56	4	<5	33	30	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
29/10/2018	BH26 0.5-0.6	10.8	16	310	2	<50	<1	18	31	11	17	221	42	<5	30	52	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
29/10/2018	BH27 0.1-0.2	14	<5	80	<1	<50	<1	8	10	46	28	255	6	<5	42	59	<0.1	<0.5	<0.5	<0.5	<0.5	2.2	<0.5	2.5	2.8	1.2	1.1	1.2	<0.5	1.1	<0.5	<0.5	0.6	13	1.4
29/10/2018	BH27 0.5-0.6	19.9	21	100	1	<50	<1	17	16	21	43	194	15	<5	32	80	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
29/10/2018	BH27 1.0-1.1	19.4	<5	120	<1	<50	<1	9	16	38	278	215	18	<5	25	75	0.2	<0.5	<0.5	<0.5	<0.5	1.5	0.6	2.9	3.7	3.0	2.7	5.6	1.9	5.6	3.0	0.8	4.1	35	7.8
29/10/2018	BH27 1.5-1.6	11.6	14	30	2	<50	<1	14	23	6	10	422	34	<5	18	32	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
29/10/2018	BH27 1.9-2.0	9.7	14	40	<1	<50	<1	20	22	7	12	1500	38	<5	26	53	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
29/10/2018	BH28 0.1-0.2	13.9	<5	30	<1	<50	<1	8	<2	<5	6	30	3	<5	21	12	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
29/10/2018	BH28 0.5-0.6	15.6	<5	80	<1	<50	<1	18	16	21	34	314	20	<5	36	72	<0.1	<0.5	<0.5	<0.5	<0.5	1.1	<0.5	2.2	2.3	0.9	0.8	1.3	<0.5	1.2	0.6	<0.5	0.8	11	1.5
29/10/2018	BH28 1.0-1.1	17	<5	30	<1	<50	<1	12	2	<5	12	124	6	<5	28	43	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
29/10/2018	BH28 1.2-1.3	24.9	<5	80	<1	<50	<1	8	11	18	81	190	9	<5	25	456	0.4	<0.5	1.1	<0.5	1.1	8.7	3.4	15.6	17.0	8.0	7.2	7.6	3.0	7.3	3.3	0.9	4.2	88	11
30/10/2018	BH29 0.5-0.6	13.5	<5	100	<1	<50	<1	8	13	43	70	345	14	<5	42	112	<0.1	<0.5	1.1	<0.5	<0.5	5.8	1.4	8.7	9.5	4.1	3.6	5.0	1.6	4.6	2.3	0.8	3.0	51	6.6
30/10/2018	BH29 1.5-1.6	14.2	<5	110	<1	<50	<1	11	9	25	78	249	10	<5	36	86	0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
30/10/2018	BH29 2.1-2.2	15.3	<5	70	<1	<50	<1	10	12	6	10	150	11	<5	22	23	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
30/10/2018	BH30 0.3-0.4	14.3	<5	100	<1	<50	<1	12	12	23	53	316	16	<5	28	100	0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
30/10/2018	BH31 0.5-0.6	16.8	7	70	<1	<50	<1	12	12	9	19	134	13	<5	25	61	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
30/10/2018	BH31 1.5-1.6	10.5	6	100	<1	<50	<1	13	17	7	12	584	28	<5	18	58	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
30/10/2018	BH32 0.5-0.6 X	15.6	<5	90	<1	<50	<1	14	8	13	21	138	13	<5	25	36	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.4	1.7	1.0	1.0	1.2	<0.5	1.1	0.5	<0.5	0.6	9	1.4
30/10/2018	BH33 0.5-0.6 X	16.8	<5	80	<1	<50	<1	9	4	8	15	80	6	<5	21	20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
30/10/2018	BH34 0.5-0.6 X	13.5	<5	180	<1	<50	<1	15	8	6	10	45	10	<5	31	16	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
30/10/2018	BH35 0.5-0.6	11.8	<5	140	<1	<50	<1	12	11	32	152	267	12	<5	40	163	0.2	<0.5	0.5	<0.5	<0.5	2.8	0.8	5.0	5.1	2.3	2.1	3.1	1.0	2.7	1.6	<0.5	2.1	29	3.5
30/10/2018	BH35 1.5-1.6	15	<5	180	<1	<50	<1	11	15	44	82	346	17	<5	37	130	0.2	<0.5	<0.5	<0.5	<0.5	2.3	0.5	3.6	3.6	1.5	1.3	1.9	0.6	1.6	0.9	<0.5	1.2	19	2.1
31/10/2018	BH36 0.5-0.6	22.7	<5	100	<1	<50	<1	17	19	40	10	624	17	<5	68	40	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2018	BH37 0.5-0.6	11.5	13	160	<1	<50	<1	13	12	67	231	295	14	<5	30	367	1	<0.5	1.2	<0.5	<0.5	5.4	1.3	10.1	10.3	5.0	4.4	7.4	2.2	6.8	3.8	1.0	4.9	64	9.7
31/10/2018	BH37 1.5-1.6	11.8	<5	40	<1	<50	<1	14	12	30	42	112	11	<5	48	73	<0.1	0.6	0.9	0.6	1.7	18.6	3.6	20.8	18.7	5.8	5.2	8.3	2.3	7.4	4.2	0.9	5.6	105	11
31/10/2018	BH37 2.5-2.6	14.4	9	240	1	<50	1	25	11	9	53	350	18	<5	61	40	<0.1	<0.5	<0.5	<0.5	0.8	5.4	1.0	6.1	5.6	1.8	1.5	2.2	0.8	2.0	1.1	<0.5	1.4	30	2.6
31/10/2018	BH37 3.5-3.6	15.3	<5	20	<1	<50	<1	15	12	11	18	238	15	<5	29	44	<0.1	<0.5	<0.5	<0.5	0.7	7.4	1.4	8.7	8.0	2.5	2.2	3.3	1.2	3.0	1.7	<0.5	2.2	42	3.9
31/10/2018	BH38 0.5-0.6	18.6	<5	70	<1	<50	<1	14	15	15	57	356	15	<5	30	45	0.2	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	1.9	2.2	1.2	1.1	1.5	<0.5	1.3	0.6	<0.5	0.8	11	1.6
31/10/2018	BH38 1.5-1.6	20.1	<5	170	<1	<50	<1	9	17	14	89	174	13	<5	17	108	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	1.3	0.6	0.6	0.8	<0.5	0.7	<0.5	<0.5	<0.5	5	0.8
31/10/2018	BH38 2.5-2.6	18.2	<5	70	<1	<50	<1	14	11	14	14	165	14	<5	28	40	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2018	BH39 0.5-0.6	17.8	<5	60	<1	<50	<1	13	10	18	42	301	16	<5	24	47	0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2018	BH39 1.5-1.6	17.8	<5	80	<1	<50	<1	15	7	24	36	146	9	<5	38	71	<0.1	<0.5	<0.5	<0.5	<0.5	3.8	0.9	5.6	5.4	2.1	2.0	2.5	1.1	2.2	1.1	<0.5	1.5	28	2.9
31/10/2018	BH39 2.5-2.6	7.4	<5	50	<1	<50	1	8	8	198	359	176	10	<5	39	227	<0.1	1.4	2.5	1.1	2.6	30.2	6.0	43.6	39.0	14.3	13.6	21.2	7.3	19.0	10.8	2.4	14.2	229	27
31/10/2018	BH40 0.5-0.6	5.7	<5	30	<1	<50	<1	6	10	60	12	267	12	<5	44	34	<0.1	4.2	24.2	1.2	3.2	50.7	18.6	179.0	200.0	93.0	83.4	158.0	29.0	76.6	54.7	18.5	63.6	1060	130
31/10/2018	BH40 1.5-1.6	8	<5	50	<1	<50	<1	8	18	70	46	355	14	<5	60	62	<0.1	1.4	8.2	<0.5	1.2	27.4	9.2	59.3	61.1	32.7	28.9	43.9	12.6	37.4	18.9	6.1	22.8	371	55
31/10/2018	BH40 2.5-2.6	10.6	<5	60	<1	<50	<1	9	13	14	15	183	17	<5	12	60	<0.1	<0.5	<0.5	<0.5	<0.5	1.0	<0.5	2.3	2.6	1.4	1.2	1.8	0.8	1.6	0.8	<0.5	1.0	14	2.1
31/10/2018	BH40 3.5-3.6	8.6	<5	40	<1	<50	<1	9	14	51	22	272	14	<5	40	51	<0.1	2.4	14.0	1.7	5.1	66.7	18.9	99.5	94.7	50.7	44.4	68.2	22.0	59.6	29.1	9.6	34.7	621	87

Environmental Site Assessment (V9) 52 New Town Road, New Town. June 2025.

Table 48 Soil Analytical Results Compared Against NEPM (2013) Health Investigation Limit Guidelines – BH41-BH53

Bold - Indicates LOR Exceedance in Non Metalic Compounds		EA055: Moisture Content															Total Recoverable Mercury by FIMS	EP075(SIM)B: Polynuclear Aromatic Hydrocarbons																		
NEPM Health Investigation Levels (HIL's) **Dust Inhalation and Soil Ingestion Assessment** X - Indicates Sample Within Proposed Excavation Zone		Moisture Content	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium Total	Cobalt	Copper	Lead	Manganese	Nickel	Selenium	Vanadium	Zinc	Mercury	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benz(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)anthracene	Benzo(g,h,i)perylene	PAHs	Benzo(a)pyrene TEQ (WHO)
Units		%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR		1	50	1	2	2	5	5	5	2	5	5	2	5	5	5	0.1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
HIL A Low Density Residential	☑ HIL A		100		60	4500	20		100	6000	300	3800	400	200		7400	40																	300	3
HIL B Medium/High Density Resident	☑ HIL B		500		90	40000	150		600	30000	1200	14000	1200	1400		60000	120																	400	4
HIL D Commerial/Industrial	☑ HIL D		3000		500	300000	900		4000	240000	1500	60000	6000	10000		400000	730																	4000	40
Sample date:	Sample ID																																		
5/11/2018	BH41 0.5-0.6 X	14.8	<5	30	<1	<50	<1	6	20	75	9	319	15	<5	43	32	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
5/11/2018	BH42 0.5-0.6 X	9.3	<5	50	<1	<50	<1	7	11	38	17	188	13	<5	34	39	<0.1	<1.1	5.4	<1.1	1.1	16.3	4.9	27.7	32.7	16.0	14.4	21.3	6.5	18.9	8.0	2.4	9.6	**185**	**27**
5/11/2018	BH42 1.5-1.6 X	8.7	<5	30	<1	<50	<1	6	25	45	13	354	18	<5	31	62	<0.1	2.9	19.5	1.3	5.5	65.9	18.5	95.8	109.0	53.4	49.0	75.1	18.7	66.4	27.2	8.2	32.1	**648**	**93**
5/11/2018	BH42 2.5-2.6 X	30.4	<5	120	<1	<50	<1	8	6	30	84	379	12	<5	17	45	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
5/11/2018	BH43 0.5-0.6 X	14.7	<5	90	<1	<50	<1	6	10	35	67	196	7	<5	62	95	0.1	<0.5	0.9	<0.5	<0.5	5.3	1.1	7.1	7.6	3.6	3.2	4.4	1.4	3.8	1.7	<0.5	2.0	**42**	**5**
5/11/2018	BH43 1.5-1.6 X	10.4	<5	110	<1	<50	<1	9	11	21	11	291	13	<5	38	36	<0.1	<0.5	2.4	<0.5	<0.5	8.5	2.5	15.8	18.5	9.6	8.8	14.1	5.3	13.4	6.2	1.6	7.8	**114**	**19**
5/11/2018	BH43 2.5-2.6 X	14.6	<5	90	<1	<50	<1	9	12	21	110	239	12	<5	35	37	<0.1	<0.5	1.0	<0.5	0.7	6.3	1.3	7.4	8.1	3.6	3.2	4.3	1.6	4.1	1.6	<0.5	2.0	**45**	**5.3**
5/11/2018	BH43 3.5-3.6	12.3	<5	50	<1	<50	<1	4	15	78	23	351	10	<5	76	53	<0.1	<0.5	2.2	<0.5	0.7	8.8	2.5	17.4	19.3	10.0	9.2	13.5	4.3	12.0	5.1	1.4	5.9	**112**	**17**
5/11/2018	BH44 0.5-0.6 X	17.7	<5	80	<1	<50	<1	12	10	6	16	62	12	<5	17	41	<0.1	<0.5	<0.5	1.0	0.9	8.1	2.7	12.0	11.1	4.6	4.3	5.9	1.8	5.1	2.3	0.5	2.8	**63**	**7.1**
5/11/2018	BH44 1.5-1.6 X	7.2	<5	40	<1	<50	<1	5	12	68	18	263	11	<5	49	39	<0.1	1.4	7.3	<0.5	1.6	23.3	6.7	38.4	43.4	23.6	21.6	36.4	10.2	33.0	14.8	4.1	18.3	**284**	**46**
5/11/2018	BH44 2.5-2.6 X	13.2	<5	40	<1	<50	<1	5	11	61	29	218	10	<5	48	33	<0.1	0.7	4.2	<0.5	0.8	9.8	3.3	22.8	26.8	14.5	13.4	23.0	7.3	21.6	9.8	2.5	12.1	**173**	**30**
5/11/2018	BH44 3.5-3.6 X	10	<5	50	<1	<50	<1	6	12	52	34	230	10	<5	46	43	<0.1	3.1	14.8	1.5	5.1	80.1	19.3	105.0	107.0	49.6	43.9	66.5	20.9	60.3	25.7	7.0	29.6	**639**	**84**
5/11/2018	BH45 0.5-0.6 X	15	<5	100	<1	<50	<1	11	9	66	83	216	13	<5	32	134	0.2	<0.5	2.5	<0.5	1.0	15.2	4.8	16.9	15.9	6.9	6.0	9.2	3.1	8.2	3.7	0.9	4.3	**99**	**12**
5/11/2018	BH46 0.5-0.6 X	13	7	170	<1	<50	<1	17	13	187	223	294	20	<5	38	221	0.3	<0.5	0.7	<0.5	<0.5	3.8	0.8	7.0	6.9	2.6	2.4	4.2	1.4	3.7	1.9	<0.5	2.4	**38**	**4.8**
5/11/2018	BH47 0.5-0.6 X	13.5	<5	200	<1	<50	<1	9	35	41	179	242	18	<5	34	373	0.5	<0.5	1.2	<0.5	<0.5	3.2	0.9	8.1	8.6	3.8	3.5	6.4	2.3	6.0	3.1	0.7	3.8	**52**	**8.3**
5/11/2018	BH47 1.5-1.6 X	20.1	<5	80	<1	<50	<1	16	16	50	24	540	20	<5	67	77	<0.1	<0.5	1.3	0.8	1.1	12.4	3.4	16.7	17.1	7.1	6.3	9.1	3.5	8.3	4.0	0.9	5.2	**97**	**12**
5/11/2018	BH48 0.5-0.6 X	19.9	<5	140	<1	<50	<1	7	26	95	154	344	17	<5	113	265	0.2	<0.5	1.6	<0.5	<0.5	3.8	1.2	10.0	10.6	5.0	4.6	8.2	3.2	7.7	4.3	0.9	5.5	**67**	**11**
5/11/2018	BH48 1.5-1.6 X	18.2	<5	130	<1	<50	<1	10	9	59	180	232	12	<5	36	254	0.4	<0.5	3.1	<0.5	<0.5	4.8	1.8	13.2	15.0	8.2	7.7	14.7	5.4	14.3	7.4	1.7	9.6	**107**	**20**
5/11/2018	BH49 0.5-0.6 X	19.2	8	60	<1	<50	<1	38	13	39	26	923	23	<5	78	65	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	0.8	<0.5	<0.5	1.1	0.6	1.1	0.7	<0.5	0.9	**6**	**1.3**
5/11/2018	BH49 1.5-1.6 X	20.8	<5	220	1	<50	<1	12	28	11	22	1070	25	<5	20	77	<0.1	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	1.1	1.3	0.7	0.7	1.1	<0.5	0.9	<0.5	<0.5	0.6	**7**	**1.1**
5/11/2018	BH50 0.5-0.6 X	16.6	<5	60	<1	<50	<1	19	23	20	25	591	22	<5	35	67	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
5/11/2018	BH50 1.5-1.6 X	17	5	80	<1	<50	<1	10	13	13	17	350	16	<5	22	47	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
5/11/2018	BH51 0.5-0.6 X	18.4	<5	640	1	<50	<1	12	19	10	31	112	15	<5	24	51	<0.1	<0.5	<0.5	<0.5	<0.5	1.6	<0.5	2.8	2.8	1.0	1.0	1.5	0.5	1.3	0.6	<0.5	0.9	**14**	**1.7**
5/11/2018	BH51 1.5-1.6 X	15.6	<5	100	<1	<50	<1	9	9	20	101	167	11	<5	20	76	0.4	<0.5	1.3	<0.5	<0.5	2.9	1.2	11.5	13.1	7.9	7.9	11.4	3.5	9.4	4.3	1.2	5.3	**81**	13
5/11/2018	BH52 0.5-0.6 X	16.9	6	140	<1	<50	<1	32	12	21	18	868	26	<5	29	61	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
5/11/2018	BH52 1.5-1.6 X	16.4	6	120	<1	<50	<1	15	11	17	18	406	17	<5	29	57	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
5/11/2018	BH53 0.5-0.6 X	20	<5	200	2	<50	<1	16	24	28	25	510	32	<5	28	70	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**2**	<0.5
5/11/2018	BH53 1.5-1.6 X	14.6	<5	30	<1	<50	<1	12	5	16	49	122	7	<5	56	30	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	0.9	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**2**	<0.5

10 INDOOR INHABITANT PVI ASSESSMENT – HSL's

This PVI assessment has been conducted in accordance with relevant CRC CARE Technical Documentation and NEPM ASC 2013 guidelines presented in references section of this report. The HSL assessment approach is generally the first (Tier 1) investigation phase adopted for assessing PVI risk at petroleum hydrocarbon (PHC) impacted sites.

HSL guidelines have been applied for samples collected from the site to account for risks that may be associated with volatile hydrocarbon vapour intrusion into confined spaces where there may be an inhalation risk through longer term exposure. This does not constitute a full vapour risk assessment but provides additional information from which to further quantify any risk.

A detailed investigation (Tier 2 to 3) is recommended over an HSL assessment where an acute risk has been identified at the site (CRC CARE 2013) because of:

- Migrating product on surface soils beneath buildings;
- Strong PHC odours;
- Flammable risk in confined spaces; and/or
- Health complaints from occupants.

Based on the site visits, none of the above conditions have been identified at the site. If the outcome of this Tier 1 assessment reveals HSL exceedances for hydrocarbon vapour intrusion, a more detailed (Tier 2) assessment will be required to further evaluate the human health risk.

PVI risk is initially interpreted through the development of HSL threshold limits from the following classifications:

- The geology and or hydrogeology of the investigation point; and
- Land use sensitivity:

The resulting HSL threshold limits are compared with laboratory analytical results.

10.1 Selected Media for Assessing PVI Risk

Table 49 presents a summary of the preferred HSL approach to assessing PVI risk. In this case, soil PHC concentrations were assessed.

Table 49 Preferred Methods for Determining Site PVI Risk

Media Analysed	Method	Limitations	Order of Preference
Soil Gas	Concentrations of soil gas through a soil vapor probe	This approach provides the most reliable data in interpreting PVI risk, although direct modelling should be applied if concentrations exceed HSL threshold limits.	Primary
Groundwater	Concentrations of PHC in groundwater through deployment of monitoring wells	Determining PVI risk based on groundwater is inherently conservative when interpreting vapour risk to account for not readily discernable preferential pathways. Reference may be drawn to alternative assessment approaches: 1) Application of site-specific conditions to the CRC CARE model for assessing PVI risk 2) Soil gas interpretation for areas where a PVI risk is identified from groundwater analysis.	Secondary
Soil	Concentrations of PHC in soil	Concentrations in soil may be subject variability due to soil moisture, organic content and oxygen ingress which create significant bias in threshold values. Reliance is placed on utilizing groundwater analysis over soil.	Tertiary

10.2 Land Use Class

For surrounding properties, the potential PVI risk is characterized through application of CRC CARE HSL's for each individual properties based on their existing land use (NEPM ASC 2013; Friebel & Nadebaum 2010). The CRC CARE guidelines have been referenced to ensure that the correct land use and density category has been adopted for surrounding land use to ensure health risks are consistent with the HSL models. Aspects considered include the:

- Sensitivity of the existing or potential land use;
- Percentage of paved area for defining potential vapour migration risk;
- Type of basement garage which may influence the confinement of PHC vapors;
- Presence of a slab or cavity for discerning vapour intrusion risk.

If hydrocarbon impacted soil is discerned at the site, consideration is given to downgradient receptors. Where applicable, land use class therefore considers:

- Downgradient receptors where onsite HSL exceedances have been identified in soil; and
- Variations in land use for different parts of the proposed development.

The following land use classes are applied:

- *HSL D for Commercial Land use* in the basement car park and several communal spaces.

where soil is intended for removal, the indoor vapour risk is not present as identified within findings tables with > slab/cut RL.

10.3 Soil Assessment Findings

Laboratory analytical results are presented in Appendix 12. Although all soil results have been included in Table 50 to Table 52, only the residual soil samples (non-excavated soil which is to remain at the site) are relevant and have been assessed against the elected NEPM ASC (2013) health screening levels (HSL) to determine potential hydrocarbon vapour risk to site users.

Specific grain, depth and land use classes are presented Table 50 to Table 52 and are relevant to the assessment. Concentrations which exceeded laboratory LOR are highlighted in bold, and HSL exceedances would be highlighted with a colored cell.

There were no exceedances for assessing indoor vapour intrusion risk.

Table 50 Soil Analytical Results Compared Against HSL D for Indoor Vapour Risk - BH01-BH20

Soil Hydrocarbon HSL's for Assessing Indoor Vapour Intrusion (NEPM 2013) Soil Sample Analysis					EP080: BTEXN					EP080/071: TRH	
Bold - Indicates LOR Exceedances					Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	F1	F2
Colour Shading - Indicates HSL Exceedances: >1 x, * 2-5 x, ** 5-20 x, *** 20-50 x, **** >50 x											
Sample ID	Sample Date	Depth Class	Grain Class	HSL	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
					LOR 0.2	LOR 0.5	LOR 0.5	LOR 0.5	LOR 1	LOR 10	LOR 50
BH01 1.0-1.1	23/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH01 2.5-2.6	23/07/2018	1 - 2	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH01 4.4-4.5	23/07/2018	2 - 4	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH02 1.0-1.1	23/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH02 2.8-2.9	23/07/2018	1 - 2	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH02 4.0-4.1	23/07/2018	2 - 4	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH03 0.5-0.6	23/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH03 2.5-2.6	23/07/2018	0 - 1	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH03 3.9-4.0	23/07/2018	2 - 4	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH04 1.5-1.6	23/07/2018	>SLAB/CUT RL	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH04 3.0-3.1	23/07/2018	1 - 2	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH04 4.5-4.6	23/07/2018	2 - 4	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH05 1.0-1.1	23/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH05 3.0-3.1	23/07/2018	0 - 1	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH05 4.5-4.6	23/07/2018	2 - 4	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH06 0.2-0.3	23/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH07 1.0-1.1	23/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH07 2.2-2.3	23/07/2018	0 - 1	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH01 1.5-1.6	23/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH01 3.5-3.6	23/07/2018	2 - 4	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH02 0.5-0.6	23/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH02 2.0-2.1	23/07/2018	0 - 1	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH03 1.0-1.1	23/07/2018	>SLAB/CUT RL	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH03 3.0-3.1	23/07/2018	1 - 2	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH04 0.5-0.6	23/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH04 2.5-2.6	23/07/2018	0 - 1	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH04 3.5-3.6	23/07/2018	1 - 2	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH05 2.0-2.1	23/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH05 4.0-4.1	23/07/2018	1 - 2	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH08_1.0-1.1	24/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH08_2.0-2.1	24/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH08_2.5-2.6	24/07/2018	0 - 1	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH08_4.5-4.6	24/07/2018	2 - 4	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH09_1.0-1.1	24/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH09_2.5-2.6	24/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH09_4.5-4.6	24/07/2018	1 - 2	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH09_6.0-6.1	24/07/2018	2 - 4	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH10_1.0-1.1	24/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH10_3.0-3.1	24/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH10_5.0-5.1	24/07/2018	0 - 1	SILT	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH11_1.0-1.1	24/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH11_2.0-2.1	24/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH11_2.5-2.6	24/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH11_3.3-3.4	24/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH12_1.0-1.1	24/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH12_2.0-2.1	24/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH12_2.5-2.6	24/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH12_3.5-3.6	24/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH13 1.0-1.1	25/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	**2**	<10	**220**
BH13 1.5-1.6	25/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH13 2.0-2.1	25/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH14 0.4-0.5	25/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	**140**
BH15 0.55-0.65	25/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH16 0.3-0.4	25/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH17 0.5-0.6	25/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	**160**
BH17 1.1-1.2	25/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH18 0.5-0.6	25/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH18 1.5-1.6	25/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH18 2.5-2.6	25/07/2018	0 - 1	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH18 2.7-2.8	25/07/2018	0 - 1	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH18 3.1-3.2	25/07/2018	0 - 1	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH18 3.5-3.6	25/07/2018	1 - 2	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH19 1.0-1.1	25/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH19 2.1-2.2	25/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH20 0.5-0.6	30/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH20 1.0-1.1	30/07/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50

Table 51 Soil Analytical Results Compared Against HSL D for Indoor Vapour Risk – BH21-BH40

Soil Hydrocarbon HSL's for Assessing Indoor Vapour Intrusion (NEPM 2013) Soil Sample Analysis					EP080: BTEXN					EP080/071: TRH	
Bold - Indicates LOR Exceedances					Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	F1	F2
Colour Shading - Indicates HSL Exceedances: >1 x, * 2-5 x, ** 5-20 x, *** 20-50 x, **** >50 x											
Sample ID	Sample Date	Depth Class	Grain Class	HSL	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
					LOR 0.2	LOR 0.5	LOR 0.5	LOR 0.5	LOR 1	LOR 10	LOR 50
BH21 0.5-0.6	24/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH21 1.5-1.6	24/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH21 2.5-2.6	24/10/2018	1 - 2	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH21 3.5-3.6	24/10/2018	2 - 4	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH21 4.5-4.6	24/10/2018	2 - 4	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH21 5.5-5.6	24/10/2018	4+	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH22 0.5-0.6	24/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH22 1.5-1.6	24/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH22 2.5-2.6	24/10/2018	0 - 1	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH22 3.4-3.5	24/10/2018	1 - 2	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH23 0.5-0.6	24/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH23 1.5-1.6	24/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH23 2.5-2.6	24/10/2018	0 - 1	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	**190**
BH23 3.5-3.6	24/10/2018	1 - 2	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH23 4.5-4.6	24/10/2018	2 - 4	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH23 5.5-5.6	24/10/2018	2 - 4	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	**60**
BH24 0.5-0.6	24/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH24 1.5-1.6	24/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH24 2.5-2.6	24/10/2018	0 - 1	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH24 3.3-3.4	24/10/2018	1 - 2	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH25 0.5-0.6	24/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH25 1.5-1.6	24/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH25 2.5-2.6	24/10/2018	0 - 1	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH25 3.5-3.6	24/10/2018	1 - 2	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH25 4.5-4.6	24/10/2018	2 - 4	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH25 5.5-5.6	24/10/2018	2 - 4	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH26 0.1-0.2	29/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH26 0.5-0.6	29/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH27 0.1-0.2	29/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH27 0.5-0.6	29/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH27 1.0-1.1	29/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH27 1.5-1.6	29/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH27 1.9-2.0	29/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH28 0.1-0.2	29/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH28 0.5-0.6	29/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH28 1.0-1.1	29/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH28 1.2-1.3	29/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH29 0.5-0.6	30/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH29 1.5-1.6	30/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH29 2.1-2.2	30/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH30 0.3-0.4	30/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH31 0.5-0.6	30/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH31 1.5-1.6	30/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH32 0.5-0.6	30/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH33 0.5-0.6	30/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH34 0.5-0.6	30/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH35 0.5-0.6	30/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH35 1.5-1.6	30/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH36 0.5-0.6	31/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH37 0.5-0.6	31/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH37 1.5-1.6	31/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	**2**	<10	<50
BH37 2.5-2.6	31/10/2018	0 - 1	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH37 3.5-3.6	31/10/2018	1 - 2	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH38 0.5-0.6	31/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH38 1.5-1.6	31/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH38 2.5-2.6	31/10/2018	0 - 1	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH39 0.5-0.6	31/10/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH39 1.5-1.6	31/10/2018	>SLAB/CUT RL	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH39 2.5-2.6	31/10/2018	>SLAB/CUT RL	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH40 0.5-0.6	31/10/2018	>SLAB/CUT RL	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	**270**
BH40 1.5-1.6	31/10/2018	>SLAB/CUT RL	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	**100**
BH40 2.5-2.6	31/10/2018	>SLAB/CUT RL	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH40 3.5-3.6	31/10/2018	>SLAB/CUT RL	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	**180**

Table 52 Soil Analytical Results Compared Against HSL D for Indoor Vapour Risk – BH41-BH53

Soil Hydrocarbon HSL's for Assessing Indoor Vapour Intrusion (NEPM 2013) Soil Sample Analysis					EP080: BTEXN					EP080/071: TRH	
Bold - Indicates LOR Exceedances					Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	F1	F2
Colour Shading - Indicates HSL Exceedances: >1 x, * 2-5 x, ** 5-20 x, *** 20-50 x, **** >50 x											
Sample ID	Sample Date	Depth Class	Grain Class	HSL	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
					LOR 0.2	LOR 0.5	LOR 0.5	LOR 0.5	LOR 1	LOR 10	LOR 50
BH41 0.5-0.6	5/11/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH42 0.5-0.6	5/11/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH42 1.5-1.6	5/11/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	**60**
BH42 2.5-2.6	5/11/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH43 0.5-0.6	5/11/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH43 1.5-1.6	5/11/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH43 2.5-2.6	5/11/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	**3**	<10	<50
BH43 3.5-3.6	5/11/2018	0 - 1	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH44 0.5-0.6	5/11/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH44 1.5-1.6	5/11/2018	>SLAB/CUT RL	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH44 2.5-2.6	5/11/2018	>SLAB/CUT RL	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH44 3.5-3.6	5/11/2018	0 - 1	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	**60**
BH45 0.5-0.6	5/11/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH46 0.5-0.6	5/11/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH47 0.5-0.6	5/11/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH47 1.5-1.6	5/11/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH48 0.5-0.6	5/11/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH48 1.5-1.6	5/11/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH49 0.5-0.6	5/11/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH49 1.5-1.6	5/11/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH50 0.5-0.6	5/11/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH50 1.5-1.6	5/11/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH51 0.5-0.6	5/11/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH51 1.5-1.6	5/11/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH52 0.5-0.6	5/11/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH52 1.5-1.6	5/11/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH53 0.5-0.6	5/11/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH53 1.5-1.6	5/11/2018	>SLAB/CUT RL	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50

10.4 Groundwater Assessment Findings

10.4.1 LNAPL Classification

Determining the presence of LNAPL at the site is important for understanding petroleum vapour intrusion risk and refining the CSM. The presence of LNAPL is based on CRC CARE (2013 page 8) guidelines for defining LNAPL based on 20% effective solubility of hydrocarbon concentrations in groundwater.

10.4.2 HSL Guidelines

Concentrations of hydrocarbons in groundwater have been assessed against NEPM ASC (2013) HSL's to determine potential risk to nearby habitable buildings because of PVI from the aquifer. Groundwater HSL's are specific to each monitoring well and involves characterisation based on the following variables:

- The HSL's for surrounding properties (already identified);
- The dominant grain class overlying the hydrocarbon impacted groundwater based on Unified Soil Classification System (USCS) and partitioning into either sand, silt or clay; and
- A depth class range is selected in accordance with the depth at which hydrocarbon impacted groundwater was intercepted. The groundwater will fit into one of the following depth classes 2 to 4 m; 4 to 8 m and greater than 8 m. A depth class is not applicable for groundwater shallower than 2 m BGS and in this case, vapour probes are recommended to be installed.

Table 53 summarises land use classification for the site; HSL D for commercial land use has been applied to all analytical results because there is no evidence that contaminated groundwater has migrated off site.

Table 53 Classification Used to Assess Petroleum Vapour Intrusion Risk to Local Receptors from Soil

Property	Monitoring Wells	Land Use Class
The Site	All Monitoring Wells	D

10.4.3 Findings

Groundwater sampling results are presented in Appendix 13. Hydrocarbon concentrations within groundwater have been compared against CRC CARE 2013 Guidelines for Assessing indoor vapour PVI risk at <2m Standing Water Level (SWL) in Table 54 and PVI risk at 2-4m SWL in Table 55, and for the Presence of LNAPL in Table 56. No LNAPL was identified and although there were detections of hydrocarbons there were no guideline exceedances at HSL D land use, and no indoor vapour exposure risk confirmed for the proposed land use.

Table 54 accounts for proposed basement excavations at the site, which will bring the finished floor level to <2m below SWL, in this scenario PVI risk from groundwater cannot be calculated and an alternative assessment such as a soil vapour assessment is recommended.

Table 55 accounts for existing groundwater SWL in MW1 and MW2 and illustrates applicable guidelines for PVI assessment. In this scenario Benzene and TRH F.1 are not of concern, and TRH F.2, which has detections is considered non-limiting as HSLs will exceed solubility limits.

In the scenario of any potential residential land use, the CRC CARE 2013 guideline limit at HSL A for TRH F.2 are 1000µg/L, hence one exceedance is observed in MW1 11/9/18, but not for MW1 on 26/11/18. It should be noted that a potential vapour intrusion risk may be present around MW1 and the existing UPSS, however this potential vapour intrusion risk can be dismissed due to two factors; 1) the propose basement and ground floor land use is considered Commercial (HSL D), with any residential apartments will be separated above the basement or ground floor, and 2) the groundwater contamination is contained to MW1, evidenced by no detections at MW2 or MW3, hence there is no evidence of migration of groundwater contamination off-site where it may have potentially affected neighbouring residential land use human health receptors.

Table 54 Summary of Groundwater Samples That Exceeded Threshold HSL Limits (<2m bgs)

NEPM (ASC) 2013 Schedule B1 Groundwater HSL's for Assessing Vapour Intrusion Risk						Benzene	Toluene	Ethylbenzene	Xylene	Naphthalene	F1	F2
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR						1	2	2	2	5	20	100
Water Sample ID	Date	Groundwater Depth Class (m)	Grain Class	HSL								
MW1	11/9/18	<2	SAND	D	Limit	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
					Result	<1	<2	<2	<2	6	<20	2534
MW1	26/11/18	<2	SAND	D	Limit	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
					Result	<1	<2	<2	<2	<5	20	470
MW2	26/11/18	<2	SAND	D	Limit	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
					Result	<1	<2	<2	<2	<5	<20	<100
MW3	26/11/18	<2	SAND	D	Limit	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
					Result	<1	<2	<2	<2	<5	<20	<100

#N/A - Requires alternative assessment approach ie. soil vapour assessment
NL - No limit applicable as any derived HSL will exceed analyte solubility limit

Table 55 Summary of Groundwater Samples That Exceeded Threshold HSL Limits (2-4m bgs)

NEPM (ASC) 2013 Schedule B1 Groundwater HSL's for Assessing Vapour Intrusion Risk						Benzene	Toluene	Ethylbenzene	Xylene	Naphthalene	F1	F2
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR						1	2	2	2	5	20	100
Water Sample ID	Date	Groundwater Depth Class (m)	Grain Class	HSL								
MW1	11/9/18	2 - 4	SAND	D	Limit	5000	NL	NL	NL	NL	6000	NL
					Result	<1	<2	<2	<2	6	<20	2534
MW1	26/11/18	2 - 4	SAND	D	Limit	5000	NL	NL	NL	NL	6000	NL
					Result	<1	<2	<2	<2	<5	20	470
MW2	26/11/18	2 - 4	SAND	D	Limit	5000	NL	NL	NL	NL	6000	NL
					Result	<1	<2	<2	<2	<5	<20	<100
MW3	26/11/18	2 - 4	SAND	D	Limit	5000	NL	NL	NL	NL	6000	NL
					Result	<1	<2	<2	<2	<5	<20	<100

#N/A - Requires alternative assessment approach ie. soil vapour assessment
NL - No limit applicable as any derived HSL will exceed analyte solubility limit

Table 56 Summary of Groundwater Concentrations Compared Against CRC CARE (Friebel & Nadebaum, 2011) Guidelines for Assessing for the Presence of LNAPL

Investigation Levels		Benzene	Toluene	Ethyl-benzene	Xylene			BTEX	Napthalene	TPH Carbon Chain Fractions		TRH Carbon Chain Fractions							
Indicates >Laboratory LOR					M , P Xylene	O Xylene	Total Xylene			C6 - C14	C10 - C14	C6 - C10	C6 - C16	F1	>C10 - C16	>C16 - C34	>C34 - C40	>C10 - C40	F2
Indicates Likely LNAPL																			
UNITS		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR		1	2	2	2	2	2	1	5	20	50	20	20	20	100	100	100	100	100
Date Collected	**Water Sample**																		
11/09/2018	MW1	<1	<2	<2	<2	<2	<2	<1	6	1400	1400	<20	2540	<20	2540	62300	13200	78000	2530
26/11/2018	MW1	<1	<2	<2	<2	<2	<2	<1	<5	180	150	20	490	20	470	11100	2450	14000	470
26/11/2018	MW2	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	<20	<20	<20	<100	<100	<100	<100	<100
26/11/2018	MW3	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	<20	<20	<20	<100	2730	230	2960	<100

Given the excavation is proposed to be below the groundwater level, NEPM ASC (2013) suggests an alternative method should be adopted to assess the vapour intrusion risk (vapour probes).

Overall vapour intrusion risk is considered low due to:

- The age of the tanks.
- The bedrock, natural soil, and majority of the fill is considered a clay texture class
- The lack of any identifiable BTEX or F1 compounds within soil or groundwater
- The lack of F2 threshold exceedance limits for commercial land use
- The configuration of the Lower Ground Floor including the underground carpark which will be well ventilated plus the wellness facility and the outside garden area for day use only.

11 TRENCH WORKER PVI ASSESSMENT – HSL's

11.1 Classification

The following Health Screening Assessment is based on hydrocarbon vapour intrusion risk to subsurface excavation workers within excavations. This is assessed through analysis of vapors from soil and soil vapours. Groundwater is generally not used to assess risk as threashold limits for all depth and grain classes are non-limiting. Land use classes are not applicable when assessing vapour intrusion into trenches.

Soil and soil vapour HSL's for assessing hydrocarbon risk to maintenance workers are based on CRC CARE Technical Report 10 guidelines (Friebel & Nadebaum 2011) and the following variables:

- Dominant grain size class of material at the soil sample depth or based on the dominant grain class of backfill material based on US Agriculture Soil Classification System (SCS) and partitioning into either sand, silt or clay; and
- Classifying soil according to depth ranges: 0 to 2 m; 2 to 4 m; 4 to 8 m; and greater than 8 m;

11.2 Findings

Laboratory analytical results are presented in Appendix 12. Summary of Soil Analytical Results Compared against HSL's for Assessing PVI Risk to Trench Workers are presented in Table 57 to Table 59. Concentrations that exceeded laboratory LOR are highlighted in bold, and if there were any HSL exceedances they would be highlighted with a colored cell.

Although there were some detections of hydrocarbons there were no exceedances of the CRC CARE HSL guidelines for Assessing PVI Risk to Trench Workers and no risk to trench workers confirmed.

Table 57 Summary of Soil Analytical Results Compared against HSL's for Assessing PVI Risk to Trench Workers – BH01-BH20

CRC CARE Health Screening Level Assessment for PHC Inhalation Risk To Trench Workers From Soil Sample Analysis				EP080: BTEXN					EP080/071: TRH	
Bold - Indicates LOR Exceedances				Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	C6 - C10 Fraction	>C10 - C16 Fraction
Dark Grey Shading - Indicates HSL Exceedances: >1 x, * 2-5 x, ** 5-20 x, *** 20-50 x, **** >50 x				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Sample ID	Sample Date	Depth Class	Grain Class	LOR 0.2	LOR 0.5	LOR 0.5	LOR 0.5	LOR 1	LOR 10	LOR 50
BH01 1.0-1.1	23/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH01 2.5-2.6	23/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH01 4.4-4.5	23/07/2018	2 to 4m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH02 1.0-1.1	23/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH02 2.8-2.9	23/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH02 4.0-4.1	23/07/2018	2 to 4m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH03 0.5-0.6	23/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH03 2.5-2.6	23/07/2018	0 to 2m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH03 3.9-4.0	23/07/2018	2 to 4m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH04 1.5-1.6	23/07/2018	0 to 2m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH04 3.0-3.1	23/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH04 4.5-4.6	23/07/2018	2 to 4m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH05 1.0-1.1	23/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH05 3.0-3.1	23/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH05 4.5-4.6	23/07/2018	2 to 4m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH06 0.2-0.3	23/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH07 1.0-1.1	23/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH07 2.2-2.3	23/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH01 1.5-1.6	23/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH01 3.5-3.6	23/07/2018	2 to 4m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH02 0.5-0.6	23/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH02 2.0-2.1	23/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH03 1.0-1.1	23/07/2018	0 to 2m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH03 3.0-3.1	23/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH04 0.5-0.6	23/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH04 2.5-2.6	23/07/2018	0 to 2m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH04 3.5-3.6	23/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH05 2.0-2.1	23/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH05 4.0-4.1	23/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH08_1.0-1.1	24/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH08_2.0-2.1	24/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH08_2.5-2.6	24/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH08_4.5-4.6	24/07/2018	2 to 4m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH09_1.0-1.1	24/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH09_2.5-2.6	24/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH09_4.5-4.6	24/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH09_6.0-6.1	24/07/2018	2 to 4m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH10_1.0-1.1	24/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH10_3.0-3.1	24/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH10_5.0-5.1	24/07/2018	0 to 2m	SILT	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH11_1.0-1.1	24/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH11_2.0-2.1	24/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH11_2.5-2.6	24/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH11_3.3-3.4	24/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH12_1.0-1.1	24/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH12_2.0-2.1	24/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH12_2.5-2.6	24/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH12_3.5-3.6	24/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH13 1.0-1.1	25/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	**2**	<10	**220**
BH13 1.5-1.6	25/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH13 2.0-2.1	25/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH14 0.4-0.5	25/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	**140**
BH15 0.55-0.65	25/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH16 0.3-0.4	25/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH17 0.5-0.6	25/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	**160**
BH17 1.1-1.2	25/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH18 0.5-0.6	25/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH18 1.5-1.6	25/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH18 2.5-2.6	25/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH18 2.7-2.8	25/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH18 3.1-3.2	25/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH18 3.5-3.6	25/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH19 1.0-1.1	25/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH19 2.1-2.2	25/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH20 0.5-0.6	30/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH20 1.0-1.1	30/07/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50

Table 58 Summary of Soil Analytical Results Compared against HSL's for Assessing PVI Risk to Trench Workers – BH21-BH40

CRC CARE Health Screening Level Assessment for PHC Inhalation Risk To Trench Workers From Soil Sample Analysis				EP080: BTEXN					EP080/071: TRH	
Bold - Indicates LOR Exceedances										
Dark Grey Shading - Indicates HSL Exceedances: >1 x, * 2-5 x, ** 5-20 x, *** 20-50 x, **** >50 x				Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	C6 - C10 Fraction	>C10 - C16 Fraction
Sample ID	Sample Date	Depth Class	Grain Class	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
				LOR 0.2	LOR 0.5	LOR 0.5	LOR 0.5	LOR 1	LOR 10	LOR 50
BH21 0.5-0.6	24/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH21 1.5-1.6	24/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH21 2.5-2.6	24/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH21 3.5-3.6	24/10/2018	2 to 4m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH21 4.5-4.6	24/10/2018	2 to 4m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH21 5.5-5.6	24/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH22 0.5-0.6	24/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH22 1.5-1.6	24/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH22 2.5-2.6	24/10/2018	0 to 2m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH22 3.4-3.5	24/10/2018	0 to 2m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH23 0.5-0.6	24/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH23 1.5-1.6	24/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH23 2.5-2.6	24/10/2018	0 to 2m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	**190**
BH23 3.5-3.6	24/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH23 4.5-4.6	24/10/2018	2 to 4m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH23 5.5-5.6	24/10/2018	2 to 4m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	**60**
BH24 0.5-0.6	24/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH24 1.5-1.6	24/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH24 2.5-2.6	24/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH24 3.3-3.4	24/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH25 0.5-0.6	24/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH25 1.5-1.6	24/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH25 2.5-2.6	24/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH25 3.5-3.6	24/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH25 4.5-4.6	24/10/2018	2 to 4m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH25 5.5-5.6	24/10/2018	2 to 4m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH26 0.1-0.2	29/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH26 0.5-0.6	29/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH27 0.1-0.2	29/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH27 0.5-0.6	29/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH27 1.0-1.1	29/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH27 1.5-1.6	29/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH27 1.9-2.0	29/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH28 0.1-0.2	29/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH28 0.5-0.6	29/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH28 1.0-1.1	29/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH28 1.2-1.3	29/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH29 0.5-0.6	30/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH29 1.5-1.6	30/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH29 2.1-2.2	30/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH30 0.3-0.4	30/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH31 0.5-0.6	30/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH31 1.5-1.6	30/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH32 0.5-0.6	30/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH33 0.5-0.6	30/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH34 0.5-0.6	30/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH35 0.5-0.6	30/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH35 1.5-1.6	30/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH36 0.5-0.6	31/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH37 0.5-0.6	31/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH37 1.5-1.6	31/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	**2**	<10	<50
BH37 2.5-2.6	31/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH37 3.5-3.6	31/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH38 0.5-0.6	31/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH38 1.5-1.6	31/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH38 2.5-2.6	31/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH39 0.5-0.6	31/10/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH39 1.5-1.6	31/10/2018	0 to 2m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH39 2.5-2.6	31/10/2018	0 to 2m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH40 0.5-0.6	31/10/2018	0 to 2m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	**270**
BH40 1.5-1.6	31/10/2018	0 to 2m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	**100**
BH40 2.5-2.6	31/10/2018	0 to 2m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH40 3.5-3.6	31/10/2018	0 to 2m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	**180**

Table 59 Summary of Soil Analytical Results Compared against HSL's for Assessing PVI Risk to Trench Workers – BH41-BH53

CRC CARE Health Screening Level Assessment for PHC Inhalation Risk To Trench Workers From Soil Sample Analysis				EP080: BTEXN					EP080/071: TRH	
Bold - Indicates LOR Exceedances										
Dark Grey Shading - Indicates HSL Exceedances: >1 x, * 2-5 x, ** 5-20 x, *** 20-50 x, **** >50 x				Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	C6 - C10 Fraction	>C10 - C16 Fraction
Sample ID	Sample Date	Depth Class	Grain Class	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
				LOR 0.2	LOR 0.5	LOR 0.5	LOR 0.5	LOR 1	LOR 10	LOR 50
BH41 0.5-0.6	5/11/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH42 0.5-0.6	5/11/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH42 1.5-1.6	5/11/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	**60**
BH42 2.5-2.6	5/11/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH43 0.5-0.6	5/11/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH43 1.5-1.6	5/11/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH43 2.5-2.6	5/11/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	**3**	<10	<50
BH43 3.5-3.6	5/11/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH44 0.5-0.6	5/11/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH44 1.5-1.6	5/11/2018	0 to 2m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH44 2.5-2.6	5/11/2018	0 to 2m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH44 3.5-3.6	5/11/2018	0 to 2m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	**60**
BH45 0.5-0.6	5/11/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH46 0.5-0.6	5/11/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH47 0.5-0.6	5/11/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH47 1.5-1.6	5/11/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH48 0.5-0.6	5/11/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH48 1.5-1.6	5/11/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH49 0.5-0.6	5/11/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH49 1.5-1.6	5/11/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH50 0.5-0.6	5/11/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH50 1.5-1.6	5/11/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH51 0.5-0.6	5/11/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH51 1.5-1.6	5/11/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH52 0.5-0.6	5/11/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH52 1.5-1.6	5/11/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH53 0.5-0.6	5/11/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH53 1.5-1.6	5/11/2018	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50

12 SOIL DISPOSAL ASSESSSMENT

12.1 Guidelines

Soil which is excavated from the site for landfill disposal is to be assessed against Information Bulletin 105 (IB105) for Classification and Management of Contaminated Soil for Disposal. The Environmental Protection Authority (EPA) uses 4 categories to classify contaminated soil as per Table 60:

- (Level 1) Fill Material;
- (Level 2) Low Level Contaminated Soil;
- (Level 3) Contaminated Soil; and
- (Level 4) Contaminated Soil.

Fixed numerical values are presented for soil concentrations and leachable fraction concentrations.

Table 60 Summary of IB105 Classification Guidelines

	Classification (with reference to Table 2)	Controlled Waste[1]	Comments
Fill Material[2] (Level 1)	Soil that exhibits levels of contaminants below the limits defined under *Fill Material* in Table 2.	Unlikely	Soil classified as *Fill Material* can still be a 'pollutant' under the *Environmental Management and Pollution Control Act 1994* and needs to be responsibly managed.
Low Level Contaminated Soil (Level 2)	Soil that exhibits levels of contaminants above the limits defined under *Fill Material* but below the limits defined under *Low Level Contaminated Soil* in Table 2.	Likely	Where leachable concentrations have not been prescribed, maximum total concentrations will be used to classify the soil.
Contaminated Soil (Level 3)	Soil that exhibits levels of contaminants above the limits defined under *Low Level Contaminated Soil* but below the limits defined under *Contaminated Soil* in Table 2.	Yes	Where leachable concentrations have not been prescribed, maximum total concentrations will be used to classify the soil.
Contaminated Soil for Remediation (Level 4)	Soil that exhibits levels of contaminants above the limits defined under *Contaminated Soil* in Table 2 (regardless of the maximum total concentrations) is generally ***not*** considered acceptable for off-site disposal without prior treatment.	Yes	Soil that contains contaminants that do not have criteria for leachable concentrations (*e.g.* petroleum hydrocarbons), and the levels of contaminants exceed the maximum total concentrations listed in *Contaminated Soil*, are generally classified as *Contaminated Soil for Remediation*.

[1] Controlled Waste is defined in the *Environmental Management and Pollution Control Act 1994*.
[2] Criteria for *Fill Material* are the limits set by the Director for the purposes of R.9(2)(a)(ii) in the *Regulations*.

12.2 Findings

The soil samples were compared against IB105 guidelines for soil disposal, see Table 61, Table 62 and Table 64 for the solid waste classification. See Table 63 and Table 65 for the leachate data results. Material tested at the site is classified in a range from Level 1 to Level 4 Material with an overall average of Level 2 or below. To accurately manage the excavated material for appropriate disposal, grid soil sampling was conducted. The construction company undertaking the development should be provided with these results, as this will assist with soil management on site.

Table 61 Soil Analytical Results Compared Against IB105 Total Solids Investigation Limits for soil Disposal – BH01-BH20

Information Bulletin 105 Classification and Management of Contaminated Soil For Disposal		Arsenic	Barium	Beryllium	Cadmium	Chromium Total	Copper	Cobalt	Lead	Manganese	Mercury	Nickel	Selenium	Zinc	Benzo(a)pyrene	C6 - C9 Fraction	C10 - C36 Fraction (sum)	Sum of polycyclic aromatic hydrocarbons	Benzene	Toluene	Ethylbenzene	Total Xylenes
Unit		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR		50	1	2	5	5	2	5	5	5	0.1	2	5	5	0.5	10	50	0.5	0.2	0.5	0.5	0.5
Investigation Level Selected																						
IB105 Level 1		<20	<300	<2	<3	<50	<100	<100	<300	<500	<1	<60	<10	<200	<0.08	<65	<1000	<20	<1	<1	<3	<14
IB105 Level 2		20	300	2	3	50	100	100	300	500	1	60	10	200	0.08	65	1000	20	1	1	3	14
IB105 Level 3		200	3000	40	40	500	2000	200	1200	5000	30	600	50	14000	2	650	5000	40	5	100	100	180
IB105 Level 4		750	30000	400	400	5000	7500	1000	3000	25000	110	3000	200	50000	20	1000	10000	200	50	1000	1080	1800
23/07/2018	BH01 1.0-1.1 X	<5	50	<1	<1	8	8	5	35	82	<0.1	7	<5	45	0.6	<10	<50	6.7	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH01 2.5-2.6	<5	30	<1	<1	10	15	5	25	25	<0.1	8	<5	1100	5.1	<10	420	77.8	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH01 4.4-4.5	6	50	<1	<1	6	54	11	52	846	1	12	<5	66	17.4	<10	1170	152	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH02 1.0-1.1 X	<5	440	<1	<1	10	46	13	162	236	0.4	13	<5	132	0.6	<10	<50	6.8	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH02 2.8-2.9	<5	730	1	<1	16	12	13	56	63	<0.1	12	<5	71	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH02 4.0-4.1	<5	220	1	<1	22	54	26	7	99	<0.1	22	<5	35	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH03 0.5-0.6 X	5	140	<1	<1	13	24	14	502	378	0.1	16	<5	118	1.4	<10	<50	17	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH03 2.5-2.6	<5	260	<1	<1	3	28	10	12	105	<0.1	7	<5	40	7.8	<10	540	83.7	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH03 3.9-4.0	<5	70	<1	<1	12	25	11	14	261	<0.1	16	<5	44	8.9	<10	780	119	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH04 1.5-1.6 X	<5	130	<1	<1	14	35	10	128	301	0.2	14	<5	113	25.6	<10	1360	306	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH04 3.0-3.1	<5	170	<1	<1	14	35	11	217	224	0.1	14	<5	127	1.7	<10	<50	20.7	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH04 4.5-4.6	<5	180	<1	<1	12	28	14	136	1040	0.1	27	<5	184	1.5	<10	<50	16.1	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH05 1.0-1.1 X	<5	60	<1	<1	8	7	7	21	78	<0.1	11	<5	244	<0.5	<10	<50	3.1	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH05 3.0-3.1	<5	120	<1	2	15	44	21	94	179	0.1	22	<5	322	1.9	<10	<50	22	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH05 4.5-4.6	<5	100	<1	<1	8	32	17	122	199	0.2	14	<5	102	3.9	<10	110	58.2	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH06 0.2-0.3 X	<5	150	<1	<1	10	30	10	174	253	0.4	12	<5	168	1.7	<10	<50	22.4	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH07 1.0-1.1 X	<5	230	<1	<1	11	20	11	80	173	0.1	13	<5	161	<0.5	<10	<50	3.2	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH07 2.2-2.3 X	<5	260	<1	<1	8	17	9	120	309	0.4	7	<5	70	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH01 1.5-1.6 X	5	40	<1	<1	15	8	9	28	223	<0.1	12	<5	64	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH01 3.5-3.6	<5	20	<1	<1	8	29	14	23	277	<0.1	12	<5	60	12.7	<10	820	131	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH02 0.5-0.6 X	5	1880	<1	<1	24	37	10	349	297	1.2	12	<5	221	1.8	<10	<50	15.8	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH02 2.0-2.1 X	<5	340	1	<1	12	11	16	82	125	0.2	13	<5	62	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH03 1.0-1.1 X	6	140	<1	<1	19	44	16	93	308	0.1	17	<5	176	0.9	<10	<50	8.6	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH03 3.0-3.1	<5	80	<1	<1	5	52	10	218	263	<0.1	9	<5	573	17.5	<10	1230	205	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH04 0.5-0.6	<5	110	<1	<1	14	35	18	56	276	0.1	17	<5	236	4.7	<10	310	60.5	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH04 2.5-2.6	<5	320	<1	<1	12	25	24	37	576	<0.1	50	<5	74	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH04 3.5-3.6	<5	140	<1	<1	10	26	17	76	441	<0.1	23	<5	130	1	<10	<50	9	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH05 2.0-2.1	<5	140	<1	<1	12	36	19	120	206	0.3	14	<5	111	4.3	<10	270	57.2	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH05 4.0-4.1	<5	150	<1	<1	9	40	12	221	269	0.3	13	<5	280	4.9	<10	490	54.7	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH08_1.0-1.1	<5	50	<1	<1	6	40	8	25	211	<0.1	9	<5	42	25.5	<10	2080	301	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH08_2.0-2.1	<5	60	<1	<1	10	18	6	7	69	<0.1	7	<5	12	1.5	<10	<50	13.8	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH08_2.5-2.6	<5	80	<1	<1	13	30	13	29	210	<0.1	12	<5	20	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH08_4.5-4.6	5	90	<1	<1	11	<5	39	13	171	<0.1	14	<5	31	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH09_1.0-1.1	<5	50	<1	<1	7	33	8	16	257	<0.1	10	<5	40	16.6	<10	1610	161	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH09_2.5-2.6	<5	50	<1	<1	7	20	7	24	377	<0.1	10	<5	30	1	<10	<50	10.5	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH09_4.5-4.6	<5	40	<1	<1	4	31	7	15	92	<0.1	5	<5	23	22.8	<10	1470	268	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH09_6.0-6.1	6	120	<1	<1	13	29	11	289	120	0.7	15	<5	170	0.7	<10	<50	8.5	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH10_1.0-1.1	<5	140	<1	<1	<2	56	30	37	408	<0.1	13	<5	47	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH10_3.0-3.1	<5	140	<1	<1	9	90	9	114	462	0.6	11	<5	123	1	<10	<50	8.8	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH10_5.0-5.1	<5	70	<1	<1	8	7	16	14	325	<0.1	12	<5	34	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH11_1.0-1.1	7	120	<1	<1	8	55	12	60	202	0.1	11	<5	105	4	<10	560	42.2	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH11_2.0-2.1	<5	100	2	<1	8	17	27	14	294	<0.1	20	<5	61	5.5	<10	520	62	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH11_2.5-2.6	<5	180	<1	<1	11	84	7	256	310	0.8	10	<5	321	1.9	<10	<50	16.5	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH11_3.3-3.4 X	13	160	2	<1	17	7	42	15	1630	<0.1	47	<5	44	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH12_1.0-1.1 X	<5	110	<1	<1	9	26	9	49	116	<0.1	9	<5	125	1.2	<10	<50	14.7	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH12_2.0-2.1 X	<5	100	<1	<1	11	24	12	24	448	<0.1	13	<5	50	<0.5	<10	<50	3.5	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH12_2.5-2.6	<5	120	<1	<1	3	77	43	9	281	<0.1	7	<5	32	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH12_3.5-3.6	<5	90	<1	<1	7	33	8	72	236	0.5	9	<5	50	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH13 1.0-1.1	5	80	<1	<1	11	51	10	779	296	0.4	11	<5	44	29.8	<10	3260	496	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH13 1.5-1.6	<5	90	<1	<1	8	44	10	128	252	0.2	12	<5	41	0.8	<10	<50	9.2	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH13 2.0-2.1	11	100	1	<1	22	9	16	30	552	<0.1	13	<5	33	0.8	<10	<50	10.3	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH14 0.4-0.5	5	100	<1	<1	8	10	11	16	1030	<0.1	11	<5	32	<0.5	<10	3220	0.5	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH15 0.55-0.65	6	20	1	<1	14	17	28	14	830	<0.1	42	<5	82	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH16 0.3-0.4	<5	20	<1	<1	7	69	11	7	381	<0.1	10	<5	42	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH17 0.5-0.6	<5	100	<1	<1	12	40	9	62	167	<0.1	14	<5	107	89.1	<10	4870	1290	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH17 1.1-1.2	12	1620	1	<1	12	9	18	17	111	<0.1	33	<5	57	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH18 0.5-0.6	<5	120	<1	<1	14	22	13	46	239	<0.1	14	<5	72	0.5	<10	<50	3.6	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH18 1.5-1.6	5	170	<1	<1	15	35	18	123	242	0.4	22	<5	242	3.4	<10	460	34.4	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH18 2.5-2.6	<5	80	<1	<1	34	60	29	7	517	<0.1	28	<5	103	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH18 2.7-2.8	<5	310	<1	<1	17	136	12	1160	199	4.5	23	<5	593	1.6	<10	210	14.8	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH18 3.1-3.2	5	180	<1	<1	16	96	10	479	194	1.5	15	<5	293	1.3	<10	<50	11.1	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH18 3.5-3.6	6	130	1	<1	11	<5	18	11	256	<0.1	19	<5	27	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH19 1.0-1.1	<5	150	<1	<1	4	58	11	56	179	<0.1	5	<5	66	<0.5	<10	<50	1.3	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH19 2.1-2.2	6	80	1	<1	15	10	14	10	109	<0.1	19	<5	33	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
30/07/2018	BH20 0.5-0.6	<5	40	<1	<1	9	23	4	18	91	<0.1	7	<5	40	1.1	<10	<50	10.2	<0.2	<0.5	<0.5	<0.5
30/07/2018	BH20 1.0-1.1	<5	120	<1	<1	13	25	9	114	212	0.5	11	<5	117	<0.5	<10	<50	1.6	<0.2	<0.5	<0.5	<0.5

Note no Leachate testing.
It is likely that if testing had been conducted the metals would come down to Level 1. And Benzo(a)pyrene would come down to Level 2.
Level 1 is not achievable for Benzo(a)pyrene as no test exist to meet the conservative guideline.
C^{10}-C^{36} Total Recoverable Hydrocarbon results will not change with leachate testing either.

Table 62 Soil Analytical Results Compared Against IB105 Total Solids Investigation Limits for soil Disposal – BH21-BH40 plus GT01-GT03

Information Bulletin 105 Classification and Management of Contaminated Soil For Disposal		Arsenic	Barium	Beryllium	Cadmium	Chromium Total	Copper	Cobalt	Lead	Manganese	Mercury	Nickel	Selenium	Zinc	Benzo[a]pyrene	C6 - C9 Fraction	C10 - C36 Fraction (sum)	Sum of polycyclic aromatic hydrocarbons	Benzene	Toluene	Ethylbenzene	Total Xylenes
Unit		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR		50	1	2	5	5	2	5	5	5	0.1	2	5	5	0.5	10	50	0.5	0.2	0.5	0.5	0.5
Investigation Level Selected																						
IB105 Level 1		<20	<300	<2	<3	<50	<100	<100	<300	<500	<1	<60	<10	<200	<0.08	<65	<1000	<20	<1	<1	<3	<14
IB105 Level 2		20	300	2	3	50	100	100	300	500	1	60	10	200	0.08	65	1000	20	1	1	3	14
IB105 Level 3		200	3000	40	40	500	2000	200	1200	5000	30	600	50	14000	2	650	5000	40	5	100	100	180
IB105 Level 4		750	30000	400	400	5000	7500	1000	3000	25000	110	3000	200	50000	20	1000	10000	200	50	1000	1080	1800
24/10/2018	BH21 0.5-0.6 X	<5	50	<1	<1	15	172	11	27	168	<0.1	16	<5	41	14.3	<10	880	150	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH21 1.5-1.6 X	<5	70	<1	<1	8	11	6	77	128	<0.1	7	<5	57	0.8	<10	190	6.1	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH21 2.5-2.6	<5	50	<1	<1	<2	94	19	11	465	<0.1	6	<5	42	1.9	<10	<50	14.9	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH21 3.5-3.6	<5	40	<1	<1	4	78	19	5	436	0.1	12	<5	32	0.6	<10	<50	2.7	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH21 4.5-4.6	<5	70	<1	<1	9	82	26	17	478	<0.1	15	<5	46	6.1	<10	<50	43.4	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH21 5.5-5.6	<5	60	<1	<1	6	70	17	32	355	<0.1	10	<5	81	4.6	<10	<50	42.9	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH22 0.5-0.6 X	<5	150	<1	<1	12	30	20	90	243	0.2	20	<5	122	4.1	<10	120	44.5	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH22 1.5-1.6 X	<5	90	<1	<1	14	48	24	32	256	0.2	16	<5	48	<0.5	<10	<50	0.5	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH22 2.5-2.6	<5	90	<1	<1	25	58	23	<5	358	<0.1	24	<5	37	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH22 3.4-3.5	<5	80	<1	<1	24	57	18	12	428	<0.1	25	<5	44	<0.5	<10	<50	1.9	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH23 0.5-0.6 X	6	130	<1	<1	16	56	12	141	298	0.2	24	<5	116	6.7	<10	630	77.7	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH23 1.5-1.6 X	<5	150	<1	<1	17	41	12	175	310	0.2	22	<5	302	3.8	<10	<50	45	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH23 2.5-2.6	<5	100	<1	<1	10	39	10	220	180	0.1	11	<5	123	166	<10	5790	2080	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH23 3.5-3.6	<5	3730	<1	<1	10	2410	21	186	405	0.1	13	<5	208	2.5	<10	530	27	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH23 4.5-4.6	5	140	1	<1	11	18	18	16	1090	<0.1	21	<5	63	2.2	<10	<50	22.2	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH23 5.5-5.6	9	80	<1	<1	11	39	13	42	630	0.1	16	<5	134	45.2	<10	2510	472	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH24 0.5-0.6 X	<5	100	<1	<1	12	21	11	70	227	0.1	16	<5	120	4.8	<10	260	52.9	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH24 1.5-1.6 X	<5	160	<1	<1	19	15	9	31	222	<0.1	13	<5	51	<0.5	<10	<50	0.6	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH24 2.5-2.6	<5	170	<1	<1	24	16	14	22	455	<0.1	20	<5	56	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH24 3.3-3.4	<5	200	1	<1	17	42	19	212	518	0.6	22	<5	220	0.7	<10	<50	5.1	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH25 0.5-0.6 X	<5	210	<1	<1	8	25	16	49	305	<0.1	15	<5	114	0.9	<10	<50	15.3	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH25 1.5-1.6 X	<5	80	<1	<1	16	40	25	8	142	<0.1	20	<5	33	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH25 2.5-2.6 X	<5	160	2	<1	8	29	57	50	165	0.1	12	<5	38	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH25 3.5-3.6	<5	160	<1	<1	12	26	20	138	210	0.4	18	<5	134	2.2	<10	280	24.8	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH25 4.5-4.6	<5	170	<1	<1	12	43	17	460	372	0.3	19	<5	215	14.9	<10	770	153	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH25 5.5-5.6	<5	20	<1	<1	4	<5	<2	6	28	<0.1	<2	<5	<5	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
29/10/2018	BH26 0.1-0.2	<5	30	<1	<1	6	23	4	14	56	<0.1	4	<5	30	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
29/10/2018	BH26 0.5-0.6	16	310	2	<1	16	11	31	17	221	<0.1	42	<5	52	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
29/10/2018	BH27 0.1-0.2	<5	90	<1	<1	6	46	10	28	255	<0.1	6	<5	59	1.1	<10	<50	12.7	<0.2	<0.5	<0.5	<0.5
29/10/2018	BH27 0.5-0.6	21	100	1	<1	17	21	16	43	194	<0.1	15	<5	80	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
29/10/2018	BH27 1.0-1.1	<5	120	<1	<1	9	38	16	278	215	0.2	18	<5	75	5.6	<10	320	35.4	<0.2	<0.5	<0.5	<0.5
29/10/2018	BH27 1.5-1.6	14	30	2	<1	14	6	23	10	422	<0.1	34	<5	32	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
29/10/2018	BH27 1.9-2.0	14	40	<1	<1	20	7	22	12	1500	<0.1	38	<5	53	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
29/10/2018	BH28 0.1-0.2	<5	30	<1	<1	8	<5	<2	6	30	<0.1	3	<5	12	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
29/10/2018	BH28 0.5-0.6	<5	80	<1	<1	18	21	16	34	314	<0.1	20	<5	72	1.2	<10	<50	11.2	<0.2	<0.5	<0.5	<0.5
29/10/2018	BH28 1.0-1.1	<5	30	<1	<1	12	<5	2	12	124	<0.1	6	<5	43	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
29/10/2018	BH28 1.2-1.3	<5	80	<1	<1	8	18	11	81	190	0.4	9	<5	456	7.3	<10	550	88.4	<0.2	<0.5	<0.5	<0.5
30/10/2018	BH29 0.5-0.6	<5	100	<1	<1	8	43	13	70	345	<0.1	14	<5	112	4.6	<10	440	51.3	<0.2	<0.5	<0.5	<0.5
30/10/2018	BH29 1.5-1.6	<5	110	<1	<1	11	25	9	78	249	0.3	10	<5	86	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
30/10/2018	BH29 2.1-2.2	<5	70	<1	<1	10	6	12	10	150	<0.1	11	<5	23	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
30/10/2018	BH30 0.3-0.4	<5	100	<1	<1	12	23	12	53	316	0.1	16	<5	100	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
30/10/2018	BH31 0.5-0.6	7	70	<1	<1	12	9	12	19	134	<0.1	13	<5	61	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
30/10/2018	BH31 1.5-1.6	6	100	<1	<1	13	7	17	12	584	<0.1	28	<5	58	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
30/10/2018	BH32 0.5-0.6 X	<5	90	<1	<1	14	13	6	21	136	<0.1	13	<5	36	1.1	<10	<50	8.5	<0.2	<0.5	<0.5	<0.5
30/10/2018	BH33 0.5-0.6 X	<5	80	<1	<1	9	6	4	15	80	<0.1	6	<5	20	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
30/10/2018	BH34 0.5-0.6 X	<5	380	<1	<1	15	6	8	10	45	<0.1	10	<5	16	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
30/10/2018	BH35 0.5-0.6	<5	140	<1	<1	12	32	11	152	267	0.2	12	<5	163	2.7	<10	270	29.1	<0.2	<0.5	<0.5	<0.5
30/10/2018	BH35 1.5-1.6	<5	180	<1	<1	11	44	15	82	346	0.2	17	<5	130	1.6	<10	<50	19	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH36 0.5-0.6	<5	100	<1	<1	17	40	19	10	624	<0.1	17	<5	40	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH37 0.5-0.6	13	160	<1	<1	13	67	12	231	295	1	14	<5	367	6.8	<10	470	63.8	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH37 1.5-1.6	<5	40	<1	<1	14	30	12	42	112	<0.1	11	<5	73	7.4	<10	430	105	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH37 2.5-2.6	9	240	1	1	25	9	11	53	350	<0.1	16	<5	40	2	<10	110	29.5	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH37 3.5-3.6	<5	20	<1	<1	15	11	12	18	238	<0.1	15	<5	44	3	<10	120	42.3	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH38 0.5-0.6	<5	70	<1	<1	14	13	15	57	356	0.2	13	<5	45	1.3	<10	<50	11.3	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH38 1.5-1.6	<5	170	<1	<1	9	14	17	89	174	<0.1	13	<5	108	0.7	<10	<50	5.2	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH38 2.5-2.6	<5	70	<1	<1	14	14	11	14	165	<0.1	14	<5	40	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH39 0.5-0.6	<5	60	<1	<1	13	18	10	42	301	0.1	16	<5	47	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH39 1.5-1.6	<5	80	<1	<1	15	24	7	36	146	<0.1	9	<5	71	2.2	<10	<50	28.2	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH39 2.5-2.6	<5	50	<1	1	8	198	8	359	176	<0.1	10	<5	227	19	<10	1120	229	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH40 0.5-0.6	<5	30	<1	<1	6	60	10	12	267	<0.1	12	<5	34	76.6	<10	7370	1060	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH40 1.5-1.6	<5	50	<1	<1	6	70	18	46	353	<0.1	14	<5	62	37.4	<10	2470	371	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH40 2.5-2.6	<5	60	<1	<1	9	14	13	15	183	<0.1	17	<5	60	1.6	<10	<50	14.3	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH40 3.5-3.6	<5	40	<1	<1	9	51	14	22	272	<0.1	14	<5	51	59.6	<10	4280	621	<0.2	<0.5	<0.5	<0.5
17/10/2018	GT01	----	----	----	----	----	----	----	----	----	----	----	----	----	6.7	----	----	101	----	----	----	----
17/10/2018	GT02	----	----	----	----	----	----	----	----	----	----	----	----	----	1	----	----	12.5	----	----	----	----
17/10/2018	GT03	----	----	----	----	----	----	----	----	----	----	----	----	----	9.1	----	----	136	----	----	----	----
Averaging		<50	154	<2	<5	10	66	15	65	285	0.1	14	<5	85	8.5	<10	500	100	<0.2	<0.5	<0.5	<0.5

Table 63 Soil Analytical Results Compared Against IB105 Leachate Investigation Limits for soil Disposal – BH21-BH40, plus GT01-GT03

Information Bulletin 105 Classification and Management of Contaminated Soil For Disposal Leachable Fraction *Italic/** - Based On Soil (Total) Limit **Bold** - Based On Leach Limit		Arsenic	Barium	Beryllium	Cadmium	Chromium Total	Hexavalent Chromium	Copper	Cobalt	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Tin	Zinc	Aldrin + Dieldrin	DDT + DDD + DDE	Benzo(a)pyrene	Phenol	C6 - C9 Fraction	C10 - C36 Fraction (sum)	Benzo(a)pyrene (TEQ)
Unit		mg/L	mg/L	mg/L	mg/L	mg/L		mg/L		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		mg/L	µg/L	µg/L	µg/L	µg/L			µg/L
LOR		0.1	0.1	0.05	0.05	0.1		0.1		0.1	0.1	0.001	0.1	0.1	0.1	0.1		0.1	0.5	0.5	0.5	1			0.5
Investigation Level Selected																									
IB105 Level 1																									
IB105 Level 2		<0.5	<35	<1	<0.1	<0.5		<10		<0.5	<25	<0.01	<2.5	<1	<0.1	<0.5		<25	<3	<200	<0.5	<14000			<0.5
IB105 Level 3		0.5	35	1	0.1	0.5		10		0.5	25	0.01	2.5	1	0.1	0.5		25	3	200	0.5	14000			0.5
IB105 Level 4		5	350	4	0.5	5		100		5	250	0.1	20	8	1	5		250	30	2000	5	50000			
24/10/2018	BH21 0.5-0.6 X							*													**<0.5**				**<0.5**
24/10/2018	BH21 1.5-1.6 X																				*				
24/10/2018	BH21 2.5-2.6																				*				
24/10/2018	BH21 3.5-3.6																				*				
24/10/2018	BH21 4.5-4.6																				**<0.5**				**<0.5**
24/10/2018	BH21 5.5-5.6																				**<0.5**				**<0.5**
24/10/2018	BH22 0.5-0.6 X																				**<0.5**				**<0.5**
24/10/2018	BH22 1.5-1.6 X																								
24/10/2018	BH22 2.5-2.6																								
24/10/2018	BH22 3.4-3.5																								
24/10/2018	BH23 0.5-0.6 X																				**<0.5**				**<0.5**
24/10/2018	BH23 1.5-1.6 X																	*			**<0.5**				**<0.5**
24/10/2018	BH23 2.5-2.6																				**<0.5**			*	**<0.5**
24/10/2018	BH23 3.5-3.6		*					*										*			**<0.5**				**<0.5**
24/10/2018	BH23 4.5-4.6										*										**<0.5**				**<0.5**
24/10/2018	BH23 5.5-5.6										*										**<0.5**			*	**<0.5**
24/10/2018	BH24 0.5-0.6 X																				**<0.5**				**<0.5**
24/10/2018	BH24 1.5-1.6 X																								
24/10/2018	BH24 2.5-2.6																								
24/10/2018	BH24 3.3-3.4										*							*			*				
24/10/2018	BH25 0.5-0.6 X																				*				
24/10/2018	BH25 1.5-1.6 X																								
24/10/2018	BH25 2.5-2.6 X																								
24/10/2018	BH25 3.5-3.6																				**<0.5**				**<0.5**
24/10/2018	BH25 4.5-4.6									*								*			**<0.5**				**<0.5**
24/10/2018	BH25 5.5-5.6																								
29/10/2018	BH26 0.1-0.2																								
29/10/2018	BH26 0.5-0.6		*																						
29/10/2018	BH27 0.1-0.2																				*				
29/10/2018	BH27 0.5-0.6	*																							
29/10/2018	BH27 1.0-1.1																				**<0.5**				**<0.5**
29/10/2018	BH27 1.5-1.6																								
29/10/2018	BH27 1.9-2.0										*														
29/10/2018	BH28 0.1-0.2																								
29/10/2018	BH28 0.5-0.6																				*				
29/10/2018	BH28 1.0-1.1																								
29/10/2018	BH28 1.2-1.3																	*			**<0.5**				**<0.5**
30/10/2018	BH29 0.5-0.6																				**<0.5**				**<0.5**
30/10/2018	BH29 1.5-1.6																								
30/10/2018	BH29 2.1-2.2																								
30/10/2018	BH30 0.3-0.4																								
30/10/2018	BH31 0.5-0.6																								
30/10/2018	BH31 1.5-1.6										*														
30/10/2018	BH32 0.5-0.6 X																				*				
30/10/2018	BH33 0.5-0.6 X																								
30/10/2018	BH34 0.5-0.6 X		*																						
30/10/2018	BH35 0.5-0.6																				**<0.5**				**<0.5**
30/10/2018	BH35 1.5-1.6																				*				
31/10/2018	BH36 0.5-0.6										*														
31/10/2018	BH37 0.5-0.6																	*			**<0.5**				**<0.5**
31/10/2018	BH37 1.5-1.6																				**<0.5**				**<0.5**
31/10/2018	BH37 2.5-2.6																				*<0.5**				**<0.5**
31/10/2018	BH37 3.5-3.6																				**<0.5**				**<0.5**
31/10/2018	BH38 0.5-0.6																				*				
31/10/2018	BH38 1.5-1.6																				*				
31/10/2018	BH38 2.5-2.6																								
31/10/2018	BH39 0.5-0.6																								
31/10/2018	BH39 1.5-1.6																				**<0.5**				**<0.5**
31/10/2018	BH39 2.5-2.6							*		*								*			**<0.5**			*	**<0.5**
31/10/2018	BH40 0.5-0.6																				**<0.5**			*	**<0.5**
31/10/2018	BH40 1.5-1.6																				**<0.5**			*	**<0.5**
31/10/2018	BH40 2.5-2.6																				*				
31/10/2018	BH40 3.5-3.6																				**<0.5**			*	**<0.5**
17/10/2018	GT01																				**<0.5**				**<0.5**
17/10/2018	GT02																				*<0.5**				**<0.5**
17/10/2018	GT03																				**<0.5**				**<0.5**

Table 64 Soil Analytical Results Compared Against IB105 Total Solids Investigation Limits for soil Disposal – BH41-BH53

Information Bulletin 105 Classification and Management of Contaminated Soil For Disposal		Arsenic	Barium	Beryllium	Cadmium	Chromium Total	Copper	Cobalt	Lead	Manganese	Mercury	Nickel	Selenium	Zinc	Benzo(a)pyrene	C6 - C9 Fraction	C10 - C36 Fraction (sum)	Sum of polycyclic aromatic hydrocarbons	Benzene	Toluene	Ethylbenzene	Total Xylenes
Unit		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR		50	1	2	5	5	2	5	5	5	0.1	2	5	5	0.5	10	50	0.5	0.2	0.5	0.5	0.5
Investigation Level Selected																						
IB105 Level 1		<20	<300	<2	<3	<50	<100	<100	<300	<500	<1	<60	<10	<200	<0.08	<65	<1000	<20	<1	<1	<3	<14
IB105 Level 2		20	300	2	3	50	100	100	300	500	1	60	10	200	0.08	65	1000	20	1	1	3	14
IB105 Level 3		200	3000	40	40	500	2000	200	1200	5000	30	600	50	14000	2	650	5000	40	5	100	100	180
IB105 Level 4		750	30000	400	400	5000	7500	1000	3000	25000	110	3000	200	50000	20	1000	10000	200	50	1000	1080	1800
5/11/2018	BH41 0.5-0.6 X	<5	30	<1	<1	6	75	20	9	319	<0.1	15	<5	32	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH42 0.5-0.6 X	<5	50	<1	<1	7	38	11	17	188	<0.1	13	<5	39	18.9	<10	1300	185	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH42 1.5-1.6 X	<5	30	<1	<1	6	45	25	13	354	<0.1	18	<5	62	66.4	<10	3430	648	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH42 2.5-2.6 X	<5	120	<1	<1	8	30	6	84	379	1	12	<5	45	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH43 0.5-0.6 X	<5	90	<1	<1	6	35	10	67	196	0.1	7	<5	95	3.8	<10	110	42.1	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH43 1.5-1.6 X	<5	110	<1	<1	9	21	11	11	291	<0.1	13	<5	36	13.4	<10	650	114	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH43 2.5-2.6 X	<5	90	<1	<1	9	21	12	110	239	<0.1	12	<5	37	4.1	<10	140	45.2	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH43 3.5-3.6	<5	50	<1	<1	4	78	15	23	351	<0.1	10	<5	53	12	<10	520	112	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH44 0.5-0.6 X	<5	80	<1	<1	12	6	10	16	62	<0.1	12	<5	41	5.1	<10	370	63.1	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH44 1.5-1.6 X	<5	40	<1	<1	5	68	12	18	263	<0.1	11	<5	39	33	<10	1710	284	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH44 2.5-2.6 X	<5	40	<1	<1	5	61	11	29	218	<0.1	10	<5	33	21.6	<10	1680	173	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH44 3.5-3.6 X	<5	50	<1	<1	6	52	12	34	230	<0.1	10	<5	43	60.3	<10	3400	639	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH45 0.5-0.6 X	<5	100	<1	<1	11	66	9	83	216	0.2	13	<5	134	8.2	<10	400	98.6	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH46 0.5-0.6 X	7	170	<1	<1	17	187	13	223	294	0.3	20	<5	221	3.7	<10	240	37.8	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH47 0.5-0.6 X	<5	200	<1	<1	9	41	35	179	242	0.5	18	<5	373	6	<10	400	51.6	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH47 1.5-1.6 X	<5	80	<1	<1	16	50	16	24	540	<0.1	20	<5	77	8.3	<10	680	97.2	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH48 0.5-0.6 X	<5	140	<1	<1	7	95	26	154	344	0.2	17	<5	265	7.7	<10	520	66.6	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH48 1.5-1.6 X	<5	130	<1	<1	10	59	9	180	232	0.4	12	<5	254	14.3	<10	1370	107	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH49 0.5-0.6 X	8	60	<1	<1	38	39	13	26	923	<0.1	23	<5	65	1.1	<10	<50	5.9	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH49 1.5-1.6 X	<5	220	1	<1	12	11	28	22	1070	<0.1	25	<5	77	0.9	<10	<50	6.9	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH50 0.5-0.6 X	<5	60	<1	<1	19	20	23	25	591	<0.1	22	<5	67	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH50 1.5-1.6 X	5	80	<1	<1	10	13	13	17	350	<0.1	16	<5	47	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH51 0.5-0.6 X	<5	640	1	<1	12	10	19	31	112	<0.1	15	<5	51	1.3	<10	<50	14	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH51 1.5-1.6 X	<5	100	<1	<1	9	20	9	101	167	0.4	11	<5	76	9.4	<10	410	80.9	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH52 0.5-0.6 X	6	140	<1	<1	32	21	12	18	868	<0.1	26	<5	61	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH52 1.5-1.6 X	6	120	<1	<1	15	17	11	18	406	<0.1	17	<5	57	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH53 0.5-0.6 X	<5	200	2	<1	16	28	24	25	510	<0.1	32	<5	70	<0.5	<10	<50	1.6	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH53 1.5-1.6 X	<5	30	<1	<1	12	16	5	49	122	<0.1	7	<5	30	<0.5	<10	<50	2.2	<0.2	<0.5	<0.5	<0.5
Averaging		<50	116	<2	<5	10	44	15	55	360	0.1	16	<5	90	11	<10	650	103	<0.2	<0.5	<0.5	<0.5

Table 65 Soil Analytical Results Compared Against IB105 Leachate Investigation Limits for soil Disposal – BH41-BH53

Information Bulletin 105 Classification and Management of Contaminated Soil For Disposal Leachable Fraction *Italic/** - Based On Soil (Total) Limit **Bold** - Based On Leach Limit		Arsenic	Barium	Beryllium	Cadmium	Chromium Total	Hexavalent Chromium	Copper	Cobalt	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Tin	Zinc	Aldrin + Dieldrin	DDT + DDD + DDE	Benzo(a)pyrene	Phenol	C6 - C9 Fraction	C10 - C36 Fraction (sum)	Benzo(a)pyrene (TEQ)
Unit		mg/L	mg/L	mg/L	mg/L	mg/L		mg/L		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		mg/L	µg/L	µg/L	µg/L	µg/L			µg/L
LOR		0.1	0.1	0.05	0.05	0.1		0.1		0.1	0.1	0.001	0.1	0.1	0.1	0.1		0.1	0.5	0.5	0.5	1			0.5
Investigation Level Selected																									
IB105 Level 1																									
IB105 Level 2		<0.5	<35	<1	<0.1	<0.5		<10		<0.5	<25	<0.01	<2.5	<1	<0.1	<0.5		<25	<3	<200	<0.5	<14000			<0.5
IB105 Level 3		0.5	35	1	0.1	0.5		10		0.5	25	0.01	2.5	1	0.1	0.5		25	3	200	0.5	14000			0.5
IB105 Level 4		5	350	4	0.5	5		100		5	250	0.1	20	8	1	5		250	30	2000	5	50000			
5/11/2018	BH41 0.5-0.6 X																								
5/11/2018	BH42 0.5-0.6 X																				<0.5			*	<0.5
5/11/2018	BH42 1.5-1.6 X																				<0.5			*	<0.5
5/11/2018	BH42 2.5-2.6 X																								
5/11/2018	BH43 0.5-0.6 X																				<0.5				<0.5
5/11/2018	BH43 1.5-1.6 X																				<0.5				<0.5
5/11/2018	BH43 2.5-2.6 X																				<0.5				<0.5
5/11/2018	BH43 3.5-3.6																				<0.5				<0.5
5/11/2018	BH44 0.5-0.6 X																				<0.5				<0.5
5/11/2018	BH44 1.5-1.6 X																				<0.5			*	<0.5
5/11/2018	BH44 2.5-2.6 X																				<0.5			*	<0.5
5/11/2018	BH44 3.5-3.6 X																				<0.5			*	<0.5
5/11/2018	BH45 0.5-0.6 X																				<0.5				<0.5
5/11/2018	BH46 0.5-0.6 X							*										*			<0.5				<0.5
5/11/2018	BH47 0.5-0.6 X																	*			<0.5				<0.5
5/11/2018	BH47 1.5-1.6 X										*										<0.5				<0.5
5/11/2018	BH48 0.5-0.6 X																	*			<0.5				<0.5
5/11/2018	BH48 1.5-1.6 X																	*			<0.5			*	<0.5
5/11/2018	BH49 0.5-0.6 X										*										*				
5/11/2018	BH49 1.5-1.6 X										*										*				
5/11/2018	BH50 0.5-0.6 X										*														
5/11/2018	BH50 1.5-1.6 X																								
5/11/2018	BH51 0.5-0.6 X		*																		*				
5/11/2018	BH51 1.5-1.6 X																				<0.5				<0.5
5/11/2018	BH52 0.5-0.6 X										*														
5/11/2018	BH52 1.5-1.6 X																								
5/11/2018	BH53 0.5-0.6 X										*														
5/11/2018	BH53 1.5-1.6 X																								

13 CONCEPTUAL SITE MODEL

The following figures support the CSM; Figure 24 Diagrammatic Areas of Potential Concern an aerial photograph that shows the spatial relationship of the area of potential concern in the site aerial photograph, and Figure 25 Conceptual Site Model which illustrates the Conceptual Site Model (CSM) with potential risks identified during this investigation that may be associated with site contamination. All potential current and future contamination pathways have been considered in Table 66 Summary of Potential Receptors.

13.1 Primary Sources of Contamination

13.1.1 Confirmed Primary Source

Primary sources of contamination have been identified on site as the following, see Figure 24:

- Imported fill, covering the elevated areas of the title of *52 New Town Road* which is up to a thickness of 6m.
- Underground petroleum storage system (UPSS) infrastructure relating to the operation of a former service station at *48-50 New Town Road* is assumed to still be in situ.

13.1.2 Potential Secondary Sources of Contamination – ruled out

The following have been considered but ruled out as a risk to human health or the environment at the site.

Two offsite potential secondary sources of hydrocarbon groundwater contamination; former service station at 30-36 New Town Road (currently housing Epic Pharmacy and Rad X) and former service station at 466 Elizabeth Street (currently housing Hill Street Grocer New Town). Potential impact from these sites have been dismissed, due to the spatial separate from the site and because the sites were remediated and redeveloped with a twenty year time period, where strict remediation standards and practices enforced by EPA Tasmania.

Petroleum hydrocarbon contamination in groundwater has been identified at MW1, but not at MW2 or MW3, this suggests that the affected groundwater is contained to the site and is not migrating off-site. Hence this has been ruled out as a potential source

13.2 Potential Receptors

The following presents a summary of all potential receptors considered in the assessment.

13.2.1 Potential Human Receptors

Potential current and future onsite and offsite human receptors are depictured in Figure 25 and discussed in Table 66.

13.2.2 Potential Ecological Receptors

There are no onsite ecological receptors.

The following offsite ecological receptors have been identified:

- Maypole Creek which is 1.7 km to the north near Risdon Road; and
- The Derwent River at Cornelian Bay which is 2.12 km from the site.

There is the potential for these receptors to be impacted from contamination derived from the site, it should be managed with a soil and water management plan to protect stormwater from sediments and potentially groundwater discharge.

13.3 Transport Mechanisms and Exposure Pathways

Transport Mechanisms considered as part of the CSM are presented in Figure 25 and include:

- Direct contact – human contact of soil to skin, wind erosion, stormwater/ surface runoff, leaching of heavy metals from the soil, volatile hydrocarbon vapours sourcing from contaminated groundwater.

Exposure Pathways considered at the site are presented in Figure 25 and include:

- Dermal contact, Dust Inhalation and Soil Ingestion.



Figure 24 Diagrammatic Areas of Potential Concern

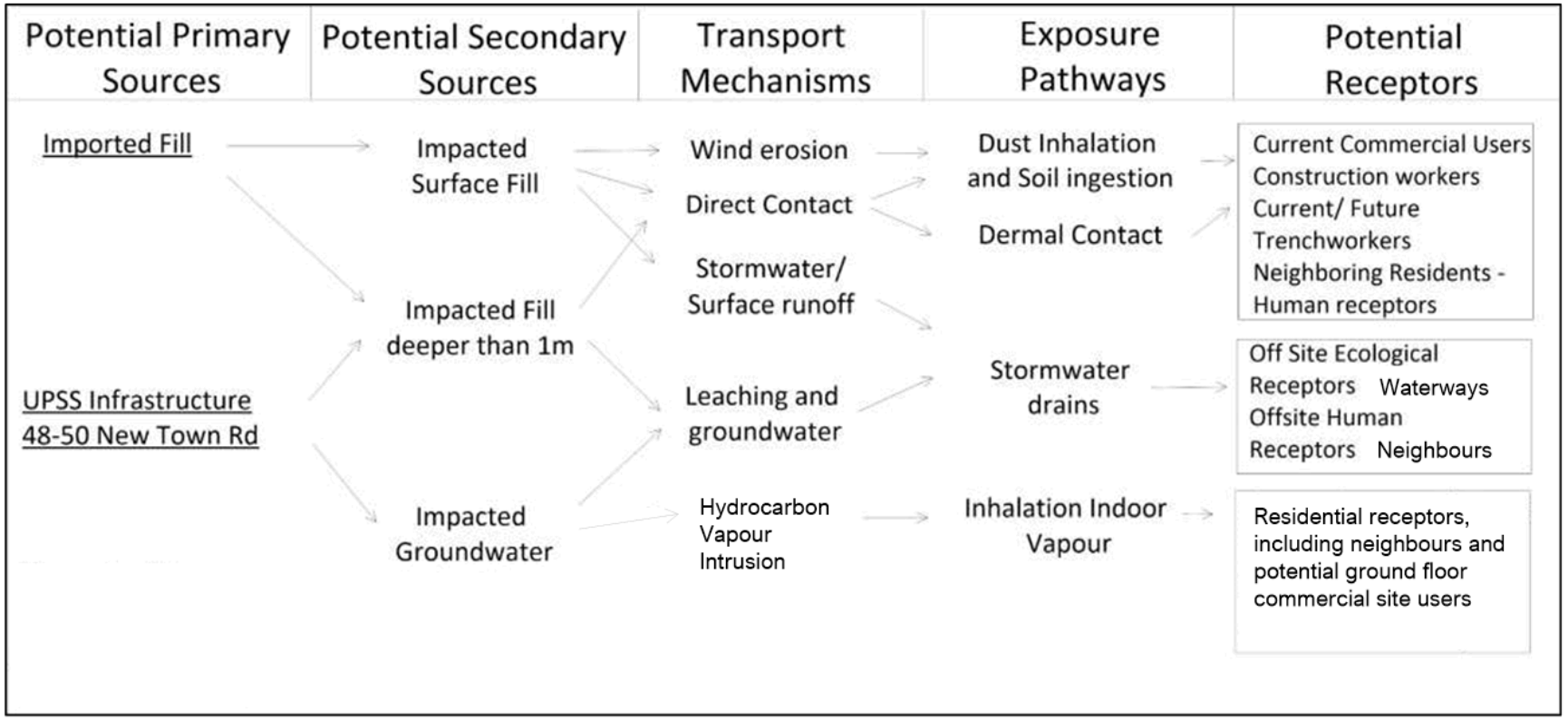


Figure 25 Conceptual Site Model

Table 66 Summary of Potential Receptors

Medium	Specific Receptor	Exposure risk	Management Strategies
Soil Impact (to depths of up to 4 m bgs)	Construction workers	Contamination has been identified in the soil. (Dermal, dust inhalation and soil ingestion)	The risk will be managed with a Contamination Management Plan (CMP). Post construction the CMP may still apply for future trench workers.
	Future onsite residents & commercial workers	Contamination has been identified in the soil. (Dermal, dust inhalation and soil ingestion)	A large volume of contaminated material will be removed, and surfaces will be sealed to mitigate exposure to future site users. This should include all garden beds and lawns. Future exposure will be limited to trench workers, risk will be managed with the CMP.
	Offsite Human Receptors	Contamination has been identified in the soil. (dust inhalation and soil ingestion. Dust exposure during construction)	CMP to be followed by construction workers to minimise dust and particle movement from the site.
	Ecosystem	Contaminated soil identified above ESLs for residential land use.	This is to be addressed in the soil and water management plan (SWMP) as part of the CMP. Care will need to be taken to ensure no contaminated soil migrates offsite into the stormwater drains.
Groundwater Impact	Future construction workers	Groundwater contamination has been identified. However no vapour risk has been identified for future site users (ground floor and basement commercial land use).	The CMP should be followed, and workers should follow WorkSafe Tasmanian standards. Hand-washing procedures should be deployed and options available as per the CMP.
	Future onsite residents & commercial workers	Groundwater contamination has been identified. However, no vapour risk has been identified given ground floor and basement use will be in line with commercial land use.	This risk is not considered plausible under current site conditions and current development plans. Any change of use to residential land use at ground floor or basement level will require a reassessment for potential vapour intrusion risk.
	Offsite Human Receptors	Groundwater contamination has been identified. However, groundwater contamination is considered contained to the site, with no evidence of contamination migrating off-site.	This risk is not considered plausible under current site conditions and current development plans. Any evidence of future migration of groundwater contamination off-site will require a reassessment for potential vapour intrusion risk.
	Ecological receptors	Groundwater at the site exceeds guideline limits for assessing risk to freshwater and marine water environments.	This is to be addressed in the soil and water management plan (SWMP) as part of the CMP.
Surface waters	Ecological receptors	Contamination has been identified in the soil. Therefore, surface waters moving across the site may mobilise contamination.	This is to be addressed in the soil and water management plan (SWMP) as part of the CMP.

14 CONCLUSIONS

14.1 Desktop Assessment

From the desktop assessment, it is concluded that:

- All buildings on the site were demolished by December 2024, photographs from site work in 2018 have been included in this report.
- The geology of the site is Triassic sediments of interbedded sandstone and mudstone. The site is situated 56-60m above sea level. The north-western portion of the site is covered by a levelled grass area.
- All surface waters from the site discharge into the street stormwater drainage system. The hydrogeology of the area is likely to consist of groundwater moving parallel with slope to the north towards the Maypole Creek which is approximately 1.7 km away. It is unlikely that any potential impact from the site would impact downgradient ecosystem receptors, given the spatial separation and dilution effect.
- The EPA Tasmania identified one property as a host to potentially contaminating activity, it is located 100m south of the site, at 30-36 New Town Road which hosted a former Caltex Service Station. This property has been ruled out as a possible upgradient contamination source.
- The following information was apparent from the listed historical aerial photographs, '*48-50 New Town Road'* hosted a service station from prior to 1957 to approximately 1970; by 1973 a new building was constructed, and it remains to this day; a total of 4 bowsers were identified in the historical aerial photographs. The site at *'52 New Town Road'* was a vacant block in 1957. By 1965 the current building plus attached warehouse buildings were constructed. There is a potential refueling bowser in the rear carpark, but it is unclear from the aerial photograph alone.
- The historical aerial photographs showed that the property at *30-36 New Town Road* hosted a service station between 1965-2000. The site at 466 Elizabeth Street hosted a service station between 1965-2000. Both properties have been ruled out as a possible upgradient contamination sources.
- WorkSafe Tasmania provided four (4) records relating to dangerous substances held at *'52 New Town Road'* for a UPSS including 2000 gallon underground super spirit tank with a S/E pump later referred to as a 5.4 k/l tank plus a 1150 L on-ground tank for Diesoleum (situated above the generator building). WorkSafe Tasmania provided a site plan for '*48-52 New Town Road'*. BP Australia was mentioned in several of the documents. There is no evidence in the records that confirms that the UPSS has been removed.
- The Hobart City Council was contacted on the 9 July 2018. The councils register of potentially contaminated sites confirmed the following: '*48 New Town Road, operated as a "retail activity" from 1975-1989 as Tasmanian Television Ltd and COR/BP with the potential contaminant listed as Hydrocarbons.'*
- Given urban setting and absence of any native vegetation, there is a distinct lack of sensitive ecological receptors in the vicinity of the site. Registered water bores are a substantial distance from the site and are not considered to be impacted by any contamination at the site.
- The following areas of potential concern have been identified:
    - Imported fill at the site, across the address at *52 New Town Road*.
    - The front of the site at *48-50 New Town Road* where the former UPSS infrastructure is situated.
- Contaminants of potential concern at the site include the following: Total Petroleum/Recoverable Hydrocarbons; Mono Aromatic Hydrocarbons: (Benzene, Toluene, Ethylbenzene, Xylene, Naphthalene); Polynuclear Aromatic Hydrocarbons; Metals.

14.2 Adopted Land Use Settings

The following investigation guideline limits were adopted for the site:

Ecosystem Receptors

- ESL A and EIL A for residential land use setting;

Human Receptors

During Site Redevelopment

- HIL A / HIL B (neighboring residents dust migration) / HSL D (construction workers and trench workers) for assessing dermal contact.
- HIL A / HIL B (neighboring residents dust migration) / HSL D (construction workers and trench workers) for dust inhalation and soil ingestion risk.
- HSL D (construction workers) for vapour intrusion risk based on commercial land use.
- Trench worker specific guidelines.

Future site users

- HSL D (Basement and Lower Ground floor site users, commercial spaces) for assessing dermal contact and for dust inhalation and soil ingestion risk.
- HSL B (future residents and short stay occupants – it is assumed no access to soil onsite post site redevelopment) / HSL D (Basement and Lower Ground floor users, commercial spaces) for vapour intrusion risk based on commercial land use.
- Trench worker specific guidelines.

14.3 Soil Assessment

From the soil assessment, it is concluded:

- There were 98 detections of hydrocarbons out of 142 samples selected for analysis.
- There were 40 samples that did not have any guideline exceedances.
- Detections for TRH, PAHs and metals were observed across the site. These results confirm multiple sources of contamination at the site, most likely sourcing from the former UPSS infrastructure and uncontrolled fill at the site.

14.3.1 Environment

Ecological Setting - Urban Residential Land Use

Despite the large number of ecological guideline exceedances, it should be noted that there is an absence of close ecological receptors to the site.

Ecological Screening Levels:

- There were the following ESL guideline limit exceedances in an urban residential land use setting; 89 samples for Benzo(a)pyrene, six samples for TRH Fraction F2 and 17 samples for TRH Fraction F3. A total of 61 samples from 142 samples were clean and had no detections.

Ecological Investigation Levels:

- There were three exceedances above the EILs residential land use guideline limits, one for copper, one for zinc, and one for lead. There were another 8 samples that had exceedances above the EILs residential land use guideline limits, however they have been discounted as a risk because the sample will be deeper than 2m below the finished floor level.

14.3.2 Human Health

Health Screening Levels – Dermal Contact

- There were a total of three exceedances from 142 samples selected for analysis, of dermal contact for residential land use.
- There were two samples that had exceedances above HSL A, low density residential guidelines: including BH23 2.5-2.6 and BH40 0.5-0.6 both for TRH Fraction F3 $>C_{16}$-C_{34}. There was one

sample that had exceedances above HSL B, high density residential guidelines, that sample was BH40 0.5-0.6 for TRH Fraction F3 $>C_{16}$-C_{34}.

- There were no exceedances above the HSL D guidelines for commercial land use for dermal contact in any of the samples.

Health Investigation Levels – Dust Inhalation and Soil Ingestion

- There were a total of 72 HIL A exceedances for assessing dust inhalation and soil ingestion risk to neighboring residential receptors. These exceedances included a total of 56 samples exceeded HIL A for benzo(a)pyrene, a total of 10 samples exceeded HIL A for total PAH's and a total of 7 samples exceeded HIL A for lead.
- There were a total of 30 HIL B exceedances for assessing dust inhalation and soil ingestion risk to neighboring residential receptors. These exceedances included a total of 26 samples exceeded HIL B for benzo(a)pyrene and a total of 4 samples exceeded HIL B for total PAH's.
- There were nine guideline exceedances for dust inhalation and soil ingestion for *commercial land use* HIL D for benzo(a)pyrene at the site indicating a risk to commercial workers developing the site.

Indoor Vapour Risk

- From the soil assessment there were no guideline exceedances and no indoor vapour intrusion risk identified.

Trench Worker

- From the soil assessment there were no guideline exceedances and no risk to trench workers identified.

14.3.3 IB105

Material tested at the site is classified under the *Information Bulletin 105* in a range from Level 1 to Level 4 Material with an overall average of Level 2. Data gaps exist across the site where access was limited during the invasive soil investigation. Further soil testing for soil disposal is anticipated during excavation stages of the proposed development.

14.4 Groundwater Assessment

The following conclusions have been made from the groundwater investigation:

- Human health: despite the elevated levels of contaminants in the groundwater, no indoor vapour risk to human health has been identified at HSL D commercial land use guidelines. HSL D commercial land use guidelines are applicable to the proposed developments as residential units will be separated from the ground floor level by basement carpark and commercial spaces. The risk of contaminated groundwater migrating to off-site residential receptors has been dismissed as there were no detections of contamination in the downgradient monitoring well, MW2.
- There were many detections of hydrocarbons (TRH fractions) in MW1 (directly downgradient of UPSS), but only low-level detections in MW2 and MW3. No free phase hydrocarbons were observed during either groundwater sampling event.
- Ecological: The groundwater results for MW1 on two occasions confirm the presence of hydrocarbons (TRH Fractions). Copper exceeded both freshwater and marine guideline limits (ANZG 2018) in MW2. Cobalt exceeded marine guideline limits (ANZG 2018) in MW1. The following PAHs exceeded both freshwater and marine guideline limits (ANZG 2018) in MW1, naphthalene, phenanthrene, anthracene, fluoranthene and benzo(a)pyrene. B(a)p accumulated in the upgradient well but not in the two downgradient wells.

14.5 Concluding Summary

The following conclusions have been made from the current investigation:

- The site assessment has confirmed the site is contaminated and a Contamination Management Plan (CMP) will be required to manage contaminated soil and groundwater at the site during site redevelopment (demolition and construction including but not limited to all earthworks).
- Once the CMP is put in place and recommendations are adhered to, the site will be suitable for the proposed use, the redevelopment of the site.
- At the time of production of this report (June 2025) it could not be determined if the UPSS infrastructure had been removed and is therefore assumed to be present. As it is a potential ongoing source for hydrocarbon contamination, the UPSS infrastructure should be decommissioned as soon as possible. It is anticipated that once the UPSS infrastructure is removed, any residual risk from hydrocarbons (TRH Fractions and naphthalene) in the groundwater will be eliminated.
- The proposed site redevelopment will involve the excavation of large volumes of fill from the site which will remove most of the contaminated material at site.
- The groundwater assessment confirmed elevated levels of hydrocarbons (TRH Fractions and naphthalene) which demonstrates that the UPSS infrastructure associated with the former service station had historic failure. Elevated levels of cobalt and copper indicated that some metals in the fill are leaching into the groundwater.
- Elevated levels of naphthalene, benzo(a)pyrene and some other metals are present in the groundwater which may pose a risk human health and the environment without adequate management.
- Elevated levels of lead and benzo(a)pyrene are present in the fill at the site and without adequate management may pose a risk to human health both onsite and offsite during development works to adjacent residents and commercial workers through dermal contact, dust inhalation and soil ingestion and may adversely impact the environment from sediment erosion into the waterways.
- In terms of soil disposal, elevated levels of barium, beryllium, lead, manganese, mercury, zinc, copper and benzo(a)pyrene and hydrocarbons have been identified and will require careful consideration when managing.

15 RECOMMENDATIONS

As the ESA has confirmed there is contaminated soil and groundwater at the site that poses a risk to the environment (off site) and human health (through dermal contact, dust inhalation and soil ingestion pathways) GES recommends the following work should be undertaken in relation to contamination mitigation and remediation measures:

Before Work Commences

- A Contamination Management Plan (CMP) (Version 6, reviewed at the time of production of this report) will be required to mitigate risks to ecological and human health receptors including risk posed from elevated levels of lead and benzo(a)pyrene in the soil and naphthalene, benzo(a)pyrene and some other metals in the groundwater. The CMP should include but not be limited to the following:
    - Soil management considerations including dust, wind, and water erosion in terms of human health and the environment in the Soil and Water Management Plan (SWMP).
    - Consideration to the duration of stockpile exposure and physical barriers to stockpiles plus standard building site security fencing.
    - Soil classification and management advice in accordance with Environment Protection Authority's Information Bulletin #105.
    - Management of contaminated groundwater at the site.

During Construction

- CMP All construction workers and trench workers should be informed of the site contamination during their site induction as identified within the CMP. The CMP should be made available to all contractors prior to the commencement of excavation works. The CMP will include a SWMP.

- Removal of UPSS infrastructure: there is no evidence that the UPSS infrastructure has been removed. It will require to removal in line with the Hobart City Councils planning requirements and EPA Tasmania's UPSS Decommissioning Regulations.
- Validation sampling in the area surrounding the UPSS infrastructure, in accordance with EPA Tasmania's UPSS Decommissioning Regulations.
- IB105 Classification The soil classified on site ranges from Level 1 Material (clean fill) to Level 4 Material (contaminated soil for remediation) classification. To accurately manage the excavated material for appropriate disposal, grid soil sampling was conducted. The construction company undertaking the development should be provided with these results, as this will assist with soil management on site. Additional soil sampling may be required in areas not adequately sampled in the original program.
- For all future excavated material, analysis should include leachate testing and be classified in accordance with the EPA Tasmania's Information Bulletin #105. Material should be transported by a licensed contractor to a suitable landfill facility that accepts contaminated material.

Statement of Suitability

The findings from this investigation confirm that soil and groundwater contamination is present at the site which does pose a potential risk to Human Health and the Environment. However, while the surface of the site is undisturbed there is no immediate risk to human or ecological receptors. Providing the following recommendations are implemented then the excavation and construction works will not adversely impact human health or the environment.

When the site is redeveloped and soil and groundwater is disturbed, the following site-specific management measures will be required including a Contamination Management Plan which will include a Soil and Water Management Plan. UPSS infrastructure will require removal in line with the Hobart City Councils planning requirements and EPA Tasmania's UPSS decommissioning Regulations. All excavated material will require waste classification in accordance with EPA Tasmania's IB105.

Limitations

In the 2018 soil and groundwater investigation the borehole locations and depths were restricted due to presence of buildings and underground infrastructure on the site. At some locations, access for the larger drill rig was unworkable and therefore, depths to the base of the fill were not obtained.

All findings within the report are based on the proposed site development layout presented in Section 2.2. As stipulated in PLN-HOB2024-0716 components in the design include a proposal for a mixed-use development involving 23 residence (multiple Dwelling) and 38 visitor accommodation units (short-term Accommodation. The Lower Ground floor includes a concrete car park and wellness facilities including a swimming pool, recreational areas, green pavilions and gardens for the use by residents and visitors.

If the site layout is to change, this report will need to be amended to reflect these changes.

Yours faithfully,



Sarah Joyce BSc (Hons)

Environmental Geologist

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LIMITATIONS STATEMENT

This ESA Report has been prepared in accordance with the scope of services between Geo-Environmental Solutions Pty. Ltd. (GES) and The House Family Office ('the Client'). To the best of GES's knowledge, the information presented herein represents the Client's requirements at the time of printing of the Report. However, the passage of time, manifestation of latent conditions or impacts of future events may result in findings differing from that described in this Report. In preparing this Report, GES has relied upon data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations referenced herein. Except as otherwise stated in this Report, GES has not verified the accuracy or completeness of such data, surveys, analyses, designs, plans and other information.

The scope of this study does not allow for the review of every possible soil and groundwater contaminant over the whole area of the site. Samples collected from the investigation area are assumed to be representative of the areas from where they were collected and indicative of the contamination status of the site at that point in time. The conclusions described within this report are based on these samples, the results of their analysis and an assessment of their contamination status.

This investigation was limited by the following factors; the borehole locations were restricted due to existing buildings on the site and many of boreholes did not reach the depth of the footprint of the proposed building.

This report does not purport to provide legal advice. Readers of the report should engage professional legal practitioners for this purpose as required.

No responsibility is accepted for use of any part of this report in any other context or for any other purpose by third party.

Appendix 1 GES Staff

GES is a specialist geotechnical and environmental consultancy providing advice on all aspects of soils, geology, hydrology, and soil and groundwater contamination across a diverse range of industries.

Geo Environmental Solutions Pty Ltd:

- ACN – 115 004 834
- ABN – 24 115 004 834

GES STAFF - ENGAGED IN SITE INVESTIGATION WORKS

Dr John Paul Cumming B.Agr.Sc (Hons) Phd CPSS GAICD

- Principle Author and Principle Environmental Consultant
- PhD in Environmental Soil Chemistry from the University of Tasmania in 2007
- 25 years' experience in environmental contamination assessment and site remediation.

Ms Sarah Joyce BSc (Hons)

- Environmental Geologist
- Honours in Geography and Environmental Science at the University of Tasmania in 2003;
- Undergraduate Degree Double Major in Geology and Geography & Environmental Science
- 25 years professional work experience and 12 years contaminated site assessment

Mr Mark Downie B.Agr.Sc (Hons)

- Soil Scientist
- 12 Year experience in contamination assessment and reporting of soils and groundwater.

Mr Aaron Plummer(Cert. IV)

- Soil Technician
- 12 years' experience in hydrocarbon and heavy metal contamination sampling of soils and groundwater.

GES STAFF – WITH CONTAMINATED SITES EXPERIENCE

Mr Kris Taylor Bsc (Hons)

- Senior Environmental & Engineering Geologist
- Honours in Environmental Geology at the University of Tasmania in 1998
- 20 years' experience in environmental contamination assessments and hydrogeology (including honours in mine site tailing pollution assessment). Including 15 years' experience in asbestos assessment.

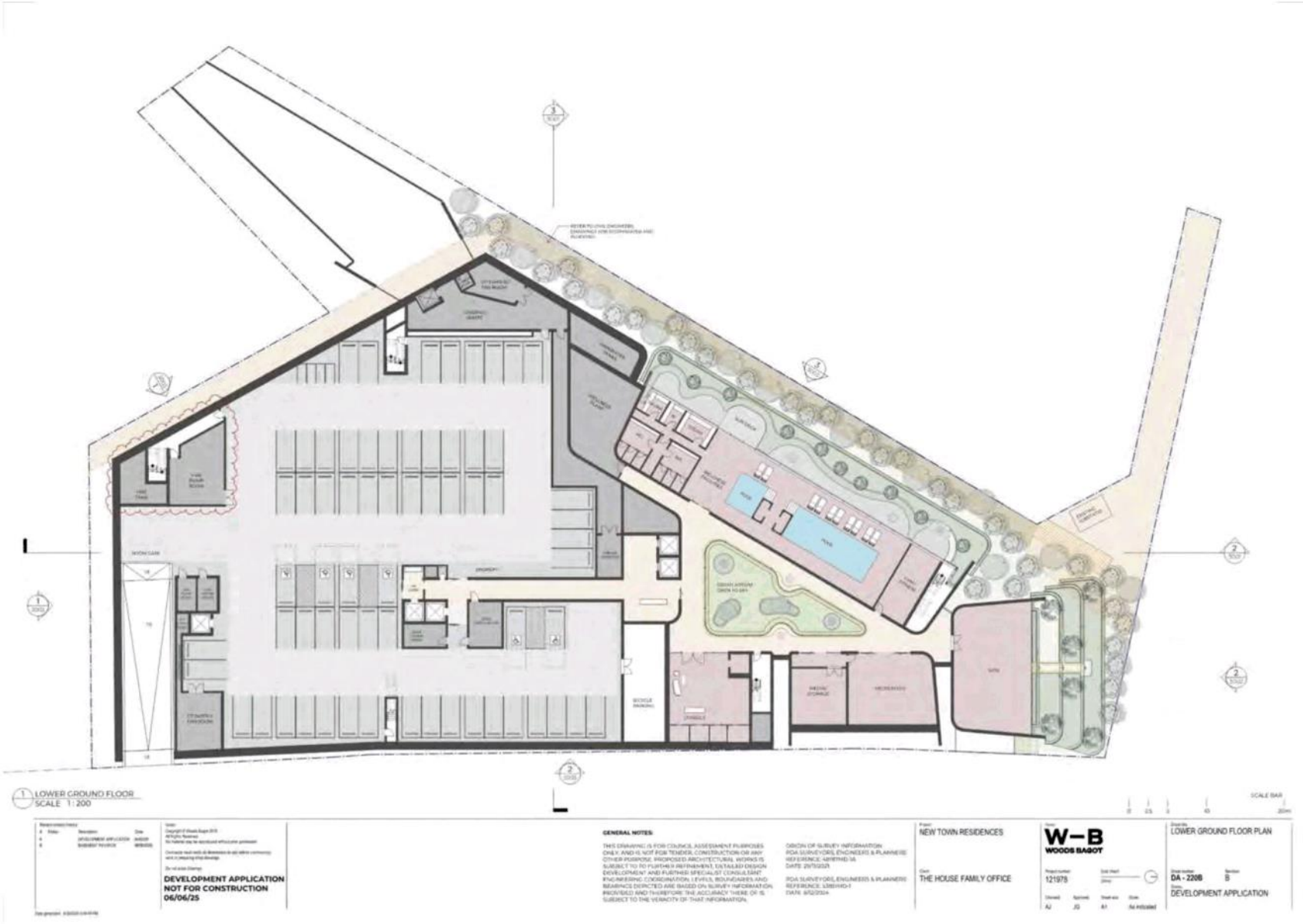
Mr Matthew Temlett

- Engineering Geologist
- Masters in Applied Environmental Geology
- 10 years working as an Engineer and two years experience in contaminated sites; soil, groundwater and conceptual site models.

Mr Grant McDonald (Adv. cert. hort.)

- Soil Technician
- 10 years' experience in hydrocarbon and heavy metal contamination sampling of soils and groundwater.

Appendix 2 Survey Plans for Development Application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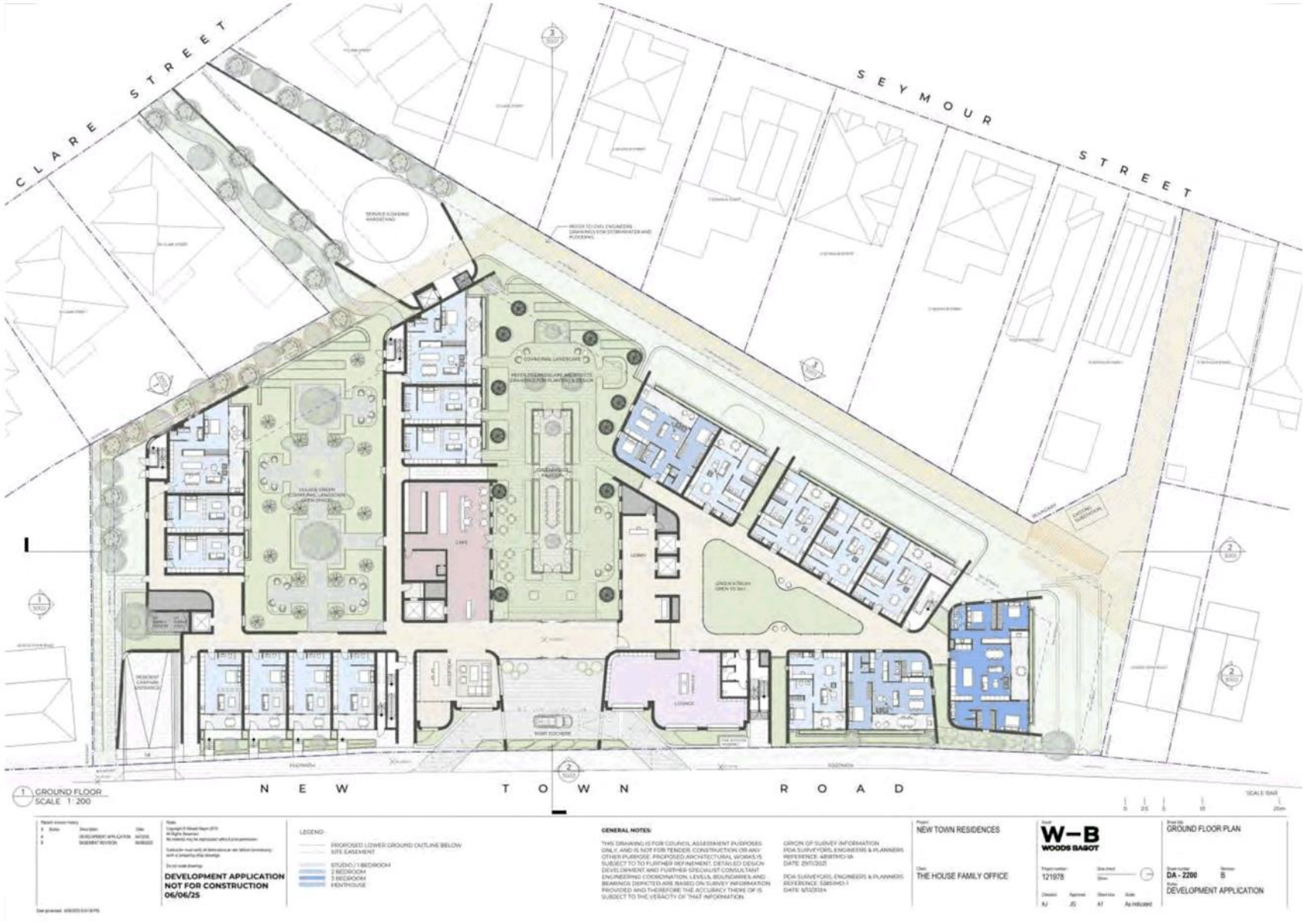
06/06/25
GENERAL NOTES:
NEW TOWN RESIDENCES
THE HOUSE FAMILY OFFICE
W–B
WOODS BAGOT
121978
LOWER GROUND FLOOR PLAN
DA - 220B
B
DEVELOPMENT APPLICATION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SEYMOUR STREET
NEW TOWN ROAD
GROUND FLOOR
SCALE 1: 200
SCALE BAR
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DEVELOPMENT APPLICATION
NOT FOR CONSTRUCTION
06/06/25
LEGEND
PROPOSED LOWER GROUND OUTLINE BELOW
SITE EASEMENT
STUDIO / 1 BEDROOM
2 BEDROOM
3 BEDROOM
PENTHOUSE
GENERAL NOTES:
THIS DRAWING IS FOR COUNCIL ASSESSMENT PURPOSES ONLY, AND IS NOT FOR TENDER, CONSTRUCTION OR ANY OTHER PURPOSE. PROPOSED ARCHITECTURAL WORKS IS SUBJECT TO TO FURTHER REFINEMENT, DETAILED DESIGN DEVELOPMENT AND FURTHER SPECIALIST CONSULTANT ENGINEERING COORDINATION. LEVELS, BOUNDARIES AND BEARINGS DEPICTED ARE BASED ON SURVEY INFORMATION PROVIDED AND THEREFORE THE ACCURACY THERE OF IS SUBJECT TO THE VERACITY OF THAT INFORMATION.
ORIGIN OF SURVEY INFORMATION
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 43818MO-1A
DATE: 25/11/2021
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53818MO-1
DATE: 5/12/2024
NEW TOWN RESIDENCES
THE HOUSE FAMILY OFFICE
W–B
WOODS BAGOT
121978
DA - 2200
B
GROUND FLOOR PLAN
DEVELOPMENT APPLICATION


1 LEVEL 1
SCALE 1:200
DEVELOPMENT APPLICATION
NOT FOR CONSTRUCTION
06/06/25
LEGEND
PROPOSED LOWER GROUND OUTLINE BELOW
SITE EASEMENT
STUDIO / 1 BEDROOM
2 BEDROOM
3 BEDROOM
PENTHOUSE
GENERAL NOTES:
NEW TOWN RESIDENCES
THE HOUSE FAMILY OFFICE
W–B
WOODS BAGOT
121878
LEVEL 01 FLOOR PLAN
DA - 2201
B
DEVELOPMENT APPLICATION


LEVEL 2
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SCALE BAR
DEVELOPMENT APPLICATION
NOT FOR CONSTRUCTION
06/06/25
LEGEND
PROPOSED LOWER GROUND OUTLINE BELOW
SITE EASEMENT
STUDIO / 1 BEDROOM
2 BEDROOM
3 BEDROOM
PENTHOUSE
GENERAL NOTES:
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DA - 2202
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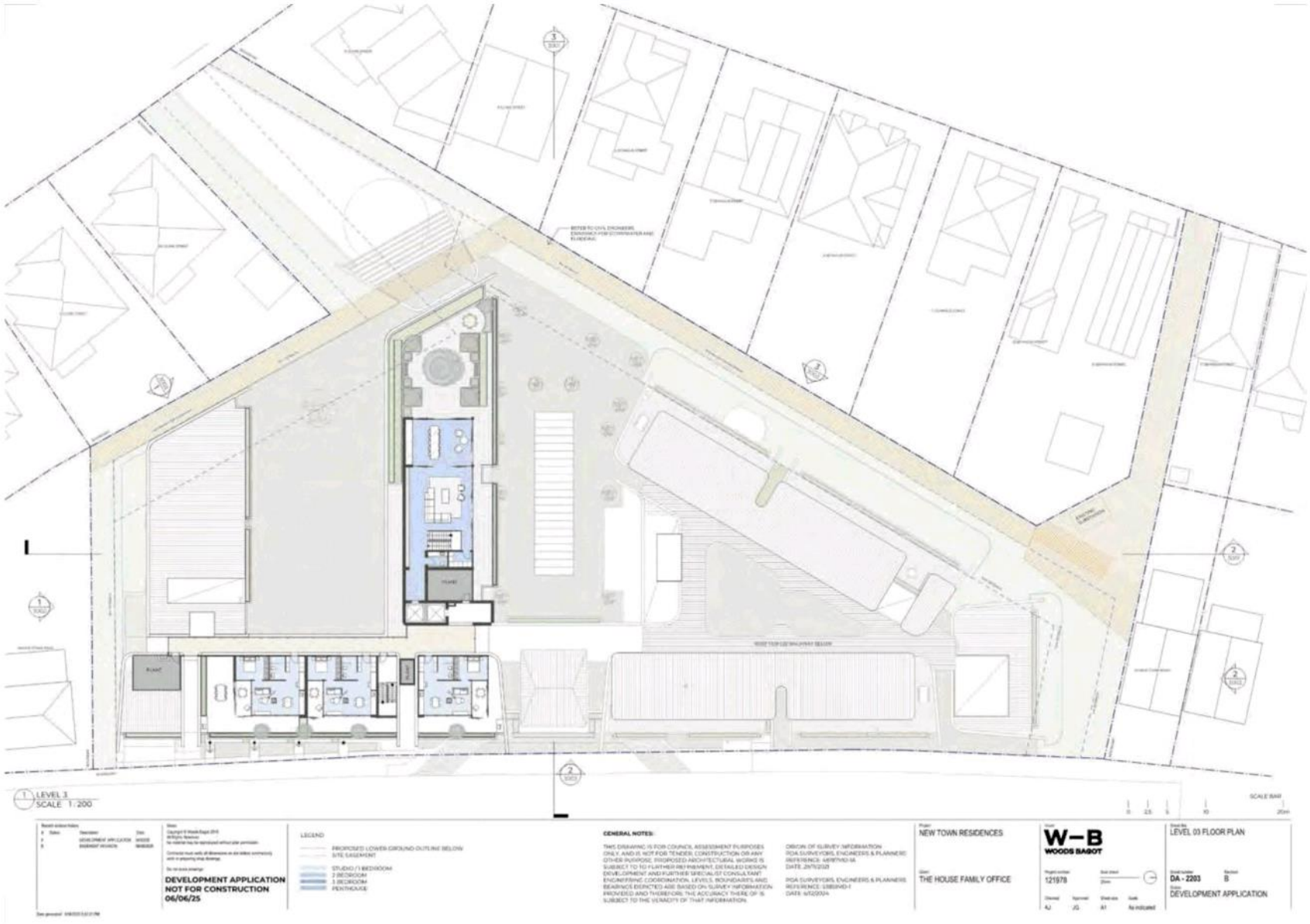
DEVELOPMENT APPLICATION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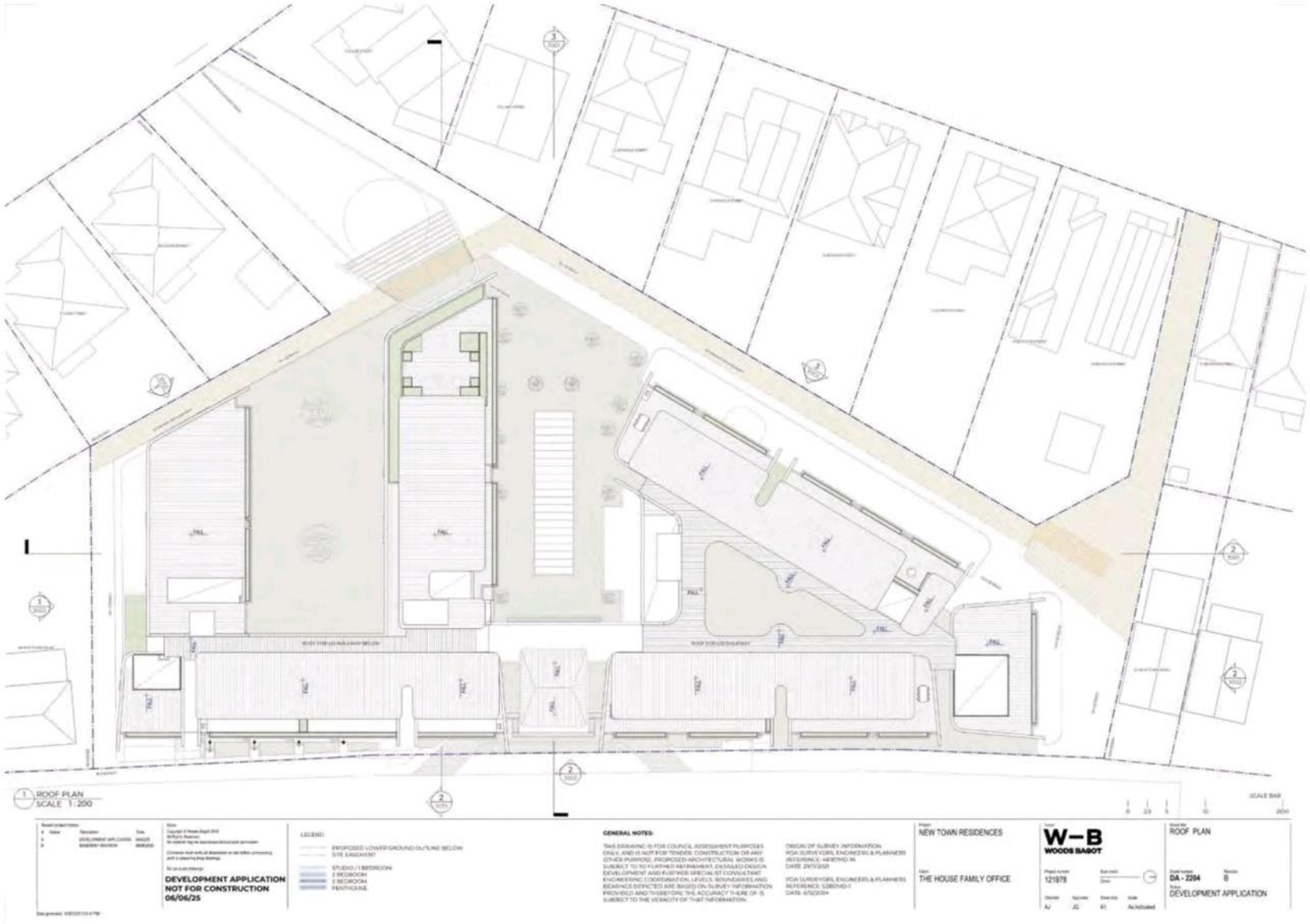
DEVELOPMENT APPLICATION


ROOF PLAN
SCALE 1:200
DEVELOPMENT APPLICATION
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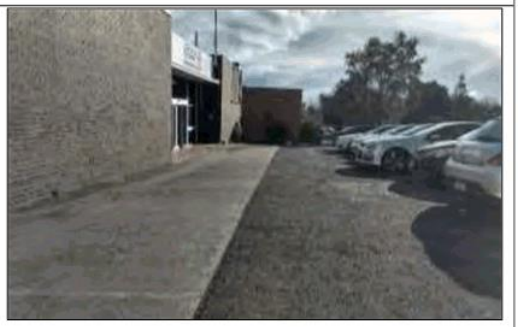
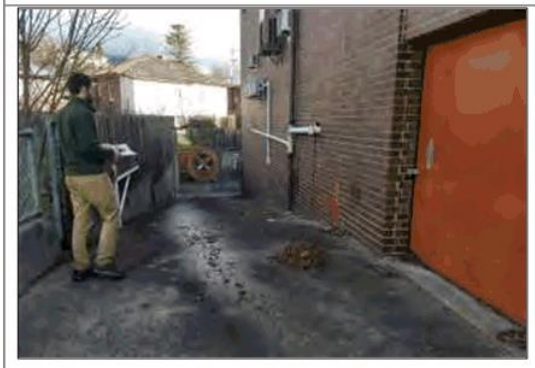
06/06/25
GENERAL NOTES:
NEW TOWN RESIDENCES
THE HOUSE FAMILY OFFICE
W–B
WOODS BAGOT
ROOF PLAN
DA - 2204
DEVELOPMENT APPLICATION

Appendix 3 Site Walkover Photographs

Table 67 Images of the site in May 2025

	
View from the Northern entrance to the site on New Town Road to the south.	View from the Northern entrance to the site on New Town Road to the west
	
View on the southern side of the site looing east towards apartment block at 47-49 New Town Road.	Monitoring well installed in 2018 by Tasmanian Drilling Services, MW3.
	
View west down original ramp between the two buildings in the center of the site.	View across the site to the north from the southern boundary.

Table 68 Images of the Site in 2018

	
Boundary between 46 New Town Road and 48-50 New Town Road	48-50 New Town Road
	
Garden bed at the front of 48-50 New Town Road	Surface covering at the front of 48-50 New Town Road, view to the north
	
Laneway to the rear of 48-50 New Town Road, southern boundary.	Surface covering at the front of 48-50 New Town Road, view to the South, red concrete slab under asphalt



View of the southern building from 46 New Town Road



View south on 48-50 New Town Road



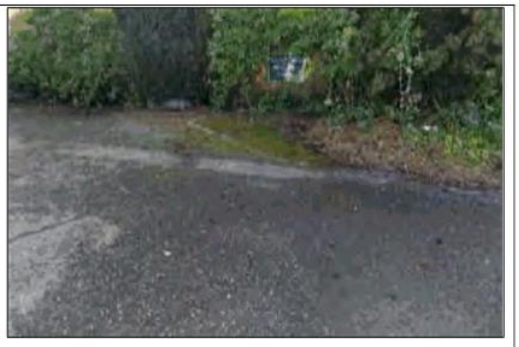
Laneway to the deliverly entrance into 52 New town road, adjacent to 48-50 New Town Road



Street front of 52 New Town Road



Surface of the carpark at the northern end of 52 New Town Road

	
Surface of the carpark at the northern end of 52 New Town Road	Carpark at the northern end of 52 New Town Road
	
Rear view of the building on 52 New Town Road	Rear view of the building on 52 New Town Road
	
Rear view of the building on 52 New Town Road	Rear view of the building on 52 New Town Road



52 New Town Road – AST above the generator at the rear (western boundary) of the site



Scrap material at rear of 52 New Town Road



52 New Town Road – concrete pad at the rear of the site near the generator



52 New Town Road – infrastructure in the concrete pad



Edge of fill on 52 New Town Road title

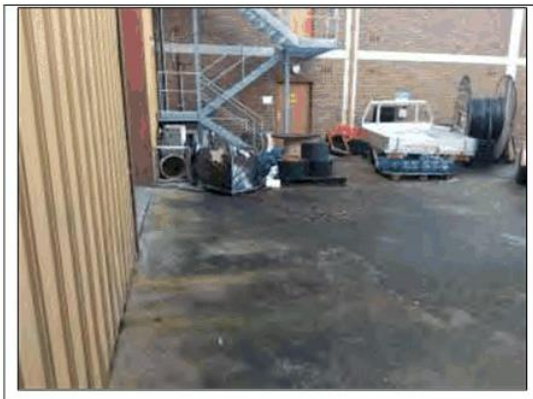


Generator room view north on 52 New Town Road title

	
Generator room view north along the fill boundary	Product label of generator
	
Generator	Generator shed view of the northern side 52 New Town Road
	
52 New Town Road – Edge of the fill	52 New Town Road – Edge of the fill

	
52 New Town Road	52 New Town Road Steep bank of the fill
	
52 New Town Road easement to Seymour Street	Rear entrance to 52 New Town Road off Clare Street
	
Rear entrance to 52 New Town Road off Clare Street	Rear of 52 New Town Road, view to the west. Potential Bowser 5 location

	
View towards building of 52 New Town Road, view to the east	Inside of building 52 New Town Road, view to the east
	
Inside of building at the back of 48-50 New Town Road, view to the east	Inside of building 52 New Town Road, view to the west
	
Inside warehouse 52 New Town Road, looking south towards 48-50 New Town Road component of the building network.	Rear of 48-50 New Town Road

	
Rear of 48-50 New Town Road	Rear of 48-50 New Town Road
	
Rear of 48-50 New Town Road	

Appendix 4 EPA PIR

Level 7, 134 Macquarie Street, Hobart TAS
GPO Box 1550, Hobart, TAS 7001 Australia

Enquiries: Contaminated Sites Unit
Phone: (03) 6165 4599
Email: contaminatedsites@epa.tas.gov.au
Web: www.epa.tas.gov.au
Our Ref: (EN-EM-AV-100706_38: H906114) sma

EPA TASMANIA
ENVIRONMENT PROTECTION AUTHORITY

30 July 2018

Ms Sarah Joyce
Geo-Environmental Solutions
29 Kirksway Place
BATTERY POINT TAS 7004

Dear Ms Joyce

PROPERTY INFORMATION REQUEST

48-50 NEW TOWN ROAD, NEW TOWN **CERTIFICATE OF TITLE: 198029/1**
52 NEW TOWN ROAD, NEW TOWN **CERTIFICATE OF TITLE 252465/1**

On 9 July 2018, the Contaminated Sites Unit received your Property Information Request relating to the land referred to above ('the Site'). A search of relevant databases and records has been undertaken.

Historic WorkSafe Tasmania [WST] records indicate that dangerous goods were stored at 48 New Town Road in underground storage tanks [UST] from 1975 to 1989; the site operator name was Tasmanian Television Ltd. The record refers to WST file number 2230.

No further records relating to contamination or potentially contaminating activities on the Site were found

30-36 New Town Road (100m south of the Site) hosted a Caltex service station that closed in the mid 1990's. EPA Tasmania received advice in August 2000 that the removal of USTs and site remediation works would be completed prior to the construction of a video retail outlet.

EPA Tasmania has no further records regarding this property, however The Hobart City Council or WST may have records relevant to your enquiry.

No other records relating to contamination or potentially contaminating activities at adjacent properties were found.

The search of records is restricted to those held by EPA Tasmania and includes records relating to: The *Environmental Management and Pollution Control (Underground Petroleum Storage Systems) Regulations 2010;* Industrial Sites (which are or have been regulated by EPA Tasmania); historic landfills; and contamination issues reported to the Contaminated Sites Unit. In addition, the Incidents and Complaints database and records relating to the historical storage of dangerous goods (as detailed below) are searched.

WorkSafe Tasmania (1300 366 322 or wstinfo@justice.tas.gov.au) may have issued dangerous goods licences and/or may hold relevant records for the Site and adjoining properties. As the storage of dangerous goods/fuels is an environmentally relevant activity, you may wish to contact them for further information.

Please note that the dangerous goods licensing records referred to by EPA Tasmania are for sites with underground storage tanks that ceased holding Dangerous Goods Licences prior to 1993. WorkSafe Tasmania hold the records for these Licences after 1993.

EPA Tasmania does not hold records on all sites that are or may be contaminated. You should consider obtaining a site history to determine the likelihood of contamination. If contamination on the Site or an adjacent property is considered likely, further assessment by a competent environmental assessment practitioner is recommended. Site assessments should be conducted in accordance with the *National Environment Protection (Assessment of Site Contamination) Measure 1999*, National Environment Protection Council (or as varied). http://epa.tas.gov.au/regulation/contaminated-sites/identification-and-assessment-of-contaminated-land/contaminated-site-assessment

Please note since 1 July 2015, the Director has required all environmental site assessments and reports submitted to the Contaminated Sites Unit for consideration to be prepared by a person certified as a specialist contaminated sites consultant under a scheme approved by the Director. Effective 30 June 2018, the endorsed scheme is operated by Certified Environmental Practitioners (CEnvP): Consultants certified under this scheme are approved to use the seal **CEnvP Site Contamination**. https://www.cenvp.org.

Further details are available at: http://epa.tas.gov.au/regulation/contaminated-sites/identification-and-assessment-of-contaminated-land/engaging-a-contaminated-site-assessment-consultant.

As local councils are able to issue Environment Protection Notices, Environmental Infringement Notices and record complaints, you may wish to contact them for additional information that may be relevant to the site. Further, if the Site has historically been subject to a permit under the *Land Use Planning and Approvals Act 1993*, the Council would have issued the permit.

Under the *Right to Information Act 2009* (RTI Act), you are entitled to apply for any records mentioned within this letter such as reports, letters, or other relevant documents. For further information on how the RTI process works and how to request information under the RTI Act please visit the Department of Primary Industries, Parks, Water and Environment website.

If you are purchasing a property, you should consider Part 5A of the *Environmental Management and Pollution Control Act 1994* (EMPCA) which defines and specifies requirements for managing contaminated sites. If there is reason to believe the site is, or is likely to be, contaminated there are certain requirements that you must meet (e.g. notification of a likely contaminated site to the Director, EPA as outlined in section 74B of the EMPCA).

Although all due care has been taken in the preparation of this letter, the Crown gives no warranty, express or implied, as to the accuracy or completeness of the information provided. The Crown and its servants or agents accept no responsibility for any loss or damage arising from reliance upon this letter, and any person relying on the letter does so at their own risk absolutely.

As you are aware, property searches incur a charge of $237.00. An invoice is enclosed.

If you have any queries in relation to the matters above, please contact the Contaminated Sites Unit using the details at the head of this correspondence or refer to the EPA website at www.epa.tas.gov.au and click on 'Regulation to locate information on Underground Fuel Tanks and Contaminated Sites.

Yours sincerely



Bruce Napier
ENVIRONMENTAL OFFICER - CONTAMINATED SITES

Email: sjoyce@geosolutions.net.au

Attachment: Invoice

2

Appendix 5 Historical Aerial Photography



Plate 5 The 1989 Historical Aerial Photograph of the site and surrounding area.



Plate 6 The 1989: Former Service Station at 30-36 New Town Road (100m south and upgradient of the site)



Plate 7 The 1989: Former Service Station, 466 Elizabeth Street, North Hobart (220m S & upgradient of the site)



Plate 8 The 1977 Historical Aerial Photograph of the site.



Plate 9 The 1973 Historical Aerial Photograph of the site.



Plate 10 The 1965 Historical Aerial Photograph the site and the surrounding area.



Plate 11 The 1965 Historical Aerial Photograph of the site.



Plate 12 The 1965 Historical Aerial Photograph of *48-50 New Town Road*.



Plate 13 The 1965 Historical Aerial Photograph of 30-36 New Town Road former Caltex Service Station.



Plate 14 The 1965 Historical Aerial Photograph of 466 Elizabeth Street; former Service Station



Plate 15 The 1957 Historical Aerial Photograph of the surrounding area (30-36' & '466' service stations not yet constructed).



Plate 16 The 1957 Historical Aerial Photograph of the site.

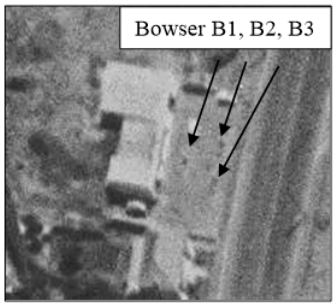
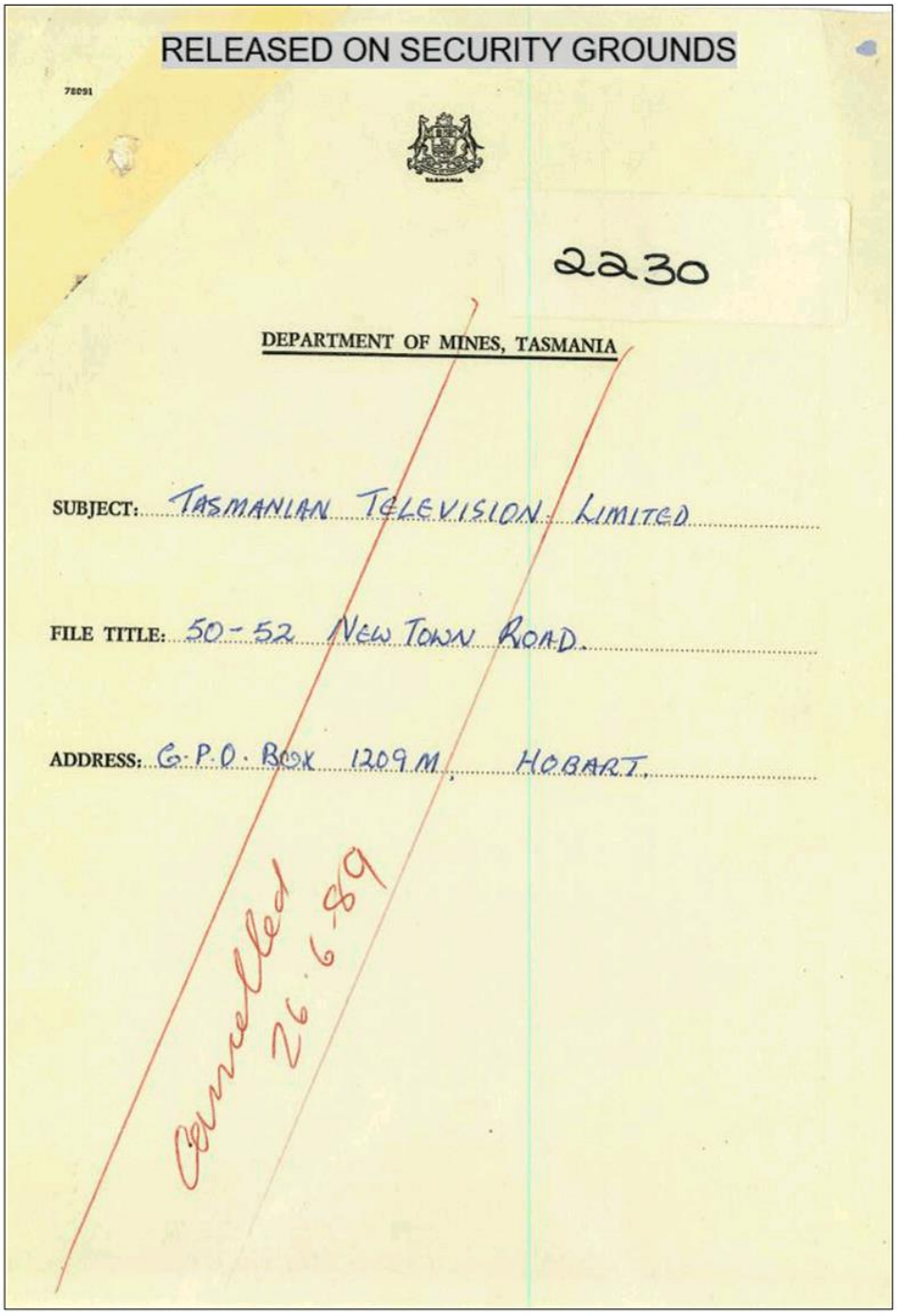


Plate 17 The 1957 Historical Aerial Photograph of *48-50 New Town Road* (Former Service Station).



Plate 18 The 1946 Historical Aerial Photograph of 52 & 48-50 New Town Road

Appendix 6 WorkSafe Tasmania - Dangerous Goods Records



RELEASED ON SECURITY GROUNDS

78091

2230

DEPARTMENT OF MINES, TASMANIA

SUBJECT: TASMANIAN TELEVISION LIMITED

FILE TITLE: 50-52 NEW TOWN ROAD.

ADDRESS: G.P.O. BOX 1209M, HOBART.

Cancelled 26.6.89

RELEASED ON SECURITY GROUNDS

MINES
File Ref. 2230
15 JUL 1999
Doc. Ref. 2024
Action Officer | Initials
RAP
CB

INSPECTION REPORT - 001
KEEPING DANGEROUS GOODS

2230

FILE NO: T302 AREA CODE JG01 DATE 9-6-89

BUSINESS TRADING NAME:
TASMANIAN TELEVISION LTD

OWNER/OCCUPIER:
AS ABOVE

POSTAL ADDRESS: 50-52 NEWTOWN ROAD
NEWTOWN

LOCATION OF STORAGE: AS ABOVE

Licence No. | Debtors No.
Resubmit to | Date

APPROVAL DATE: _____ APPROVAL NO: _____ INSPECTION DATE: 2-6-89

TYPE OF INSPECTION : ~~APPROVAL/FOLLOW-UP~~/ROUTINE/~~NEW/ADDITIONAL~~ SUPPLIER: _____

RECOMMENDED FOR LICENSING: YES/~~NO~~ INSPECTOR: P. DAVIS

U/G
REMARKS: Petrol tanks removed completely
O/H Diesel remains only

file closed.

Name of dangerous goods	Class	Qty.	Size of tanks	O/G O/H U/G	Size - cylinders, drums, packages	Qty and type of pumps
DIESEL	~~3~~ 3	1	1,150 Litres	O/H		

RESUBMIT DATE: _____ TO: _____

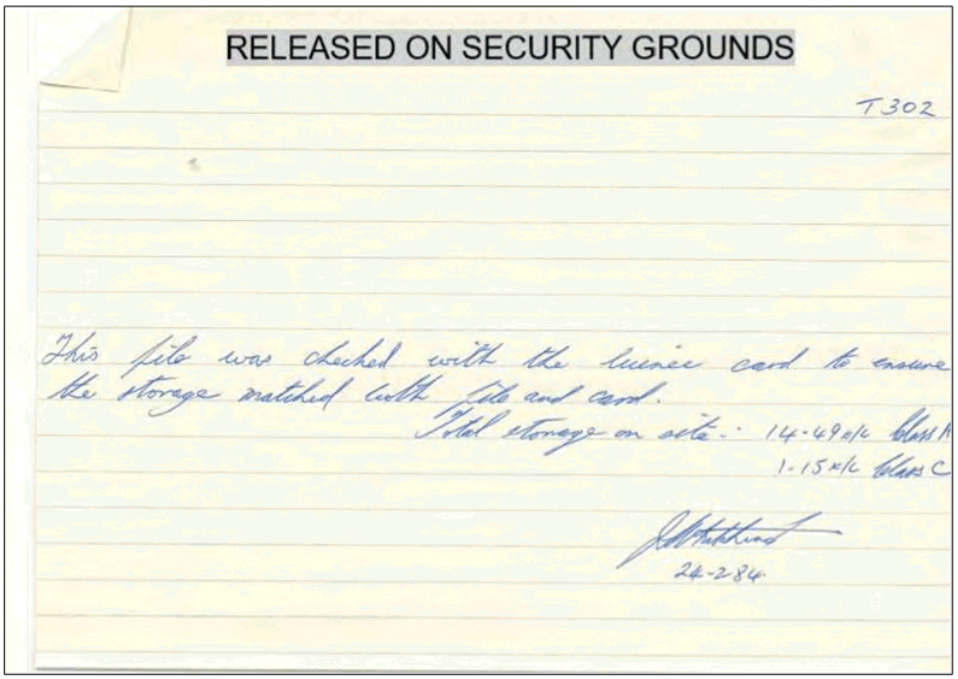
RELEASED ON SECURITY GROUNDS

T302

This file was checked with the licence card to ensure the storage matched both file and card.

Total storage on site: 14.49 k/L Class A
1.15 k/L Class C

24-2-84



RELEASED ON SECURITY GROUNDS

16 DEC 1981

Reg. 78

THIS FORM MUST BE RETURNED WITH PAYMENT

FORM 7

TASMANIA

Inflammable Liquids Act 1929

D of M	A.O.	C.G.	E.O.	D.S.M.

Received / Answered 24 DEC 1981

DEPT. OF MINES

RSS No.

APPLICATION FOR LICENCE IN RESPECT OF PREMISES FOR KEEPING OF INFLAMMABLE LIQUIDS OR DANGEROUS COMMODITIES

1. Applicants Full Name TASMANIAN TELEVISION LTD
2. Applicant's Occupation
3. Postal Address 50-52 NEW TOWN ROAD, NEW TOWN, 7008.
4. Situation of Premises to be Licensed AS ABOVE.
5. Name of Municipality and Town or Township within which, or within five miles of which premises are situated
6. Name and quantity to be manufactured / kept under this Application:—
   - Inflammable Liquid Class A (Petrol, etc.) 5·4 k/l
   - Inflammable Liquid Class B (Kerosene, etc.)
   - Dangerous Commodity
7. Number of Tanks and Package Storage Areas under this Application
8. Name and Total Quantity to be kept:—
   - Inflammable Liquid Class A (Petrol, etc.) 14·49k/l
   - Inflammable Liquid Class B (Kerosene, etc.)
   - Dangerous Commodity
9. Total Number of Tanks and Package Storage Areas installed

I declare that the above statements and answers are true to the best of my knowledge and belief.

(*Signed*)

Dated this 17th day of DECEMBER, 19 87

ADDITIONAL STORAGE INSPECTED 26/3/80

This Application, with Licence Fee of $4-00, *to be forwarded to*—

DIRECTOR OF MINES—DEPT OF MINES
34 DAVEY STREET (G.P.O. Box 124B),
HOBART, TASMANIA 7001

FOR OFFICE USE ONLY

File T302	Receipt No.	39849	Initials
	Amount of Cash/Cheque	$4·00	
Licence No. 12/81	Date	24/12/81	

(*Scale of fees is shown on reverse hereof*)

56608

RELEASED ON SECURITY GROUNDS

DEPARTMENT OF MINES
TASMANIA
DATE 26/ 6 / 1950.

For the Director of Mines, Hobart
From the Inspector of Explosives ..Hazeret.....

RECORD OF INSPECTION OF INSTALLATION

Premises of:- Tasmanian Television

Known as:

Premises at: 52 Main to Newtown.

Oil Company: BP Australia.

Date of Approval: 17/3/50

Date of Inspection: 26/3/50

Finding: ~~Unsuitable~~) for licensing
Suitable)

Pump Outfit package Storage Area: 1x5400l u/g sans

Variation from Approval: no

Application Form: Left with occupier/forwarded herewith

Amount of Fee advised ~~YES~~/NO

.....

TOTM 14.49

sent form
15/12/81

Environmental Site Assessment (V9) 52 New Town Road, New Town. June 2025.

Form 5 (Regulation 34)

Tasmania 35709 Dangerous Goods Act 1976 № 4691

RELEASED ON SECURITY GROUNDS

Fee, $2

Granted to BP Australia,
G.P.O. Box 689G,
Hobart.

Approval of Site and Construction of Premises for Keeping Inflammable Liquids or Dangerous Commodities or the Alteration thereof

Approval for the *site and construction *~~alteration of the site and construction~~ as shown on the approved Plans and specification of a *~~package/storage area~~/*tank for the undermentioned inflammable liquids and dangerous commodities, subject to the provisions of the *Dangerous Goods Act* 1976, and regulations being observed and subject to the undermentioned special conditions, situate at

Tasmanian Television, 52 Main Rd, New Town

This approval is valid only for one year from the date of issue.

Date of issue 19th Mar 1980

Chief Inspector of Explosives

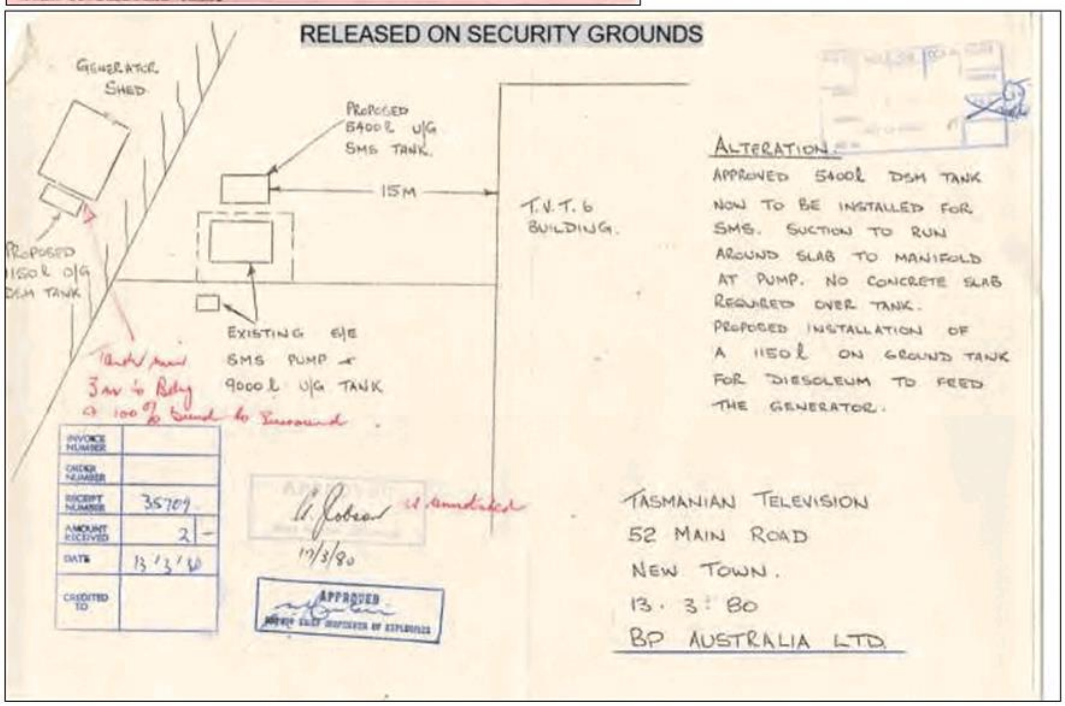
Inspector of Explosives

Inflammable liquid: Class 3-1 5-tank Litres
Class 3-2 Litres
Class 3-3 1 X 1150 O/G Tank Litres
L.P.G. (Class 2) Litres

Dangerous commodities:

SPECIAL CONDITIONS

Tank shall be located at least 3M from boundary and a 100% bund to surround tank.



Mr. Schott.
Tasmanian Television Ltd.
48-52 New Town Rd.
New Town.

RELEASED ON SECURITY GROUNDS

Reg. 78

FORM 7

TASMANIA

Inflammable Liquids Act 1929

D of M	A.O.	CG	CC & M	D.S.M.E.
				Registrar
				E & R

RECEIVED 16 FEB 1977 ANSWERED DEPT OF MINES REF. No.

APPLICATION FOR LICENCE IN RESPECT OF PREMISES FOR KEEPING OF INFLAMMABLE LIQUIDS OR DANGEROUS COMMODITIES

1. Applicant's Full Name TASMANIAN TELEVISION LIMITED
2. Applicant's Occupation COMMERCIAL TELEVISION
3. Postal Address G.P.O. BOX 1209M, HOBART. 7001
4. Situation of Premises to be Licensed rear of 50-52 New Town Road, New Town
5. Name of Municipality and Town or Township within which, or within five miles of which, premises are situated Hobart
6. Name and quantity to be ~~manufactured~~ kept under this Application:—
   - Inflammable Liquid Class A (Petrol, etc.) 9.09 Kl.
   - Inflammable Liquid Class B (Kerosene, etc.) –
   - Dangerous Commodity
7. Number of Tanks and Package Storage Areas under this Application 1 x 2600 gal Tank.
8. Name and Total Quantity to be kept:—
   - Inflammable Liquid Class A (Petrol, etc.) 9.09 Kl.
   - Inflammable Liquid Class B (Kerosene, etc.) –
   - Dangerous Commodity
9. Total Number of Tanks and Package Storage Areas installed one.

I declare that the above statements and answers are true to the best of my knowledge and belief.

TASMANIAN TELEVISION LIMITED

(*Signed*) [signature] Secretary

Dated this 7th day of February, 1977.

(*This Application, with Licence Fee of* $ 10.00, *to be forwarded to*—

Please complete this form & return urgently with cheque to

DIRECTOR OF MINES—DEPT OF MINES
34 DAVEY STREET (G.P.O. Box 124B),
HOBART, TASMANIA 7001

FOR OFFICE USE ONLY

File T 302	Receipt No.	27753 RB	Initials
	Amount of Cash/Cheque ..	$ 10.00	[initials]
Licence No. 22721	Date	16/2/77	

(*Scale of fees is shown on reverse hereof*)

86374

RELEASED ON SECURITY GROUNDS

Department of Mines
Tasmania
Date 6 /7 /1976

For the Director of Mines, Hobart
From the Inspector of Explosives .....Hobart.....

RECORD OF INSPECTION OF INSTALLATION

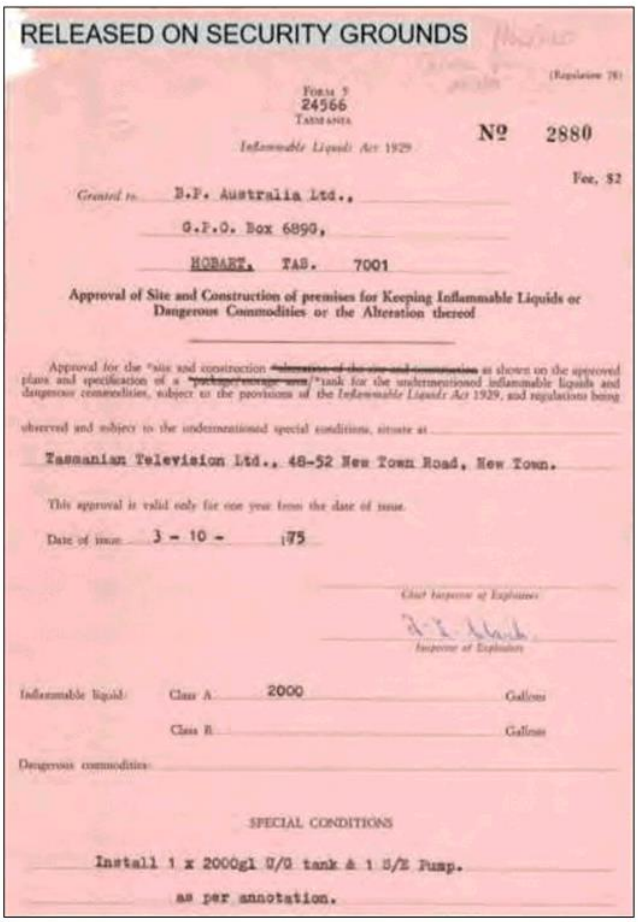
Premises of: Tasmanian Television Ltd.
Known as:
Premises at: 4-8-52 New Town Rd. New Town.
Oil Company: B.P.
Date of Approval: 20-10-75.
Date of Inspection: 5-7-76.
Finding: ~~Unsuitable~~ Suitable } for licensing
Pump Outfit package Storage Area: P.O.
Variation from Approval: NIL.
Application Form: Left with occupier/Forwarded herewith

Amount of Fee advised Yes/No $10.00

1 x 2000 gl U/G tank "A"
1 S/E pump.
9.09 KL.

.....J. J. Clark.....

Environmental Site Assessment (V9) 52 New Town Road, New Town. June 2025.



RELEASED ON SECURITY GROUNDS

(Regulation 78)

FORM 5
24566
TASMANIA

Inflammable Liquids Act 1929

№ 2880

Fee, $2

Granted to B.P. Australia Ltd.,
G.P.O. Box 6890,
HOBART, TAS. 7001

Approval of Site and Construction of premises for Keeping Inflammable Liquids or Dangerous Commodities or the Alteration thereof

Approval for the *site and construction ~~alteration of the site and construction~~ as shown on the approved plans and specification of a ~~package/storage area~~/*tank for the undermentioned inflammable liquids and dangerous commodities, subject to the provisions of the *Inflammable Liquids Act* 1929, and regulations being observed and subject to the undermentioned special conditions, situate at

Tasmanian Television Ltd., 48-52 New Town Road, New Town.

This approval is valid only for one year from the date of issue.

Date of issue 3 - 10 - 75

Chief Inspector of Explosives

Inspector of Explosives

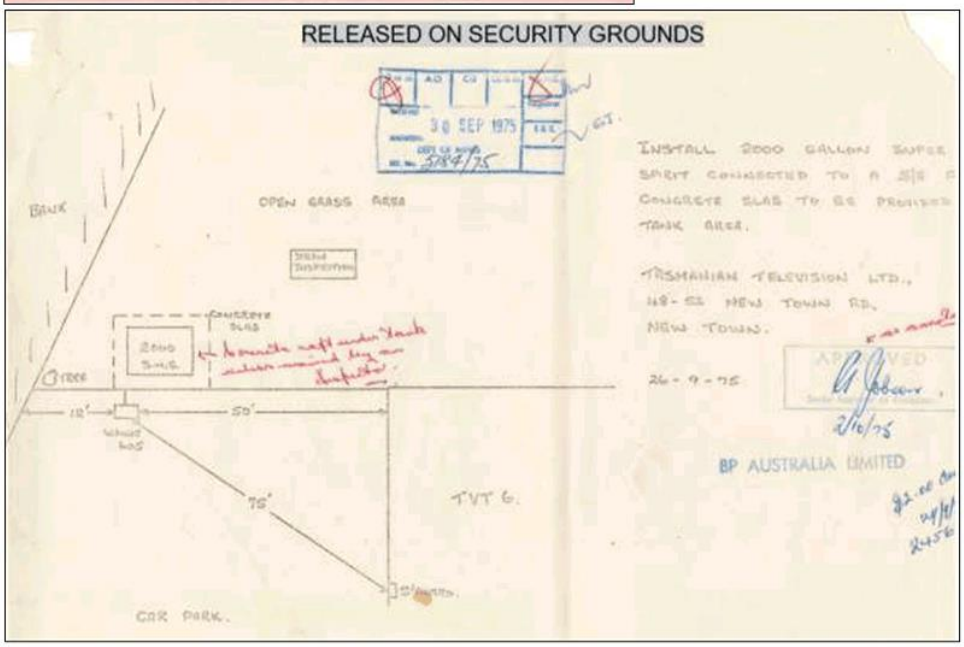
Inflammable liquid: Class A 2000 Gallons

Class B Gallons

Dangerous commodities:

SPECIAL CONDITIONS

Install 1 x 2000gl U/G tank & 1 S/E Pump.
as per annotation.



Appendix 7 PID Hire and Service Record

Thermo Fisher SCIENTIFIC

The world leader in serving science

RENTALS

Equipment Report - MiniRAE 3000 PID

This Gas Meter has been performance checked and calibrated as follows:

Lamp	Compound	Concentration	Zero	Span	Traceability Lot #	Pass?
10.6 eV	Isobutylene	100 ppm	0 ppm	100 ppm	553762	☑

Alarm Limits

High	100 ppm
Low	50 ppm

Bump Test

Date	Target Gas	Reading	Pass?
19 Jul 18	100 ppm	100.0 ppm	☑

☑ Battery Status 100 %
☑ 10 minutes test complete
☑ Spare battery status: (Min 5.5 volts) 5.77
☑ Electrical Safety Tag attached (AS/NZS 3760)

☐ Performance check (lamp, sensor)
☑ Data cleared
☑ Filters checked

Tag No: 000700

Valid to: 19/09/2018

Date: 19 Jul 18

Signed:

Please check that the following items are received and that all items are cleaned and decontaminated before return. A minimum $30 cleaning / service / repair charge may be applied to any unclean or damaged items. Items not returned will be billed for at the full replacement cost.

Sent	Returned	Item
☑	☐	MiniRAE 2000 PID / Operational Check / Battery Status 100%
☑	☐	Lamp 10.6 eV, Compound Set to: Isobutylene CFactor: 1.00
☑	☐	Protective yellow rubber boot
☑	☐	Inlet probe (attached to PID)
☑	☐	Spare water trap filter(s) Qty 3
☑	☐	Charger 240V to 12V1250mA
☑	☐	Cradle and Travel Charger
☑	☐	Instruction Manual behind foam on the lid of case "
☑	☐	Quick Guide Sheet behind foam on the lid of case "
☑	☐	Spare Alkaline Battery Compartment with batteries
☑	☐	Inline Moisture trap Filter Guide Laminated
☑	☐	Carry Case
☑	☐	Check to confirm electrical safety (tag must be valid)
☐	☐	Calibration regulator & tubing (optional)
☐	☐	Data cable and Software CD (optional)

Date: 19 Jul 18

Signed:

TFS Reference	CM0100918	Return Date:	/ /
Customer Reference	CO PAYMENT	Return Time:	
Equipment ID	PID 3000 - 62	Condition on return:	
Equipment Serial No.			

"We do more than give you great equipment... We give you great solutions!"

Phone: (Free Call) 1300 735 295 | Fax: (Free Call) 1800 675 123 | Email: RentalesAU@thermofisher.com

Issue 6 Nov 12 G0555

AES
ACTIVE ENVIRONMENTAL SOLUTIONS

Calibration and Service Report – PID

Company:	Geo-Environmental Solutions	**Manufacturer:**	RAE	**Serial #:**	590-902123
Contact:	Sarah Joyce	**Instrument:**	MINIRAE LITE SN: 590-902123	**Asset #:**	
Address:	29 Kirksway Place Battery Point TAS	**Model:**	MiniRAE Lite	**Part #:**	-
		Configuration:	VOC	**Sold:**	04.09.2012
		Wireless:	-	**Last Cal:**	25.01.2018
Phone:	03 6223 1839	**Network ID:**	-	**Job #:**	54266
Fax:		**Unit ID:**	-	**Cal Spec:**	
Email:	sjoyce@geosolutions.net.au	**Details:**		**Order #:**	-

Item	Test	Pass/Fail	Comments	Serial Number
Battery	NiCd, NiMH, Dry cell, LiIon	P		
Charger	Power Supply	P		
	Cradle, Travel Charger	P		
Pump	Flow	P	Cleaned, >500 mL/min	
Filter	Filter, fitting, etc	P	Dirty, replaced	
Alarms	Audible, visual, vibration	P		
Display	Operation	P		
Switches	Operation	P		
PCB	Operation	P		
Connectors	Condition	P		
Firmware	Version	P	Upgraded, 2.16	
Datalogger	Operation	P		
Monitor Housing	Condition	P		
Case	Condition / Type	P	Dirty, cleaned	
Sensors				
PID	Lamp	P	Dirty, cleaned	
PID	Sensor	P		
THP	Sensor	P		

Engineer's Report

Data download and PC configuration checked - Firmware upgraded to latest (Version: 2.16).
Pump assembly, Lamp and Rubber Boot cleaned, Pump Flow rate >500mL/min.
PID sensor checked if moisture sensitive - passed O.K.
New Filter fitted. Unit calibrated and serviceable.

Melbourne **Head Office** 2 Merchant Avenue THOMASTOWN VIC 3074 T: +(613) 9464 2300 F:+ (613) 9464 3421
Sydney 514 Lvl 2 6-8 Holden Street ASHFIELD NSW 2131 T: +(612) 9716 5966 F:+ (612) 9716 5988
Perth Unit 6 41 Holder Way MALAGA WA 6090 T: +(618) 9249 5663 F:+ (618) 9249 5362
Brisbane Unit 17 23 Ashtan Place BANYO QLD 4014 T: +(617) 3267 1433 F:+ (617) 3267 3559

sales@aesolutions.com.au ISO Certified 9001:2008 www.aesolutions.com.au

AES
ACTIVE ENVIRONMENTAL SOLUTIONS

Calibration Certificate

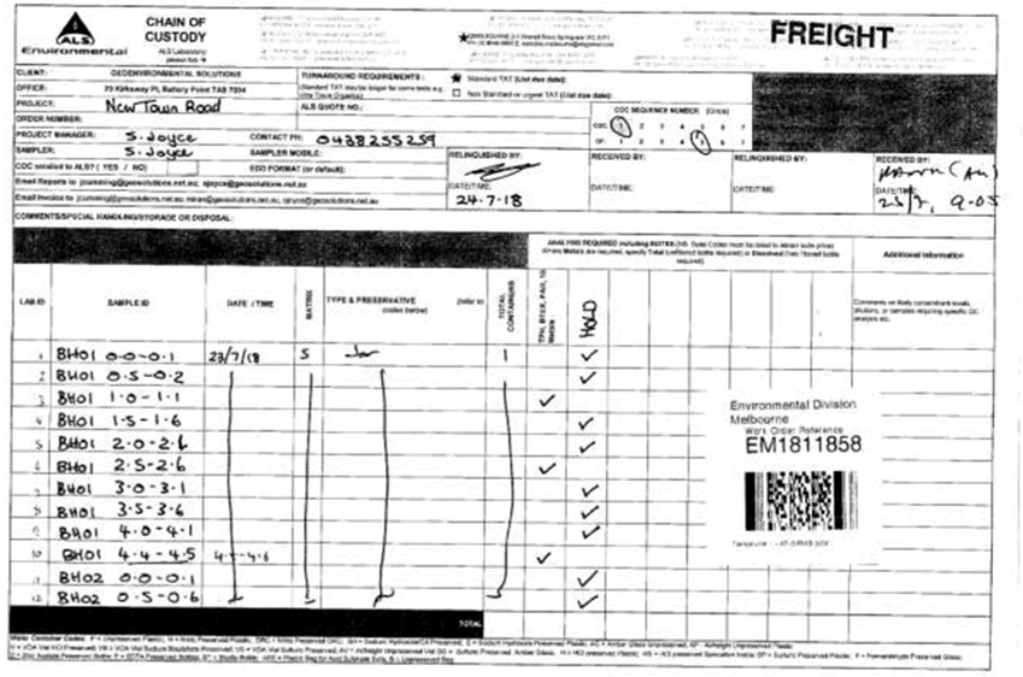
Sensor	Type	Serial No.	Span Gas	Concentration	Traceability Lot #	CF	Reading	
							Zero	Span
PID	10.6eV	1062N322047	Isobutylene	100 PPM	S110317-1		0	100.3

Calibrated/Repaired by: DARREN FRANCALANZA Date: 25.07.2018 Next Due: 25.01.2019

Melbourne **Head Office** 2 Merchant Avenue THOMASTOWN VIC 3074 T: +(613) 9464 2300 F:+ (613) 9464 3421
Sydney 514 Lvl 2 6-8 Holden Street ASHFIELD NSW 2131 T: +(612) 9716 5966 F:+ (612) 9716 5988
Perth Unit 6 41 Holder Way MALAGA WA 6090 T: +(618) 9249 5663 F:+ (618) 9249 5362
Brisbane Unit 17 23 Ashtan Place BANYO QLD 4014 T: +(617) 3267 1433 F:+ (617) 3267 3559

sales@aesolutions.com.au ISO Certified 9001:2008 www.aesolutions.com.au

Appendix 8 Laboratory Chain of Custody



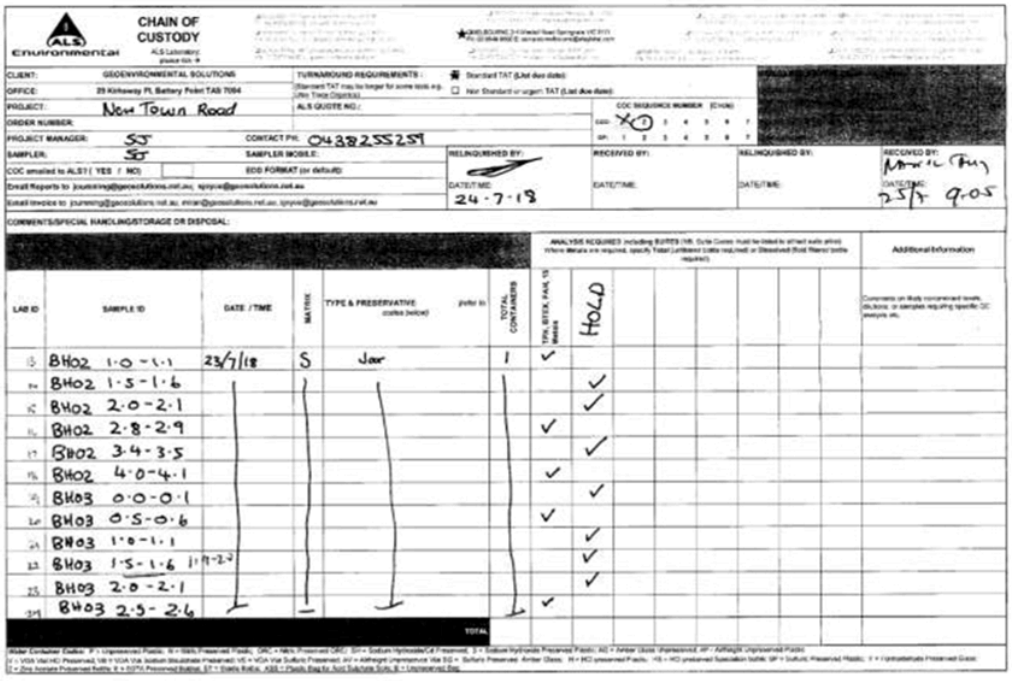
CHAIN OF CUSTODY

FREIGHT

CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 23 Kirkaway Pl, Battery Point TAS 7004
PROJECT: New Town Road
PROJECT MANAGER: S. Joyce
SAMPLER: S. Joyce
CONTACT PH: 0438255259
COC emailed to ALS? (YES / NO)
RELINQUISHED BY: DATE/TIME: 24.7.18
RECEIVED BY: DATE/TIME: 25/7, 9.05
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

Environmental Division Melbourne
Work Order Reference
EM1811858

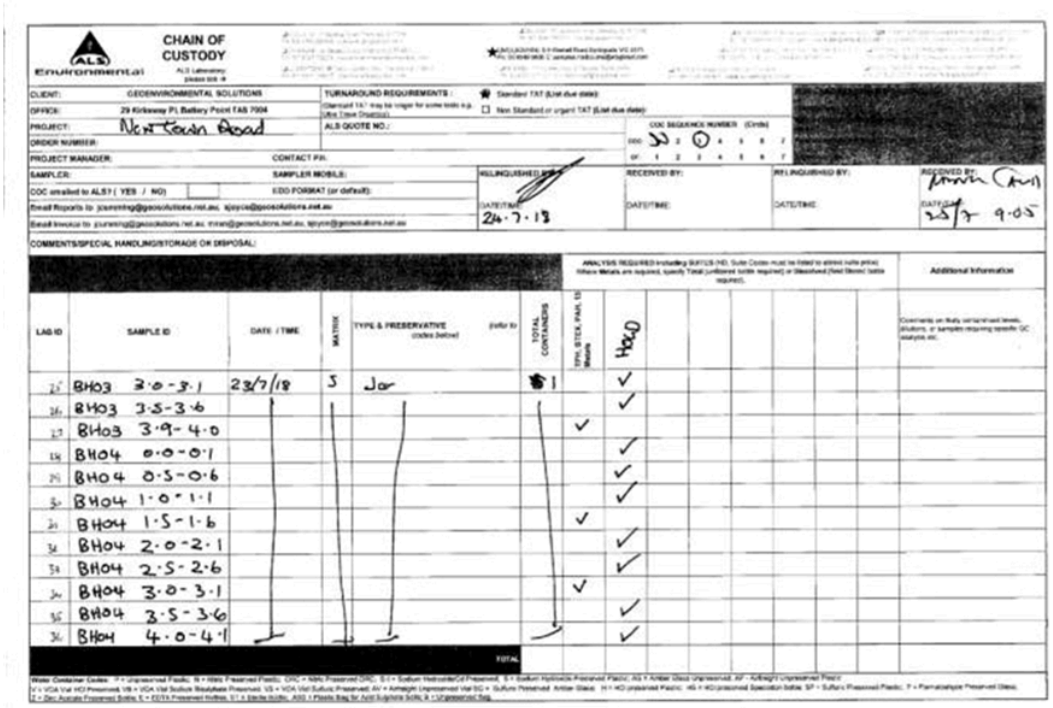
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE	TOTAL CONTAINERS	HOLD
1	BH01 0.0-0.1	23/7/18	S	Jar	1	✓
2	BH01 0.5-0.2					✓
3	BH01 1.0-1.1				✓	
4	BH01 1.5-1.6					✓
5	BH01 2.0-2.6					✓
6	BH01 2.5-2.6				✓	
7	BH01 3.0-3.1					✓
8	BH01 3.5-3.6					✓
9	BH01 4.0-4.1					✓
10	BH01 4.4-4.5	4.1-4.6			✓	
11	BH02 0.0-0.1					✓
12	BH02 0.5-0.6					✓



CHAIN OF CUSTODY

CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 23 Kirkaway Pl, Battery Point TAS 7004
PROJECT: New Town Road
PROJECT MANAGER: SJ
SAMPLER: SJ
CONTACT PH: 0438255259
COC emailed to ALS? (YES / NO)
RELINQUISHED BY: DATE/TIME: 24.7.18
RECEIVED BY: DATE/TIME: 25/7 9.05
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE	TOTAL CONTAINERS	HOLD
13	BH02 1.0-1.1	23/7/18	S	Jar	1	✓
14	BH02 1.5-1.6					✓
15	BH02 2.0-2.1					✓
16	BH02 2.8-2.9				✓	
17	BH02 3.4-3.5					✓
18	BH02 4.0-4.1				✓	
19	BH03 0.0-0.1					✓
20	BH03 0.5-0.6				✓	
21	BH03 1.0-1.1					✓
22	BH03 1.5-1.6 1.9-2.2					✓
23	BH03 2.0-2.1					✓
24	BH03 2.5-2.6				✓	



CHAIN OF CUSTODY

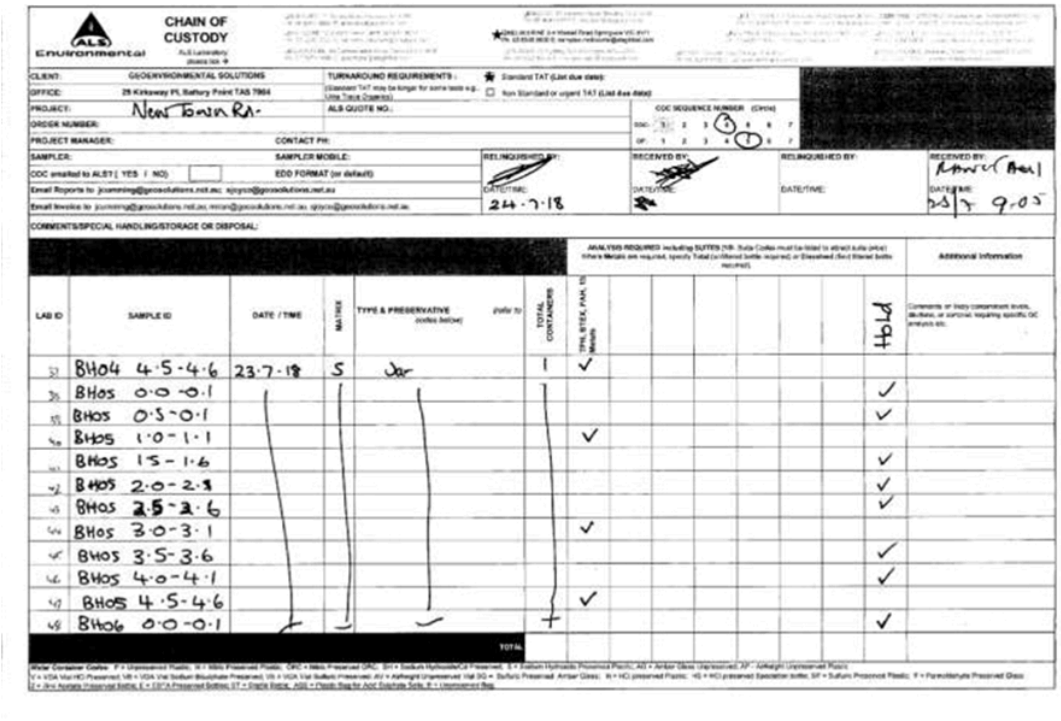
ALS Environmental

CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 29 Kirkoway Pl, Battery Point TAS 7004
PROJECT: New Town Road
ORDER NUMBER:
PROJECT MANAGER: CONTACT PH:
SAMPLER: SAMPLER MOBILE:
COC emailed to ALS? (YES / NO) EDD FORMAT (or default):
Email Reports to jcumming@geosolutions.net.au, sjoyce@geosolutions.net.au
Email Invoice to jcumming@geosolutions.net.au, miran@geosolutions.net.au, sjoyce@geosolutions.net.au
TURNAROUND REQUIREMENTS: Standard TAT (List due date); Non Standard or urgent TAT (List due date):
ALS QUOTE NO.:
COC SEQUENCE NUMBER (Circle): COC 1 2 3 4 5 6 7; OF 1 2 3 4 5 6 7
RELINQUISHED BY: DATE/TIME: 24.7.18
RECEIVED BY: DATE/TIME:
RELINQUISHED BY: DATE/TIME:
RECEIVED BY: DATE/TIME: 25/7 9.05
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price). Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required). Additional Information

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (codes below)	TOTAL CONTAINERS	TPH, BTEX, PAH, TS Metals	HOLD
26	BH03 3.0-3.1	23/7/18	S	Jar	1		✓
26	BH03 3.5-3.6						✓
27	BH03 3.9-4.0					✓	
28	BH04 0.0-0.1						✓
29	BH04 0.5-0.6						✓
30	BH04 1.0-1.1						✓
31	BH04 1.5-1.6					✓	
32	BH04 2.0-2.1						✓
33	BH04 2.5-2.6						✓
34	BH04 3.0-3.1					✓	
35	BH04 3.5-3.6						✓
36	BH04 4.0-4.1						✓
					TOTAL		

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic; V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HG = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; Y = Formaldehyde Preserved Glass; E = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.



CHAIN OF CUSTODY

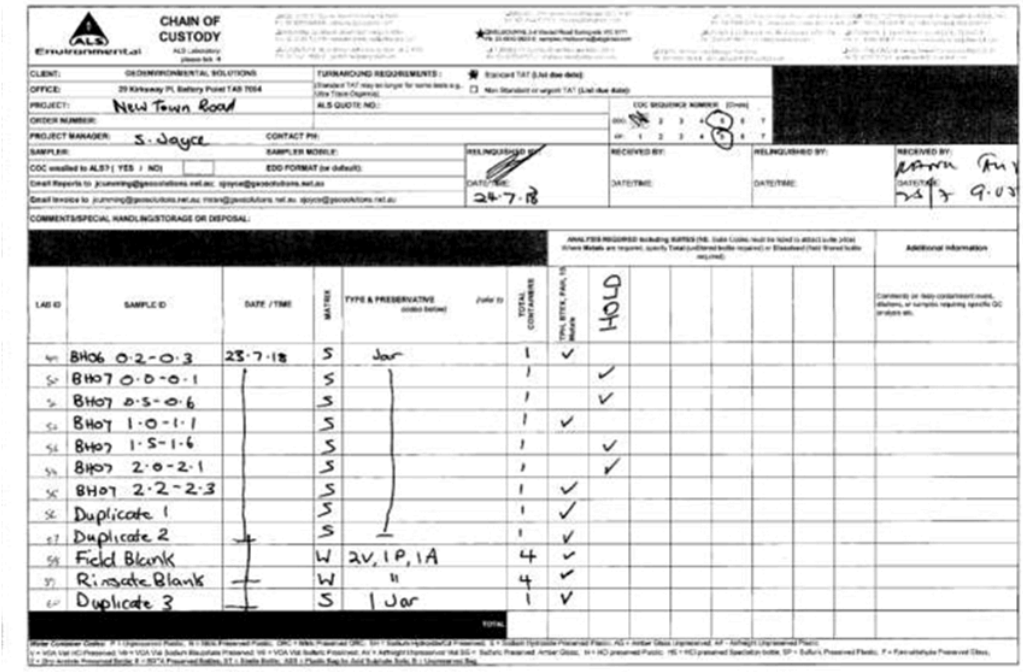
ALS Environmental

CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 29 Kirkoway Pl, Battery Point TAS 7004
PROJECT: New Town Rd
ORDER NUMBER:
PROJECT MANAGER: CONTACT PH:
SAMPLER: SAMPLER MOBILE:
COC emailed to ALS? (YES / NO) EDD FORMAT (or default):
Email Reports to jcumming@geosolutions.net.au, sjoyce@geosolutions.net.au
Email Invoice to jcumming@geosolutions.net.au, miran@geosolutions.net.au, sjoyce@geosolutions.net.au
TURNAROUND REQUIREMENTS: Standard TAT (List due date); Non Standard or urgent TAT (List due date):
ALS QUOTE NO.:
COC SEQUENCE NUMBER (Circle): COC 1 2 3 4 5 6 7; OF 1 2 3 4 5 6 7
RELINQUISHED BY: DATE/TIME: 24.7.18
RECEIVED BY: DATE/TIME:
RELINQUISHED BY: DATE/TIME:
RECEIVED BY: DATE/TIME: 25/7 9.05
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price). Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required). Additional Information

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (codes below)	TOTAL CONTAINERS	TPH, BTEX, PAH, TS Metals	HOLD
37	BH04 4.5-4.6	23.7.18	S	Jar	1	✓	
38	BH05 0.0-0.1						✓
39	BH05 0.5-0.1						✓
40	BH05 1.0-1.1					✓	
41	BH05 1.5-1.6						✓
42	BH05 2.0-2.1						✓
43	BH05 2.5-2.6						✓
44	BH05 3.0-3.1					✓	
45	BH05 3.5-3.6						✓
46	BH05 4.0-4.1						✓
47	BH05 4.5-4.6					✓	
48	BH06 0.0-0.1				+		✓
					TOTAL		

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic; V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HG = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; Y = Formaldehyde Preserved Glass; E = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.



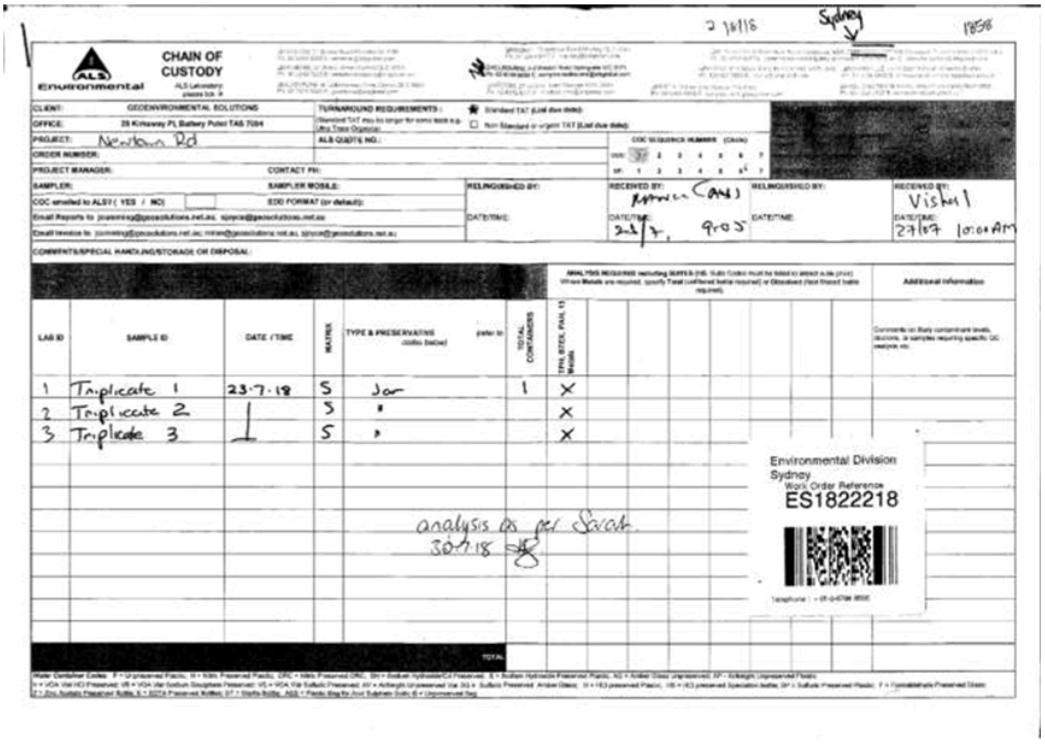
CHAIN OF CUSTODY

ALS Environmental

CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 29 Kirksway Pl, Battery Point TAS 7004
PROJECT: New Town Road
ORDER NUMBER:
PROJECT MANAGER: S. Joyce
SAMPLER:
COC emailed to ALS? (YES / NO)
Email Reports to jcumming@geosolutions.net.au; sjoyce@geosolutions.net.au
Email Invoice to jcumming@geosolutions.net.au; mrae@geosolutions.net.au; sjoyce@geosolutions.net.au
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

TURNAROUND REQUIREMENTS: Standard TAT (List due date)
Non Standard or urgent TAT (List due date)
ALS QUOTE NO.:
CONTACT PH:
SAMPLER MOBILE:
EDD FORMAT (or default):
RELINQUISHED BY: DATE/TIME: 24.7.18
RECEIVED BY: DATE/TIME:
RELINQUISHED BY: DATE/TIME:
RECEIVED BY: DATE/TIME: 25/7 9.03

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	TPH, BTEX, PAH, 15 Metals	HOLD	Additional Information
4	BH06 0.2-0.3	23.7.18	S	Jar	1	✓		
5	BH07 0.0-0.1		S		1		✓	
5	BH07 0.5-0.6		S		1		✓	
52	BH07 1.0-1.1		S		1	✓		
54	BH07 1.5-1.6		S		1		✓	
55	BH07 2.0-2.1		S		1		✓	
56	BH07 2.2-2.3		S		1	✓		
56	Duplicate 1		S		1	✓		
57	Duplicate 2		S		1	✓		
58	Field Blank		W	2V, 1P, 1A	4	✓		
59	Rinsate Blank		W	"	4	✓		
60	Duplicate 3		S	1 Jar	1	✓		
					TOTAL			



2/8/18 Sydney 1858

CHAIN OF CUSTODY

ALS Environmental

CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 29 Kirksway Pl, Battery Point TAS 7004
PROJECT: Newtown Rd
ORDER NUMBER:
PROJECT MANAGER:
SAMPLER:
COC emailed to ALS? (YES / NO)
Email Reports to joanneing@geosolutions.net.au; sjoyce@geosolutions.net.au
Email Invoice to joanneing@geosolutions.net.au; mrae@geosolutions.net.au; sjoyce@geosolutions.net.au
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

TURNAROUND REQUIREMENTS: Standard TAT (List due date)
Non Standard or urgent TAT (List due date)
ALS QUOTE NO.:
CONTACT PH:
SAMPLER MOBILE:
EDD FORMAT (or default):
RELINQUISHED BY: DATE/TIME:
RECEIVED BY: (ANA) DATE/TIME: 2/8/18 9:05
RELINQUISHED BY: DATE/TIME:
RECEIVED BY: Vishal DATE/TIME: 27/07 10:00AM

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	TPH, BTEX, PAH, 15 Metals	Additional Information
1	Triplicate 1	23.7.18	S	Jar	1	X	
2	Triplicate 2		S	"		X	
3	Triplicate 3		S	"		X	
					TOTAL		

analysis as per Sarah 30.7.18

Environmental Division
Sydney
Work Order Reference
ES1822218

re-batch
tray ns 1458-69

Shirley LeCornu

From: Sarah Joyce <sjoyce@geosolutions.net.au>
Sent: Tuesday, 31 July 2018 4:25 PM
To: Shirley LeCornu
Subject: Rebatch EM1811858
Attachments: EM1811858_0_SRN_180726095012.pdf

Hello Shirley,

Please conduct analysis (TPH/TRH/PAH/ 15 metals) on the follow samples:

1 EM1811858-004
2 EM1811858-008
3 EM1811858-012
4 EM1811858-015
5 EM1811858-021
6 EM1811858-025
7 EM1811858-029
8 EM1811858-033
9 EM1811858-035
10 EM1811858-042
11 EM1811858-046

THANKS!

Kind Regards,

Sarah Joyce
Environmental Scientist
GEO-ENVIRONMENTAL SOLUTIONS P/L
29 Kirksway Place, Battery Point, 7004
P: 0362231839
E: sjoyce@geosolutions.net.au

GES

SCANNED

Environmental Division
Melbourne
Work Order Reference
EM1812173

Telephone : +61-3-8549 9600

MS-3033-3034

BN 01/8

1

BN 01/8

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EM1811858**

Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: sjoyce@geosolutions.net.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Facsimile	: +61 03 6223 4539	Facsimile	: +61-3-8549 9626
Project	: Newtown Rd	Page	: 1 of 4
Order number	:	Quote number	: EB2017GEOENVSOL0001 (EN/222/17)
C-O-C number	: ---	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ---		
Sampler	: SJ		

Dates

Date Samples Received	: 25-Jul-2018 09:05	Issue Date	: 26-Jul-2018
Client Requested Due Date	: 01-Aug-2018	Scheduled Reporting Date	: **01-Aug-2018**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 4	Temperature	: 3.9°C - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 59 / 23

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**

Issue Date	26-Jul-2018
Page	2 of 4
Work Order	EM1811858 Amendment 0
Client	GEO-ENVIRONMENTAL SOLUTIONS

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

	Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	On Hold) SOIL - No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - S-03 15 Metals (NEPM 2013 Suite - incl. Digestion)	SOIL - S-07 TRH/BTEX/NPAH (SIM)
	EM1811858-001	23-Jul-2018 00:00	BH01 0.0-0.1	✓			
	EM1811858-002	23-Jul-2018 00:00	BH01 0.5-0.2	✓			
	EM1811858-003	23-Jul-2018 00:00	BH01 1.0-1.1		✓	✓	✓
(1)	EM1811858-004	23-Jul-2018 00:00	BH01 1.5-1.6	✗	✓	✓	✓
	EM1811858-005	23-Jul-2018 00:00	BH01 2.0-2.1	✓			
	EM1811858-006	23-Jul-2018 00:00	BH01 2.5-2.6		✓	✓	✓
	EM1811858-007	23-Jul-2018 00:00	BH01 3.0-3.1	✓			
(2)	EM1811858-008	23-Jul-2018 00:00	BH01 3.5-3.6	✗	✓	✓	✓
	EM1811858-009	23-Jul-2018 00:00	BH01 4.0-4.1	✓			
	EM1811858-010	23-Jul-2018 00:00	BH01 4.4-4.5		✓	✓	✓
	EM1811858-011	23-Jul-2018 00:00	BH02 0.0-0.1	✓			
(3)	EM1811858-012	23-Jul-2018 00:00	BH02 0.5-0.6	✗	✓	✓	✓
	EM1811858-013	23-Jul-2018 00:00	BH02 1.0-1.1		✓	✓	✓
	EM1811858-014	23-Jul-2018 00:00	BH02 1.5-1.6	✓			
(4)	EM1811858-015	23-Jul-2018 00:00	BH02 2.0-2.1	✗	✓	✓	✓
	EM1811858-016	23-Jul-2018 00:00	BH02 2.8-2.9		✓	✓	✓
	EM1811858-017	23-Jul-2018 00:00	BH02 3.4-3.5	✓			
	EM1811858-018	23-Jul-2018 00:00	BH02 4.0-4.1		✓	✓	✓
	EM1811858-019	23-Jul-2018 00:00	BH03 0.0-0.1	✓			
	EM1811858-020	23-Jul-2018 00:00	BH03 0.5-0.6		✓	✓	✓
(5)	EM1811858-021	23-Jul-2018 00:00	BH03 1.0-1.1	✗	✓	✓	✓
	EM1811858-022	23-Jul-2018 00:00	BH03 1.5-1.6	✓			
	EM1811858-024	23-Jul-2018 00:00	BH03 2.5-2.6		✓	✓	✓
(6)	EM1811858-025	23-Jul-2018 00:00	BH03 3.0-3.1	✗	✓	✓	✓
	EM1811858-026	23-Jul-2018 00:00	BH03 3.5-3.6	✓			
	EM1811858-027	23-Jul-2018 00:00	BH03 3.9-4.0		✓	✓	✓
	EM1811858-028	23-Jul-2018 00:00	BH04 0.0-0.1	✓			
(7)	EM1811858-029	23-Jul-2018 00:00	BH04 0.5-0.6	✗	✓	✓	✓
	EM1811858-030	23-Jul-2018 00:00	BH04 1.0-1.1	✓			
	EM1811858-031	23-Jul-2018 00:00	BH04 1.5-1.6		✓	✓	✓
	EM1811858-032	23-Jul-2018 00:00	BH04 2.0-2.1	✓			
(8)	EM1811858-033	23-Jul-2018 00:00	BH04 2.5-2.6	✗	✓	✓	✓
	EM1811858-034	23-Jul-2018 00:00	BH04 3.0-3.1		✓	✓	✓
(9)	EM1811858-035	23-Jul-2018 00:00	BH04 3.5-3.6	✗	✓	✓	✓
	EM1811858-036	23-Jul-2018 00:00	BH04 4.0-4.1	✓			

Issue Date	26-Jul-2018
Page	3 of 4
Work Order	EM1811858 Amendment 0
Client	GEO-ENVIRONMENTAL SOLUTIONS

Laboratory sample ID	Client sampling date / time	Client sample ID	On Hold: SOIL - No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - S-03 15 Metals (NEPM 2013 Suite - incl. Digestion)	SOIL - S-07 TRH-BTEX/PAH (SIM)
EM1811858-037	23-Jul-2018 00:00	BH04 4.5-4.6		✓	✓	✓
EM1811858-038	23-Jul-2018 00:00	BH05 0.0-0.1	✓			
EM1811858-039	23-Jul-2018 00:00	BH05 0.5-0.6	✓			
EM1811858-040	23-Jul-2018 00:00	BH05 1.0-1.1		✓	✓	✓
EM1811858-041	23-Jul-2018 00:00	BH05 1.5-1.6	✓	✓	✓	✓
(10) EM1811858-042	23-Jul-2018 00:00	BH05 2.0-2.1	✓	✓	✓	✓
EM1811858-043	23-Jul-2018 00:00	BH05 2.5-2.6	✓			
EM1811858-044	23-Jul-2018 00:00	BH05 3.0-3.1		✓	✓	✓
EM1811858-045	23-Jul-2018 00:00	BH05 3.5-3.6	✓	✓	✓	✓
(11) EM1811858-046	23-Jul-2018 00:00	BH05 4.0-4.1	✓	✓	✓	✓
EM1811858-047	23-Jul-2018 00:00	BH05 4.5-4.6		✓	✓	✓
EM1811858-048	23-Jul-2018 00:00	BH06 0.0-0.1	✓			
EM1811858-049	23-Jul-2018 00:00	BH06 0.2-0.3		✓	✓	✓
EM1811858-050	23-Jul-2018 00:00	BH07 0.0-0.1	✓			
EM1811858-051	23-Jul-2018 00:00	BH07 0.5-0.6	✓			
EM1811858-052	23-Jul-2018 00:00	BH07 1.0-1.1		✓	✓	✓
EM1811858-053	23-Jul-2018 00:00	BH07 1.5-1.6	✓			
EM1811858-054	23-Jul-2018 00:00	BH07 2.0-2.1	✓			
EM1811858-055	23-Jul-2018 00:00	BH07 2.2-2.3		✓	✓	✓
EM1811858-056	23-Jul-2018 00:00	Duplicate 1		✓	✓	✓
EM1811858-057	23-Jul-2018 00:00	Duplicate 2		✓	✓	✓
EM1811858-060	23-Jul-2018 00:00	Duplicate 3		✓	✓	✓

→ No analysis as per attached email - BN 01/8.

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-03T 15 Metals (Total) (NEPM)	WATER - W-07 TRH/BTEX/PAH
EM1811858-058	23-Jul-2018 00:00	Field Blank	✓		✓
EM1811858-059	23-Jul-2018 00:00	Rinsate Blank		✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Bharathi Narayanan

From: Shirley LeCornu
Sent: Wednesday, 1 August 2018 9:52 AM
To: Bharathi Narayanan
Subject: FW: Rebatch EM1811858

Shirley LeCornu
Client Services Coordinator – Springvale
Environmental

T +61 3 8549 9600 **D** +61 3 8549 9630
F +61 3 8549 9626
Shirley.lecornu@alsglobal.com
2-4 Westall Rd
Springvale Vic 3171
Australia

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From: Sarah Joyce [mailto:sjoyce@geosolutions.net.au]
Sent: Wednesday, 1 August 2018 9:27 AM
To: Shirley LeCornu <shirley.lecornu@alsglobal.com>
Subject: RE: Rebatch EM1811858

Yes 46. (did that a few times yesterday – must have been tired!)

From: Shirley LeCornu <shirley.lecornu@alsglobal.com>
Sent: Wednesday, 1 August 2018 9:08 AM
To: Sarah Joyce <sjoyce@geosolutions.net.au>
Subject: RE: Rebatch EM1811858

Hi Sarah

Can you please confirm last sample on the list.

Marked as 46 below. Mark as 45 on the SRN.

Will log as 46 for now.

1

Kind regards

Shirley

Shirley LeCornu
Client Services Coordinator – Springvale
Environmental

T +61 3 8549 9600 D +61 3 8549 9630
F +61 3 8549 9626
Shirley.lecornu@alsglobal.com
2-4 Westall Rd
Springvale Vic 3171
Australia

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www.alsglobal.com

From: Sarah Joyce [mailto:sjoyce@geosolutions.net.au]
Sent: Tuesday, 31 July 2018 4:25 PM
To: Shirley LeCornu <shirley.lecornu@alsglobal.com>
Subject: Rebatch EM1811858

Hello Shirley,

Please conduct analysis (TPH/TRH/PAH/ 15 metals) on the follow samples:

EM1811858-004
EM1811858-008
EM1811858-012
EM1811858-015
EM1811858-021
EM1811858-025
EM1811858-029
EM1811858-033
EM1811858-035
EM1811858-042
EM1811858-046

THANKS!

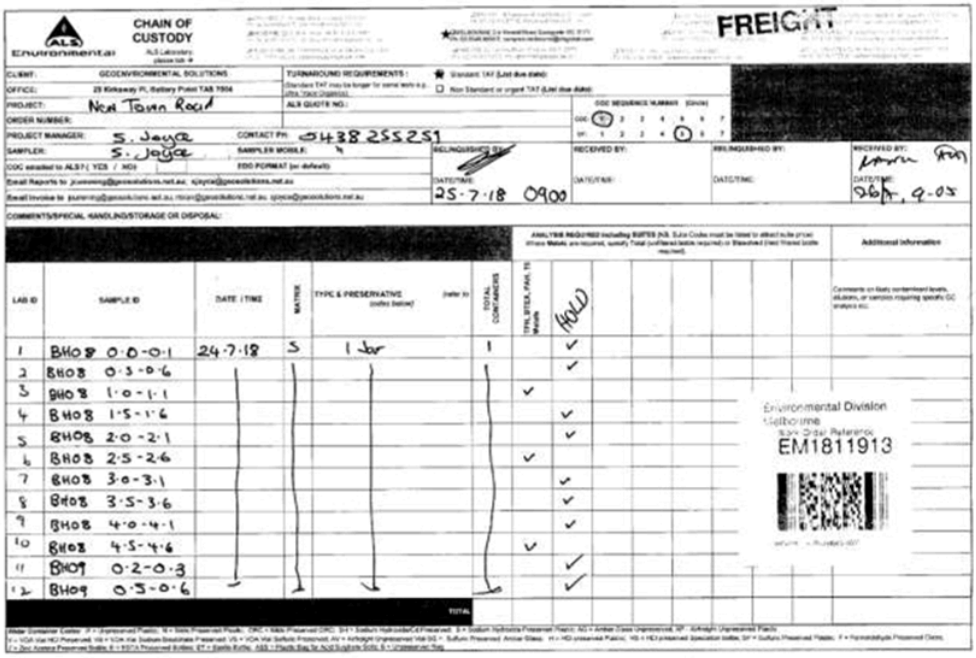
Kind Regards,

Sarah Joyce
Environmental Scientist

2

GEO-ENVIRONMENTAL SOLUTIONS P/L
29 Kirksway Place, Battery Point, 7004
P: 0362231839
E: sjoyce@geosolutions.net.au

GES



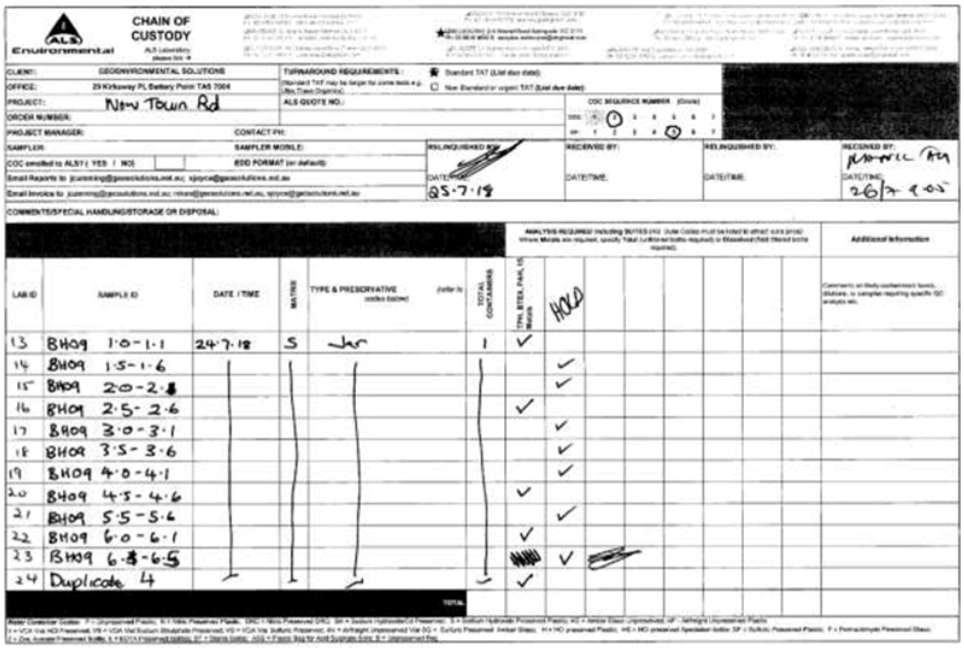
CHAIN OF CUSTODY

FREIGHT

CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 29 Kirkaway Pl, Battery Point TAS 7004
PROJECT: New Town Road
ORDER NUMBER:
PROJECT MANAGER: S. Joyce
SAMPLER: S. Joyce
CONTACT PH: 0438 255 251
SAMPLER MOBILE:
COC emailed to ALS? (YES / NO)
EDD FORMAT (or default):
TURNAROUND REQUIREMENTS: Standard TAT (List due date):
ALS QUOTE NO.:
COC SEQUENCE NUMBER
RELINQUISHED BY: DATE/TIME: 25-7-18 0900
RECEIVED BY: DATE/TIME:
RELINQUISHED BY: DATE/TIME:
RECEIVED BY: DATE/TIME: 26/7, 9:05
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

Environmental Division Melbourne
Work Order Reference
EM1811913

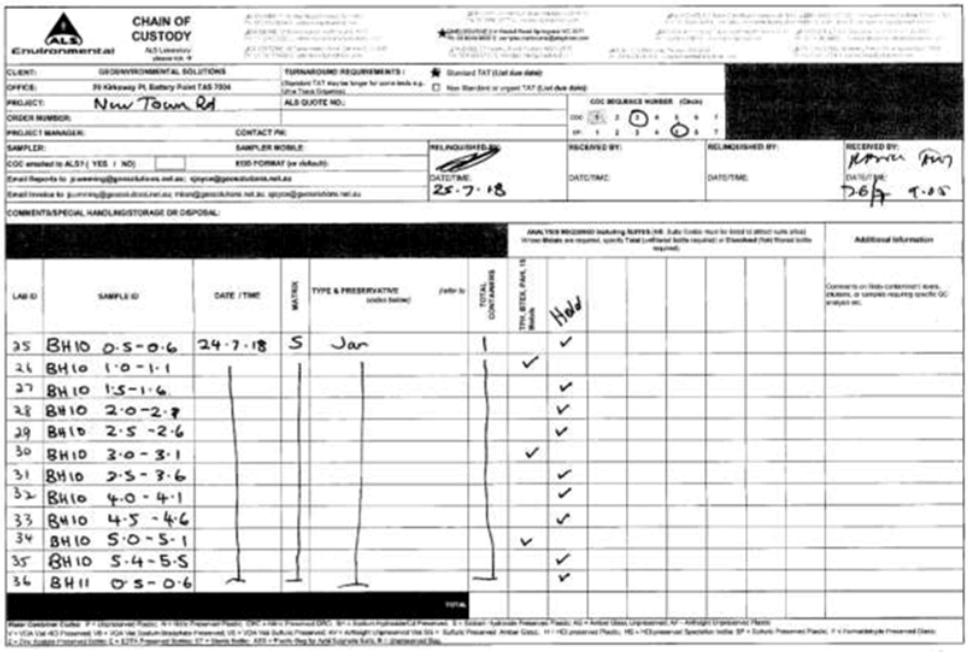
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE	TOTAL CONTAINERS	HOLD
1	BH08 0.0-0.1	24.7.18	S	1 Jar	1	✓
2	BH08 0.3-0.6					✓
3	BH08 1.0-1.1				✓	
4	BH08 1.5-1.6					✓
5	BH08 2.0-2.1					✓
6	BH08 2.5-2.6				✓	
7	BH08 3.0-3.1					✓
8	BH08 3.5-3.6					✓
9	BH08 4.0-4.1					✓
10	BH08 4.5-4.6				✓	
11	BH09 0.2-0.3					✓
12	BH09 0.3-0.6					✓
	TOTAL					



CHAIN OF CUSTODY

CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 29 Kirkaway Pl, Battery Point TAS 7004
PROJECT: New Town Rd
ORDER NUMBER:
PROJECT MANAGER:
SAMPLER:
CONTACT PH:
SAMPLER MOBILE:
COC emailed to ALS? (YES / NO)
EDD FORMAT (or default):
TURNAROUND REQUIREMENTS: Standard TAT (List due date):
ALS QUOTE NO.:
COC SEQUENCE NUMBER
RELINQUISHED BY: DATE/TIME: 25.7.18
RECEIVED BY: DATE/TIME:
RELINQUISHED BY: DATE/TIME:
RECEIVED BY: DATE/TIME: 26/7 9:05
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE	TOTAL CONTAINERS	HOLD
13	BH09 1.0-1.1	24.7.18	S	Jar	1	✓
14	BH09 1.5-1.6					✓
15	BH09 2.0-2.1					✓
16	BH09 2.5-2.6				✓	
17	BH09 3.0-3.1					✓
18	BH09 3.5-3.6					✓
19	BH09 4.0-4.1					✓
20	BH09 4.5-4.6				✓	
21	BH09 5.5-5.6					✓
22	BH09 6.0-6.1				✓	
23	BH09 6.3-6.5					✓
24	Duplicate 4				✓	
	TOTAL					



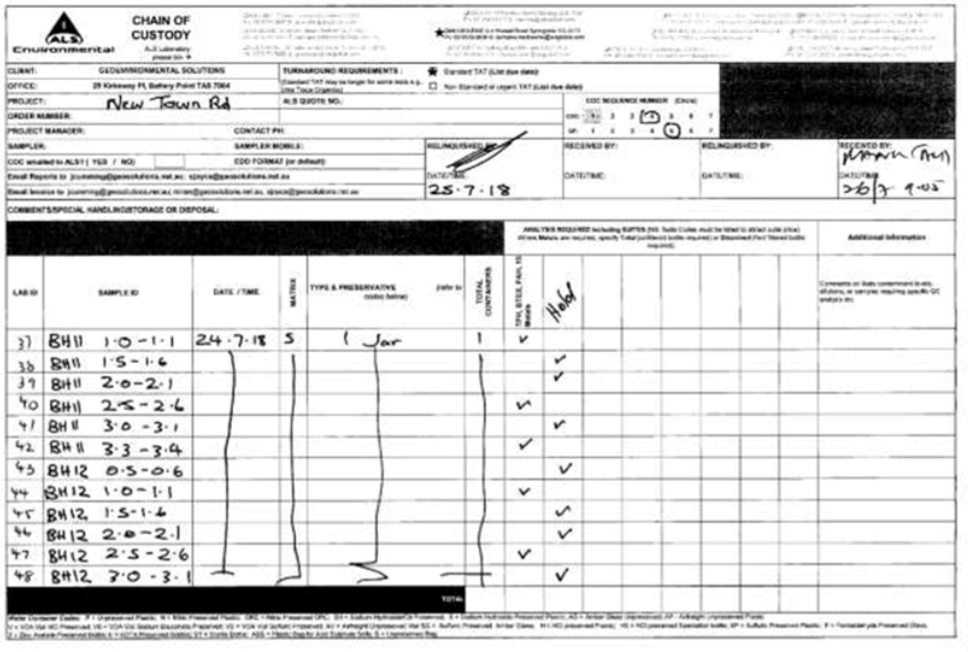
CHAIN OF CUSTODY

ALS Environmental

CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 29 Kirkaway Pl, Battery Point TAS 7004
PROJECT: New Town Rd
ORDER NUMBER:
PROJECT MANAGER:
SAMPLER:
COC emailed to ALS? (YES / NO)
Email Reports to: jcumming@geosolutions.net.au; sjoyce@geosolutions.net.au
Email Invoice to: jcumming@geosolutions.net.au; hiren@geosolutions.net.au; sjoyce@geosolutions.net.au
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

TURNAROUND REQUIREMENTS: ★ Standard TAT (List due date); ☐ Non Standard or urgent TAT (List due date):
ALS QUOTE NO.:
CONTACT PH:
SAMPLER MOBILE:
EDD FORMAT (or default):
COC SEQUENCE NUMBER (Circle): 1 2 3 4 5 6 7 of 7
RELINQUISHED BY: DATE/TIME: 25·7·18
RECEIVED BY: DATE/TIME:
RELINQUISHED BY: DATE/TIME:
RECEIVED BY: DATE/TIME: 26/7 9:05

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	refer to	TOTAL CONTAINERS	TPH, BTEX, PAH, VOC	Hold	Additional Information
25	BH10 0.5-0.6	24·7·18	S	Jar		1		✓	
26	BH10 1.0-1.1						✓		
27	BH10 1.5-1.6							✓	
28	BH10 2.0-2.1							✓	
29	BH10 2.5-2.6							✓	
30	BH10 3.0-3.1						✓		
31	BH10 3.5-3.6							✓	
32	BH10 4.0-4.1							✓	
33	BH10 4.5-4.6							✓	
34	BH10 5.0-5.1						✓		
35	BH10 5.4-5.5							✓	
36	BH11 0.5-0.6							✓	
						TOTAL			



CHAIN OF CUSTODY

ALS Environmental

CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 29 Kirkaway Pl, Battery Point TAS 7004
PROJECT: New Town Rd
ORDER NUMBER:
PROJECT MANAGER:
SAMPLER:
COC emailed to ALS? (YES / NO)
Email Reports to: jcumming@geosolutions.net.au; sjoyce@geosolutions.net.au
Email Invoice to: jcumming@geosolutions.net.au; hiren@geosolutions.net.au; sjoyce@geosolutions.net.au
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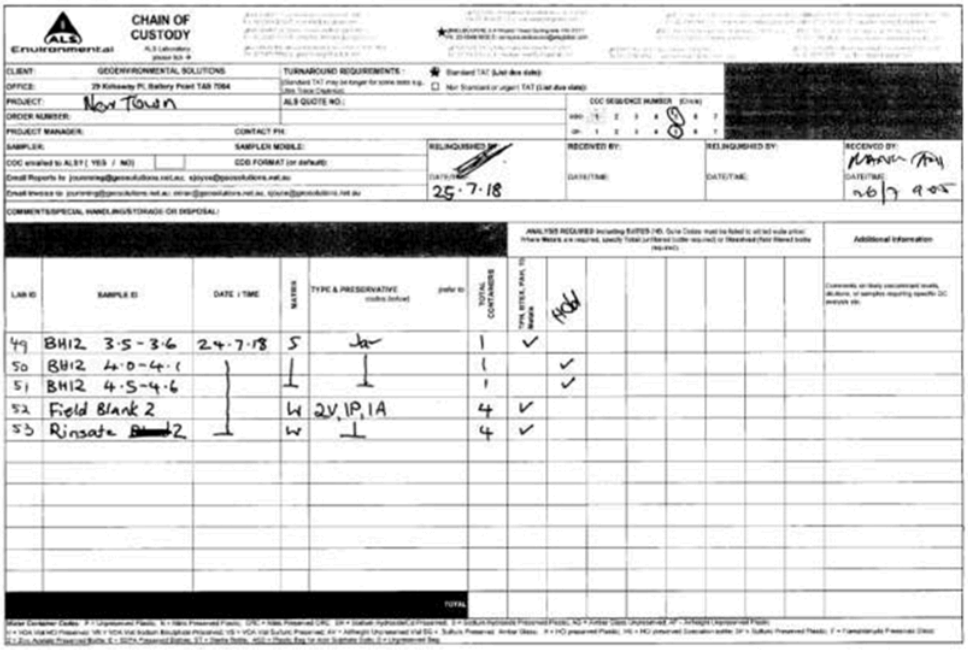
ALS QUOTE NO.:
CONTACT PH:
SAMPLER MOBILE:
EDD FORMAT (or default):
COC SEQUENCE NUMBER (Circle): 1 2 3 4 5 6 7 of 7
RELINQUISHED BY: DATE/TIME: 25·7·18
RECEIVED BY: DATE/TIME:
RELINQUISHED BY: DATE/TIME:
RECEIVED BY: DATE/TIME: 26/7 9:05

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	refer to	TOTAL CONTAINERS	TPH, BTEX, PAH, VOC	Hold	Additional Information
37	BH11 1.0-1.1	24·7·18	S	(Jar		1	✓		
38	BH11 1.5-1.6							✓	
39	BH11 2.0-2.1							✓	
40	BH11 2.5-2.6						✓		
41	BH11 3.0-3.1							✓	
42	BH11 3.3-3.4						✓		
43	BH12 0.5-0.6							✓	
44	BH12 1.0-1.1						✓		
45	BH12 1.5-1.6							✓	
46	BH12 2.0-2.1							✓	
47	BH12 2.5-2.6						✓		
48	BH12 3.0-3.1							✓	
						TOTAL			



CHAIN OF CUSTODY

ALS Environmental

CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 29 Kirksway Pl, Battery Point TAS 7004
PROJECT: New Town
ORDER NUMBER:
PROJECT MANAGER:
SAMPLER:
COC emailed to ALS? (YES / NO)
Email Reports to: jcumming@geosolutions.net.au; sjoyce@geosolutions.net.au
Email Invoice to: jcumming@geosolutions.net.au; mrae@geosolutions.net.au; sjoyce@geosolutions.net.au
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

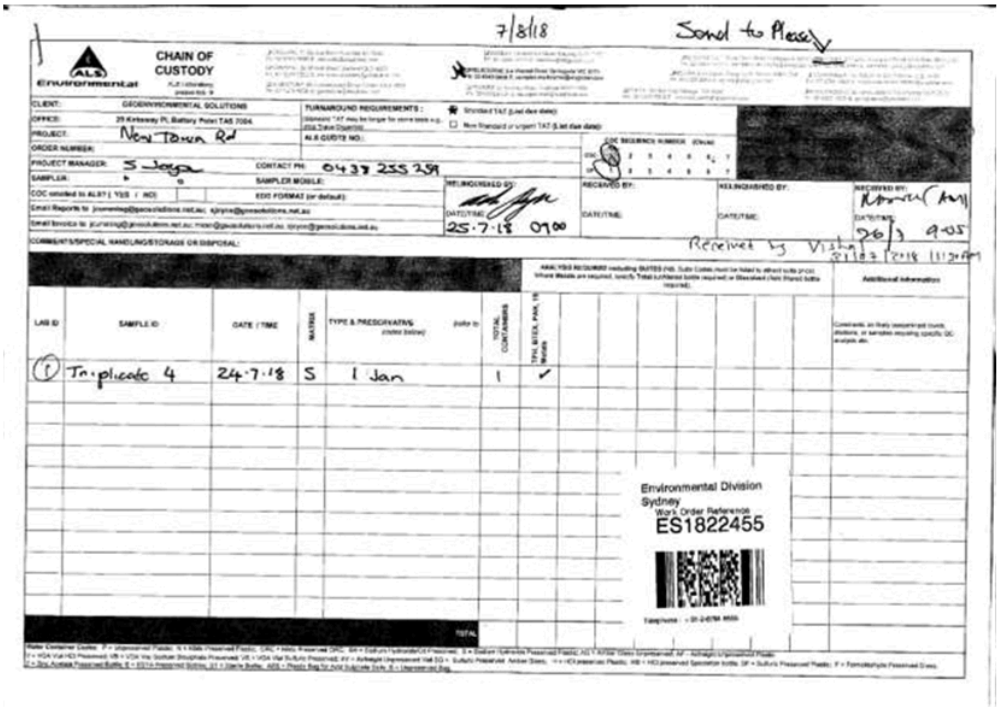
TURNAROUND REQUIREMENTS: Standard TAT (List due date)
ALS QUOTE NO.:
CONTACT PH:
SAMPLER MOBILE:
EDD FORMAT (or default):
COC SEQUENCE NUMBER (Circle): 1 2 3 4 5 6 7 8

RELINQUISHED BY: DATE/TIME: 25-7-18
RECEIVED BY: DATE/TIME:
RELINQUISHED BY: DATE/TIME:
RECEIVED BY: DATE/TIME: 26/7 9:05

ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price). Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	TPH, BTEX, PAH, VOCs	HOLD	Additional Information
49	BH12 3.5-3.6	24.7.18	S	Jar	1	✓		
50	BH12 4.0-4.1	"	"	"	1		✓	
51	BH12 4.5-4.6	"	"	"	1		✓	
52	Field Blank 2	"	W	2V, 1P, 1A	4	✓		
53	Rinsate Blank 2	"	W	"	4	✓		
	TOTAL							

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic; V = VOA Vial HCl Preserved; VS = VOA Vial Sodium Bisulphate Preserved; VA = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.



7/8/18 Send to Please

CHAIN OF CUSTODY

ALS Environmental

CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 29 Kirksway Pl, Battery Point TAS 7004
PROJECT: New Town Rd
ORDER NUMBER:
PROJECT MANAGER: S Joyce
SAMPLER:
COC emailed to ALS? (YES / NO)
Email Reports to: jcumming@geosolutions.net.au; sjoyce@geosolutions.net.au
Email Invoice to: jcumming@geosolutions.net.au; mrae@geosolutions.net.au; sjoyce@geosolutions.net.au
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

TURNAROUND REQUIREMENTS: Standard TAT (List due date)
ALS QUOTE NO.:
CONTACT PH: 0437 255 259
SAMPLER MOBILE:
EDD FORMAT (or default):
COC SEQUENCE NUMBER (Circle): 1 2 3 4 5 6 7 8

RELINQUISHED BY: DATE/TIME: 25.7.18 0900
RECEIVED BY: DATE/TIME:
RELINQUISHED BY: DATE/TIME:
RECEIVED BY: DATE/TIME: 26/7 9:05

Received by Vistar 31/7/2018 11:24AM

ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price). Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	TPH, BTEX, PAH, VOCs	Additional Information
1	Triplicate 4	24.7.18	S	1 Jar	1	✓	
	TOTAL						

Environmental Division
Sydney
Work Order Reference
ES1822455

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic; V = VOA Vial HCl Preserved; VS = VOA Vial Sodium Bisulphate Preserved; VA = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

re-batch
tracy: HS1474-76

Shirley LeCornu

From:	Sarah Joyce <sjoyce@geosolutions.net.au>
Sent:	Tuesday, 31 July 2018 4:21 PM
To:	Shirley LeCornu
Subject:	Re-batch's for New Town Road
Attachments:	Rebatch request EM1811913.pdf; REbatch request EM1811891.pdf

Hello Shirley,

Please see the attached SRN with Re-batch details for New Town Road:

EM1811913
EM1811891

Kind Regards,

Sarah Joyce
Environmental Scientist
GEO-ENVIRONMENTAL SOLUTIONS P/L
29 Kirksway Place, Battery Point, 7004
P: 0362231839
E: sjoyce@geosolutions.net.au

Environmental Division
Melbourne
Work Order Reference
EM1812174

Telephone : +61-3-8549 9600

MS: 3034
BN 01/8

1

Rebatch x3

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: EM1811913		
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: sjoyce@geosolutions.net.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Facsimile	: +61 03 6223 4539	Facsimile	: +61-3-8549 9626
Project	: Newtown Rd	Page	: 1 of 4
Order number	:	Quote number	: EB2017GEOENVSOL0001 (EN/222/17)
C-O-C number	: ---	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ---		
Sampler	: SARAH JOYCE		

Dates

Date Samples Received	: 26-Jul-2018 09:05	Issue Date	: 27-Jul-2018
Client Requested Due Date	: 02-Aug-2018	Scheduled Reporting Date	: **02-Aug-2018**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 2	Temperature	: 5.9°C - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 53 / 19

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**

RIGHT SOLUTIONS RIGHT PARTNER

Issue Date	27-Jul-2018
Page	2 of 4
Work Order	EM1811913 Amendment 0
Client	GEO-ENVIRONMENTAL SOLUTIONS

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	On Hold) SOIL - No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - S-03 15 Metals (NEPM 2013 Suite - incl. Digestion)	SOIL - S-07 (HHBSTEXN/PAH (SIM)
EM1811913-001	24-Jul-2018 00:00	BH08_0.0-0.1	✓			
EM1811913-002	24-Jul-2018 00:00	BH08_0.5-0.6	✓			
EM1811913-003	24-Jul-2018 00:00	BH08_1.0-1.1		✓	✓	✓
EM1811913-004	24-Jul-2018 00:00	BH08_1.5-1.6	✓			
(1) EM1811913-005	24-Jul-2018 00:00	BH08_2.0-2.1	✓	✓	✓	✓
EM1811913-006	24-Jul-2018 00:00	BH08_2.5-2.6		✓	✓	✓
EM1811913-007	24-Jul-2018 00:00	BH08_3.0-3.1	✓			
EM1811913-008	24-Jul-2018 00:00	BH08_3.5-3.6	✓			
EM1811913-009	24-Jul-2018 00:00	BH08_4.0-4.1	✓			
EM1811913-010	24-Jul-2018 00:00	BH08_4.5-4.6		✓	✓	✓
EM1811913-011	24-Jul-2018 00:00	BH09_0.2-0.3	✓			
EM1811913-012	24-Jul-2018 00:00	BH09_0.5-0.6	✓			
EM1811913-013	24-Jul-2018 00:00	BH09_1.0-1.1		✓	✓	✓
EM1811913-014	24-Jul-2018 00:00	BH09_1.5-1.6	✓			
EM1811913-015	24-Jul-2018 00:00	BH09_2.0-2.1	✓			
EM1811913-016	24-Jul-2018 00:00	BH09_2.5-2.6		✓	✓	✓
EM1811913-017	24-Jul-2018 00:00	BH09_3.0-3.1	✓			
EM1811913-018	24-Jul-2018 00:00	BH09_3.5-3.6	✓			
EM1811913-019	24-Jul-2018 00:00	BH09_4.0-4.1	✓			
EM1811913-020	24-Jul-2018 00:00	BH09_4.5-4.6		✓	✓	✓
EM1811913-021	24-Jul-2018 00:00	BH09_5.5-5.6	✓			
EM1811913-022	24-Jul-2018 00:00	BH09_6.0-6.1		✓	✓	✓
EM1811913-023	24-Jul-2018 00:00	BH09_6.3-6.5	✓			
EM1811913-024	24-Jul-2018 00:00	Duplicate 4		✓	✓	✓
EM1811913-025	24-Jul-2018 00:00	BH10_0.5-0.6	✓			
EM1811913-026	24-Jul-2018 00:00	BH10_1.0-1.1		✓	✓	✓
EM1811913-027	24-Jul-2018 00:00	BH10_1.5-1.6	✓			
EM1811913-028	24-Jul-2018 00:00	BH10_2.0-2.1	✓			
EM1811913-029	24-Jul-2018 00:00	BH10_2.5-2.6	✓			
EM1811913-030	24-Jul-2018 00:00	BH10_3.0-3.1		✓	✓	✓
EM1811913-031	24-Jul-2018 00:00	BH10_3.5-3.6	✓			
EM1811913-032	24-Jul-2018 00:00	BH10_4.0-4.1	✓			
EM1811913-033	24-Jul-2018 00:00	BH10_4.5-4.6	✓			
EM1811913-034	24-Jul-2018 00:00	BH10_5.0-5.1		✓	✓	✓
EM1811913-035	24-Jul-2018 00:00	BH10_5.4-5.5	✓			

Issue Date	: 27-Jul-2018						
Page	: 3 of 4						
Work Order	: EM1811913 Amendment 0						
Client	: GEO-ENVIRONMENTAL SOLUTIONS						

				On Hold: SOIL for analysis requested	SOIL - EA055-103 Moisture Content	SOIL - S-03 15 Metals (NEPM 2013 Suite - excl. Digestion)	SOIL - S-07 TRHBTEXN/PAH (SIM)
	EM1811913-036	24-Jul-2018 00:00	BH11_0.5-0.6	✓			
	EM1811913-037	24-Jul-2018 00:00	BH11_1.0-1.1		✓	✓	✓
	EM1811913-038	24-Jul-2018 00:00	BH11_1.5-1.6	✓			
(2)	EM1811913-039	24-Jul-2018 00:00	BH11_2.0-2.1	✓	✓	✓	✓
	EM1811913-040	24-Jul-2018 00:00	BH11_2.5-2.6		✓	✓	✓
	EM1811913-041	24-Jul-2018 00:00	BH11_3.0-3.1	✓			
	EM1811913-042	24-Jul-2018 00:00	BH11_3.3-3.4		✓	✓	✓
	EM1811913-043	24-Jul-2018 00:00	BH12_0.5-0.6	✓			
	EM1811913-044	24-Jul-2018 00:00	BH12_1.0-1.1		✓	✓	✓
	EM1811913-045	24-Jul-2018 00:00	BH12_1.5-1.6	✓			
(3)	EM1811913-046	24-Jul-2018 00:00	BH12_2.0-2.1	✓	✓	✓	✓
	EM1811913-047	24-Jul-2018 00:00	BH12_2.5-2.6		✓	✓	✓
	EM1811913-048	24-Jul-2018 00:00	BH12_3.0-3.1	✓			
	EM1811913-049	24-Jul-2018 00:00	BH12_3.5-3.6		✓	✓	✓
	EM1811913-050	24-Jul-2018 00:00	BH12_4.0-4.1	✓			
	EM1811913-051	24-Jul-2018 00:00	BH12_4.5-4.6	✓			

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - W403T 15 Metals (Total) (NEPM)	WATER - W407 TRHBTEXN/PAH
EM1811913-052	24-Jul-2018 00:00	Field Blank 2	✓	✓
EM1811913-053	24-Jul-2018 00:00	Rinsate 2	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

FREIGHT

CHAIN OF CUSTODY

| | | |

Environmental Site Assessment (V9) 52 New Town Road, New Town. June 2025.

CHAIN OF CUSTODY

ALS Environmental

CLIENT:	GEOENVIRONMENTAL SOLUTIONS	TURNAROUND REQUIREMENTS:	☒ Standard TAT (List due date)
OFFICE:	29 Kirksway Pl, Battery Point TAS 7004	(Standard TAT may be longer for some tests e.g. Jim Trace Organics)	☐ Non Standard or urgent TAT (List due date)
PROJECT:	New Town Rd	ALS QUOTE NO.:	COC SEQUENCE NUMBER (Circle)
ORDER NUMBER:			
PROJECT MANAGER:		CONTACT PH:	
SAMPLER:		SAMPLER MOBILE:	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to: jcumming@geosolutions.net.au; sjoyce@geosolutions.net.au			
Email Invoice to: jcumming@geosolutions.net.au; mhan@geosolutions.net.au; sjoyce@geosolutions.net.au			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE/TIME: 25.7.18	DATE/TIME:	DATE/TIME:	DATE/TIME: 26/7 9.05

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to)	TOTAL CONTAINERS	TPH, BTEX, PAH, TS	Hold							Additional Information
25	BH19 2.1-2.2	25.7.18	S	Jar	1	✓								
26	Field Blank 3	↓	W	2V, 1A, 1P	4	✓								
27	Rinsate 3	↓	W	↓	4	✓								
				TOTAL										

re-batch
tray ~~[illegible]~~
hs1473-74

Shirley LeCornu

From: Sarah Joyce <sjoyce@geosolutions.net.au>
Sent: Tuesday, 31 July 2018 4:21 PM
To: Shirley LeCornu
Subject: Re-batch's for New Town Road
Attachments: Rebatch request EM1811913.pdf; REbatch request EM1811891.pdf

Hello Shirley,

Please see the attached SRN with Re-batch details for New Town Road:

EM1811913
EM1811891

Kind Regards,

Sarah Joyce
Environmental Scientist
GEO-ENVIRONMENTAL SOLUTIONS P/L
29 Kirksway Place, Battery Point, 7004
P: 0362231839
E: sjoyce@geosolutions.net.au

GES

Environmental Division
Melbourne
Work Order Reference
EM1812175

MS: 3034
BN 01/8

Rebatch x 4

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EM1811891**		
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: sjoyce@geosolutions.net.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Facsimile	: +61 03 6223 4539	Facsimile	: +61-3-8549 9626
Project	: Newtown Rd	Page	: 1 of 3
Order number	:	Quote number	: EB2017GEOENVSOL0001 (EN/222/17)
C-O-C number	: ---	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ---		
Sampler	: SARAH JOYCE		

Dates

Date Samples Received	: 26-Jul-2018 09:05	Issue Date	: 26-Jul-2018
Client Requested Due Date	: 02-Aug-2018	Scheduled Reporting Date	: **02-Aug-2018**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 2	Temperature	: 6.4°C - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 27 / 14

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks). Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**

RIGHT SOLUTIONS RIGHT PARTNER

Issue Date : 26-Jul-2018
Page : 2 of 3
Work Order : EM1811891 Amendment 0
Client : GEO-ENVIRONMENTAL SOLUTIONS

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

Method / Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
Dissolved Mercury by FIMS : EG035F		
Field Blank 3	- Clear Plastic Bottle - Unfiltered; Lab-acidified	- Clear Plastic Bottle - Nitric Acid; Filtered
Rinsate 3	- Clear Plastic Bottle - Unfiltered; Lab-acidified	- Clear Plastic Bottle - Nitric Acid; Filtered
Dissolved Metals by ICP-MS - Suite A : EG020A-F		
Field Blank 3	- Clear Plastic Bottle - Unfiltered; Lab-acidified	- Clear Plastic Bottle - Nitric Acid; Filtered
Rinsate 3	- Clear Plastic Bottle - Unfiltered; Lab-acidified	- Clear Plastic Bottle - Nitric Acid; Filtered

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

	Laboratory sample ID	Client sampling date / time	Client sample ID	On Hold| SOIL - No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - S-03 15 Metals (NEPM 2013 Suite - incl. Digestion)	SOIL - S-07 TRH/BTEX/PAH (SIM)
	EM1811891-001	25-Jul-2018 00:00	BH14 0.2-0.3	✓			
	EM1811891-002	25-Jul-2018 00:00	BH14 0.4-0.5		✓	✓	✓
	EM1811891-003	25-Jul-2018 00:00	BH15 0.2-0.3	✓			
	EM1811891-004	25-Jul-2018 00:00	BH15 0.55-0.65		✓	✓	✓
	EM1811891-005	25-Jul-2018 00:00	BH16 0.3-0.4		✓	✓	✓
	EM1811891-006	25-Jul-2018 00:00	BH13 0.5-0.6	✓			
	EM1811891-007	25-Jul-2018 00:00	BH13 1.0-1.1		✓	✓	✓
	EM1811891-008	25-Jul-2018 00:00	BH13 1.5-1.6		✓	✓	✓
(1)	EM1811891-009	25-Jul-2018 00:00	BH13 2.0-2.1	✗	✓	✓	✓
	EM1811891-010	25-Jul-2018 00:00	BH17 0.2-0.3	✓			
	EM1811891-011	25-Jul-2018 00:00	BH17 0.5-0.6		✓	✓	✓
	EM1811891-012	25-Jul-2018 00:00	BH17 1.0-1.1	✓			
	EM1811891-013	25-Jul-2018 00:00	BH17 1.1-1.2		✓	✓	✓
(2)	EM1811891-014	25-Jul-2018 00:00	BH18 0.5-0.6	✗	✓	✓	✓
	EM1811891-015	25-Jul-2018 00:00	BH18 1.0-1.1	✓			
	EM1811891-016	25-Jul-2018 00:00	BH18 1.5-1.6		✓	✓	✓
	EM1811891-017	25-Jul-2018 00:00	BH18 2.0-2.1	✗	✓	✓	✓
(3)	EM1811891-018	25-Jul-2018 00:00	BH18 2.5-2.6	✗	✓	✓	✓
	EM1811891-019	25-Jul-2018 00:00	BH18 2.7-2.8		✓	✓	✓
(4)	EM1811891-020	25-Jul-2018 00:00	BH18 3.1-3.2	✗	✓	✓	✓
	EM1811891-021	25-Jul-2018 00:00	BH18 3.5-3.6		✓	✓	✓
	EM1811891-022	25-Jul-2018 00:00	BH19 0.5-0.6	✓			
	EM1811891-023	25-Jul-2018 00:00	BH19 1.0-1.1		✓	✓	✓
	EM1811891-024	25-Jul-2018 00:00	BH19 1.5-1.6	✓			
	EM1811891-025	25-Jul-2018 00:00	BH19 2.1-2.2		✓	✓	✓



CHAIN OF CUSTODY

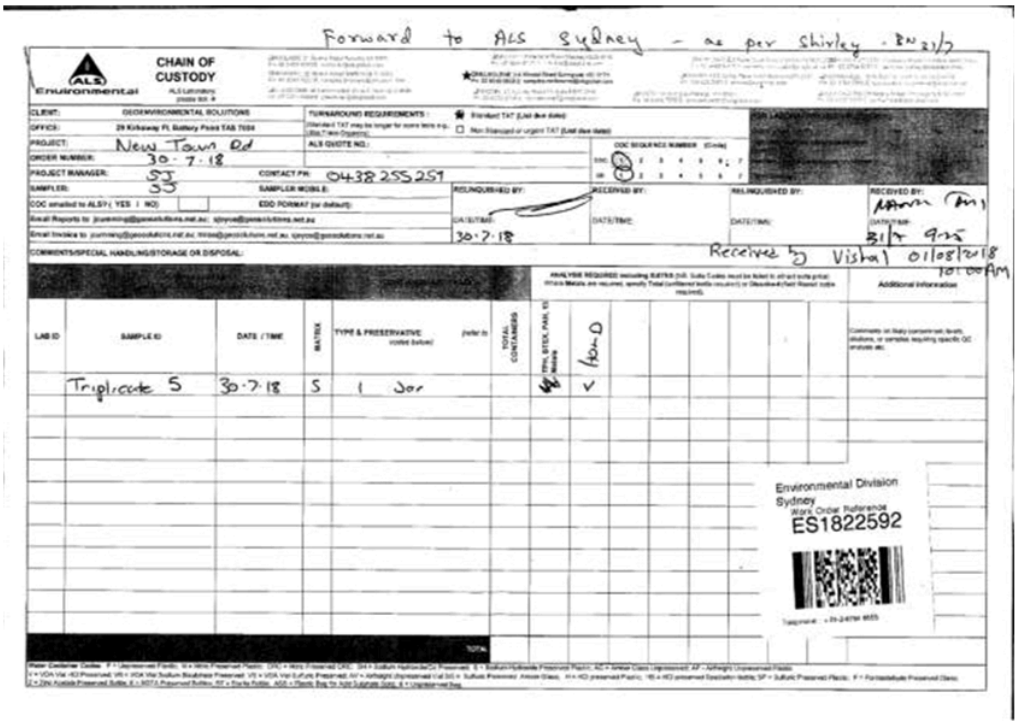
FREIGHT

CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 29 Kirkaway Pl, Battery Point TAS 7004
PROJECT: New Town Road
ORDER NUMBER: 30 July 2018
PROJECT MANAGER: SJ
SAMPLER: SJ
CONTACT PH: 0438 255 251
SAMPLER MOBILE:
COC emailed to ALS? (YES / NO)
EDD FORMAT (or default):
Email Reports to: jcumming@geosolutions.net.au; sjoyce@geosolutions.net.au
Email Invoices to: jcumming@geosolutions.net.au; hross@geosolutions.net.au; sjoyce@geosolutions.net.au
TURNAROUND REQUIREMENTS: Standard TAT (List due date):
ALS QUOTE NO.:
COC SEQUENCE NUMBER (Circle): 1 2 3 4 5 6 7 8 / 1 2 3 4 5 6 7
RELINQUISHED BY: DATE/TIME: 30·7·18 1500
RECEIVED BY: DATE/TIME:
RELINQUISHED BY: DATE/TIME:
RECEIVED BY: DATE/TIME: 31/7 9·25
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	TPH/BTEX/PAH/VOCs	Hold
1	Field Blank 4	30·7·18	W	2V, 1P, 1A	4	✓	
2	Rinsate 4		W	1	4	✓	
3	BH20 0.5-0.6		S	1 Jar	1	✓	
4	BH20 1.0-1.1					✓	
5	Duplicate 5						✓

Additional Information: PID 0.1; PID 2.6ppm

Environmental Division Melbourne
Work Order Reference
EM1812116



Forward to ALS Sydney - as per Shirley - BN 31/7

CHAIN OF CUSTODY

CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 29 Kirkaway Pl, Battery Point TAS 7004
PROJECT: New Town Rd
ORDER NUMBER: 30·7·18
PROJECT MANAGER: SJ
SAMPLER: SJ
CONTACT PH: 0438 255 251
SAMPLER MOBILE:
COC emailed to ALS? (YES / NO)
EDD FORMAT (or default):
Email Reports to: jcumming@geosolutions.net.au; sjoyce@geosolutions.net.au
Email Invoices to: jcumming@geosolutions.net.au; hross@geosolutions.net.au; sjoyce@geosolutions.net.au
TURNAROUND REQUIREMENTS: Standard TAT (List due date):
ALS QUOTE NO.:
COC SEQUENCE NUMBER (Circle): 1 2 3 4 5 6 7 8 / 1 2 3 4 5 6 7
RELINQUISHED BY: DATE/TIME: 30·7·18
RECEIVED BY: DATE/TIME:
RELINQUISHED BY: DATE/TIME:
RECEIVED BY: DATE/TIME: 31/7 9·25
Received by Vishal 01/08/2018 10:00AM
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	TPH/BTEX/PAH/VOCs	Hold
	Triplicate 5	30·7·18	S	1 Jar		✓	✓

Environmental Division Sydney
Work Order Reference
ES1822592



CHAIN OF CUSTODY

FREIGHT URGENT

CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 29 Kirkaway Pl, Battery Point TAS 7004
PROJECT: New Town Rd
ORDER NUMBER:
PROJECT MANAGER: S Joyce
SAMPLER: A Plummer
CONTACT PH: 0438 253 259
SAMPLER MOBILE: 0405 821977
EDD FORMAT (or default):
TURNAROUND REQUIREMENTS: 48 Hrs
ALS QUOTE NO.:
COC SEQUENCE NUMBER
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:
RELINQUISHED BY: A Plummer DATE/TIME: 11-9-18
RECEIVED BY:
DATE/TIME:
RECEIVED BY: DATE/TIME: 13/9, 9:25

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE	TOTAL CONTAINERS	TPH, BTEX, PAH	Additional Information
1	MW1	11-9-18	W	2VS, 1P, 1AG	4	X	Metals ~~Unable to be~~ field filtered!
2	DUPLICATE	↓	↓	↓	4	X	
3	TRIPLICATE				4	X	
4	FIELD BLANK	11-9-18	W	2VS, 1AG	3	X	Needs to be filtered in lab.
					TOTAL 15		

Environmental Division Melbourne
Work Order Reference
EM1814666

AR 13/9

Shirley LeCornu

From: Sarah Joyce <sjoyce@geosolutions.net.au>
Sent: Thursday, 13 September 2018 10:42 AM
To: Shirley LeCornu; ALS Enviro Melbourne
Cc: Aaron Plummer
Subject: FW: SRN for ALS Workorder : EM1814666 | Your Reference: New Town Rd
Attachments: EM1814666_0_SRN_180913103610.pdf

Hi All,

Please forward the Triplicate (your ID EM1814666-003) sample to ALS Sydney – Smithfield.

Thanks!

From: angel-no-reply@alsglobal.com <angel-no-reply@alsglobal.com>
Sent: Thursday, 13 September 2018 10:36 AM
To: Sarah Joyce <sjoyce@geosolutions.net.au>
Subject: SRN for ALS Workorder : EM1814666 | Your Reference: New Town Rd

ALS Environmental

Deliverables for ALS Workorder EM1814666

Project: New Town Rd

Dear SARAH JOYCE,

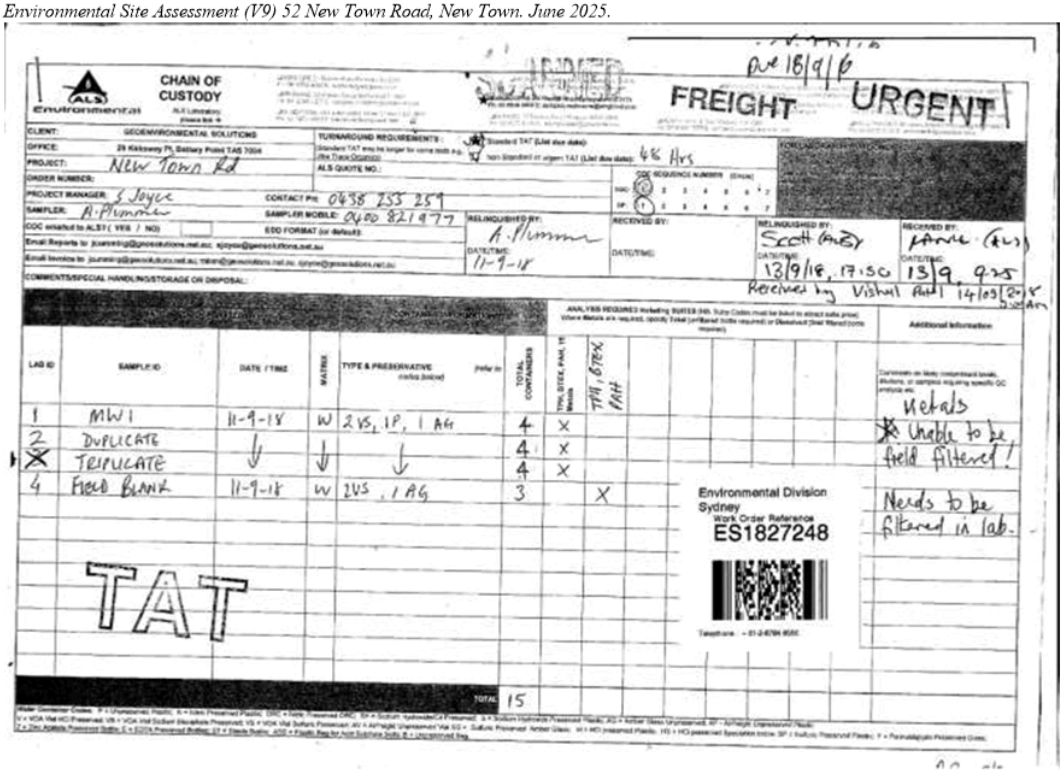
Please find enclosed the following deliverables for **EM1814666**:

- EM1814666_0_SRN_180913103610.pdf

Report Recipients

- SARAH JOYCE
  - EM1814666_0_SRN_180913103610.pdf (Email)
- JOHN PAUL CUMMING
  - EM1814666_0_SRN_180913103610.pdf (Email)

1



CHAIN OF CUSTODY

ALS Environmental

ORDERED Due 18/9/18

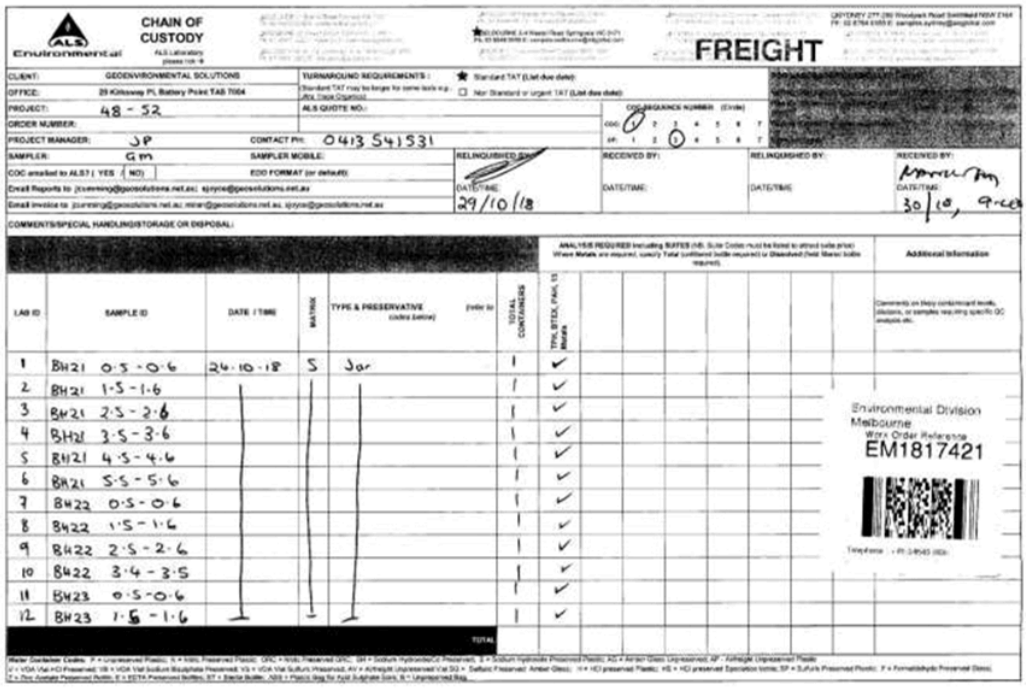
FREIGHT URGENT

CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 29 Kirksway Pl, Battery Point TAS 7004
PROJECT: New Town Rd
ORDER NUMBER:
PROJECT MANAGER: S Joyce
SAMPLER: A Plummer
CONTACT PH: 0438 255 259
SAMPLER MOBILE: 0400 821 977
COC emailed to ALS? (YES / NO):
EDD FORMAT (or default):
Email Reports to: jcurrenti@geosolutions.net.au; sjoyce@geosolutions.net.au
Email Invoice to: jcurrenti@geosolutions.net.au; mlarr@geosolutions.net.au; sjoyce@geosolutions.net.au
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

TURNAROUND REQUIREMENTS: Standard TAT (List due date); Non Standard or urgent TAT (List due date): 48 Hrs
ALS QUOTE NO.:
SEQUENCE NUMBER (Circle): MW 1 2 3 4 5 6 7; DP 1 2 3 4 5 6 7

RELINQUISHED BY: A Plummer DATE/TIME: 11-9-18
RECEIVED BY: DATE/TIME:
RELINQUISHED BY: Scott (AES) DATE/TIME: 13/9/18, 17:50
RECEIVED BY: DATE/TIME: 13/9, 925
Received by Vishal Patil 14/09/18 9:25am

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	TPH, BTEX, PAH, HM Metals	TPH / BTEX	PAH	Additional Information
1	MW1	11-9-18	W	2VS, 1P, 1AG	4	X			Metals * Unable to be field filtered!
2	DUPLICATE	↓	↓	↓	4	X			
X	TRIPLICATE				4	X			
4	FIELD BLANK	11-9-18	W	2VS, 1AG	3		X		Needs to be filtered in lab.



CHAIN OF CUSTODY

FREIGHT

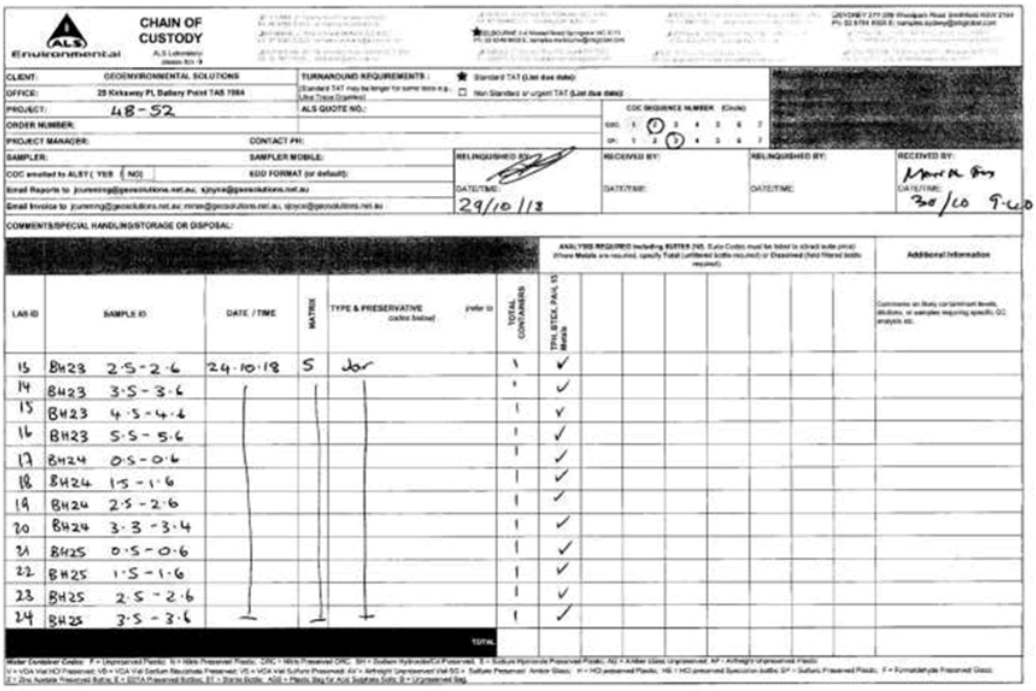
CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 25 Kirksway Pl, Battery Point TAS 7004
PROJECT: 48 - 52
ORDER NUMBER:
PROJECT MANAGER: JP
SAMPLER: GM
CONTACT PH: 0413 541531
SAMPLER MOBILE:
COC emailed to ALS? YES (NO)
EDD FORMAT (or default):
Email Reports to jcumming@geosolutions.net.au; sjoyce@geosolutions.net.au
Email Invoice to jcumming@geosolutions.net.au; mmer@geosolutions.net.au, sjoyce@geosolutions.net.au
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:
TURNAROUND REQUIREMENTS: ★ Standard TAT (List due date); ☐ Non Standard or urgent TAT (List due date)
ALS QUOTE NO.:
COC SEQUENCE NUMBER (Circle): COC 1 (2) 3 4 5 6 7; OF: 1 2 (3) 4 5 6 7
RELINQUISHED BY: DATE/TIME: 29/10/18
RECEIVED BY: DATE/TIME:
RELINQUISHED BY: DATE/TIME:
RECEIVED BY: DATE/TIME: 30/10, 9:40

ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) — Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (codes below)	TOTAL CONTAINERS	TPH, BTEX, PAH, 10 Metals	Additional Information
1	BH21 0.5-0.6	24.10.18	S	Jar	1	✓	
2	BH21 1.5-1.6				1	✓	
3	BH21 2.5-2.6				1	✓	
4	BH21 3.5-3.6				1	✓	
5	BH21 4.5-4.6				1	✓	
6	BH21 5.5-5.6				1	✓	
7	BH22 0.5-0.6				1	✓	
8	BH22 1.5-1.6				1	✓	
9	BH22 2.5-2.6				1	✓	
10	BH22 3.4-3.5				1	✓	
11	BH23 0.5-0.6				1	✓	
12	BH23 1.5-1.6				1	✓	
				TOTAL			

Environmental Division Melbourne
Work Order Reference
EM1817421

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic; V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.



CHAIN OF CUSTODY

CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 25 Kirksway Pl, Battery Point TAS 7004
PROJECT: 48-52
ORDER NUMBER:
PROJECT MANAGER:
SAMPLER:
COC emailed to ALS? YES (NO)
EDD FORMAT (or default):
Email Reports to jcumming@geosolutions.net.au; sjoyce@geosolutions.net.au
Email Invoice to jcumming@geosolutions.net.au; mmer@geosolutions.net.au, sjoyce@geosolutions.net.au
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:
TURNAROUND REQUIREMENTS: ★ Standard TAT (List due date); ☐ Non Standard or urgent TAT (List due date)
ALS QUOTE NO.:
COC SEQUENCE NUMBER (Circle): COC 1 (2) 3 4 5 6 7; OF: 1 2 (3) 4 5 6 7
CONTACT PH:
SAMPLER MOBILE:
RELINQUISHED BY: DATE/TIME: 29/10/18
RECEIVED BY: DATE/TIME:
RELINQUISHED BY: DATE/TIME:
RECEIVED BY: DATE/TIME: 30/10 9:40

ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) — Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (codes below)	TOTAL CONTAINERS	TPH, BTEX, PAH, 10 Metals	Additional Information
13	BH23 2.5-2.6	24.10.18	S	Jar	1	✓	
14	BH23 3.5-3.6				1	✓	
15	BH23 4.5-4.6				1	✓	
16	BH23 5.5-5.6				1	✓	
17	BH24 0.5-0.6				1	✓	
18	BH24 1.5-1.6				1	✓	
19	BH24 2.5-2.6				1	✓	
20	BH24 3.3-3.4				1	✓	
21	BH25 0.5-0.6				1	✓	
22	BH25 1.5-1.6				1	✓	
23	BH25 2.5-2.6				1	✓	
24	BH25 3.5-3.6				1	✓	
				TOTAL			

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic; V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick ✓

CLIENT:	GEOENVIRONMENTAL SOLUTIONS	TURNAROUND REQUIREMENTS:	★ Standard TAT (List due date):
OFFICE:	29 Kirksway Pl, Battery Point TAS 7004		☐ Non Standard or urgent TAT (List due date):
PROJECT:	48-52	ALS QUOTE NO.:	
ORDER NUMBER:			
PROJECT MANAGER:	JP	CONTACT PH:	
SAMPLER:	GM	SAMPLER MOBILE:	
COC emailed to ALS?	YES (NO)	EDD FORMAT (or default):	
Email Reports to:	jcumming@geosolutions.net.au; sjoyce@geosolutions.net.au		
Email Invoice to:	jcumming@geosolutions.net.au; mmarr@geosolutions.net.au; sjoyce@geosolutions.net.au		
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:			

COC SEQUENCE NUMBER (Circle): COC: 1 2 3 4 5 6 7; SF: 1 2 (3) 4 5 6 7

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE/TIME: 29/10/18	DATE/TIME:	DATE/TIME:	DATE/TIME: 30/10 9:40

ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price). Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	TPH, BTEX, PAH, 15 Metals	Additional Information
25	BH25 4.5-4.6	24.10.18	S	Jar	1	✓	
26	BH23 5.5-5.6				1	✓	
27	DUPLICATE 1				1	✓	
28	Rinsate Blank		W	2V1P, 1A	4	✓	
				TOTAL			

Comments on likely contaminant levels, dilutions, or variables requiring specific QC analysis etc:

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic

V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; E = Ice Advice Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag

---

Client / Client code: GEOENVSOL
Project: 48-52
Project Manager: John Paul Cumming
Date /time sample rec: 30/10 @ 9:40am
Date/time Instructions rec: 5/11 @ 5:28pm
Due date: STANDARD
Due date surcharge:

Rebatch

CS Contact: Kane
Additional Information:
OUT OF HOLDING TIME TODAY

URGENT

Environmental Division
Melbourne
Work Order Reference
EM1817821

New Lab ID	Sample information: Client ID	Sampling Date / Time	Previous Work Order Reference	Previous ALS ID	Tray Number(s)	Container	Number of Containers	Analysis: Standard	Analysis: Leach: TCLP	PAH	Copper	Barium	Shortest Holding time expiry
1	BH21 0.5-0.6	24/10/2018 0:00	EM1817421	1	MS:4443-44	Jar	1		X	X			07-Nov-18
2	BH21 4.5-4.6	24/10/2018 0:00	EM1817421	5	MS:4443-44	Jar	1		X	X			07-Nov-18
3	BH21 5.5-5.6	24/10/2018 0:00	EM1817421	6	MS:4443-44	Jar	1		X	X			07-Nov-18
4	BH22 0.5-0.6	24/10/2018 0:00	EM1817421	7	MS:4443-44	Jar	1		X	X			07-Nov-18
5	BH23 0.5-0.6	24/10/2018 0:00	EM1817421	11	MS:4443-44	Jar	1		X	X			07-Nov-18
6	BH23 1.5-1.6	24/10/2018 0:00	EM1817421	12	MS:4443-44	Jar	1		X	X			07-Nov-18
7	BH23 2.5-2.6	24/10/2018 0:00	EM1817421	13	MS:4443-44	Jar	1		X	X			07-Nov-18
8	BH23 3.5-3.6	24/10/2018 0:00	EM1817421	14	MS:4443-44	Jar	1		X	X	X	X	07-Nov-18
9	BH23 4.5-4.6	24/10/2018 0:00	EM1817421	15	MS:4443-44	Jar	1		X	X			07-Nov-18
10	BH23 5.5-5.6	24/10/2018 0:00	EM1817421	16	MS:4443-44	Jar	1		X	X			07-Nov-18
11	BH24 0.5-0.6	24/10/2018 0:00	EM1817421	17	MS:4443-44	Jar	1		X	X			07-Nov-18
12	BH25 3.5-3.6	24/10/2018 0:00	EM1817421	24	MS:4443-44	Jar	1		X	X			07-Nov-18
13	BH25 4.5-4.6	24/10/2018 0:00	EM1817421	25	MS:4443-44	Jar	1		X	X			07-Nov-18
						TOTAL	13						

Kane Vorwerk

From: JP Cumming <jcumming@geosolutions.net.au>
Sent: Monday, 5 November 2018 5:28 PM
To: Melbourne Enviro Services
Cc: Sarah Joyce
Subject: FW: RESULTS & EDD & INVOICE for ALS Workorder : EM1817421 | Your Reference: 48-52

Follow Up Flag: Follow up
Flag Status: Flagged

Got auto reply Shirley was away so see samples please

From: JP Cumming
Sent: Monday, 5 November 2018 5:26 PM
To: 'Shirley LeCornu' <shirley.lecornu@alsglobal.com>
Cc: Sarah Joyce <sjoyce@geosolutions.net.au>
Subject: FW: RESULTS & EDD & INVOICE for ALS Workorder : EM1817421 | Your Reference: 48-52

Hi Shirley can we get leachate and the PAH analysis on the following samples that exceeded level 2 for our EPA IB105

Thanks

JP

BH21 0.5-0.6	BH21 4.5-4.6	BH21 5.5-5.6	BH22 0.5-0.6
24/10/2018	24/10/2018	24/10/2018	24/10/2018
EM1817421001	EM1817421005	EM1817421006	EM1817421007
SOIL	SOIL	SOIL	SOIL

BH23 0.5-0.6	BH23 1.5-1.6	BH23 2.5-2.6	BH23 3.5-3.6	BH23 4.5-4.6	BH23 5.5-5.6	BH24 0.5-0.6
24/10/2018	24/10/2018	24/10/2018	24/10/2018	24/10/2018	24/10/2018	24/10/2018
EM1817421011	EM1817421012	EM1817421013	EM1817421014	EM1817421015	EM1817421016	EM1817421017
SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL

BH25 3.5-3.6	BH25 4.5-4.6
24/10/2018	24/10/2018
EM1817421024	EM1817421025
SOIL	SOIL

On sample below it was also high on copper and barium so would need analysis on leachate for those two elements as well as the PAH

1

BH23 3.5-3.6
24/10/2018
EM1817421014
SOIL

From: angel-no-reply@alsglobal.com <angel-no-reply@alsglobal.com>
Sent: Monday, 5 November 2018 4:54 PM
To: JP Cumming <jcumming@geosolutions.net.au>
Subject: RESULTS & EDD & INVOICE for ALS Workorder : EM1817421 | Your Reference: 48-52

ALS Environmental

Deliverables for ALS Workorder EM1817421

Project: 48-52

Dear JOHN PAUL CUMMING,

Please find enclosed the following deliverables for **EM1817421**:

- EM1817421_0_COA.pdf
- EM1817421_0_ENMRG.CSV
- EM1817421_0_XTAB.XLS
- EM1817421_0_QC.pdf
- EM1817421_0_QCI.pdf
- L763274_INV.pdf
- EM1817421_COC.pdf

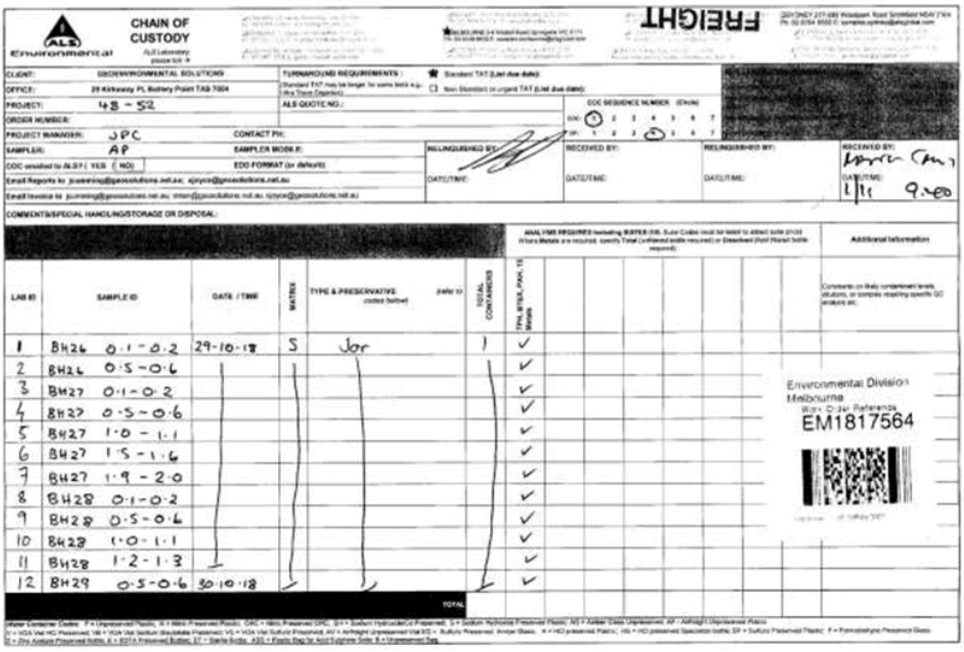
Report Recipients

- JOHN PAUL CUMMING
  - EM1817421_0_COA.pdf (Email)
  - EM1817421_0_ENMRG.CSV (Email)
  - EM1817421_0_XTAB.XLS (Email)
  - EM1817421_0_QC.pdf (Email)
  - EM1817421_0_QCI.pdf (Email)
  - L763274_INV.pdf (Email)
  - EM1817421_COC.pdf (Email)
- SARAH JOYCE
  - EM1817421_0_COA.pdf (Email)
  - EM1817421_0_ENMRG.CSV (Email)
  - EM1817421_0_XTAB.XLS (Email)
  - EM1817421_0_QC.pdf (Email)
  - EM1817421_0_QCI.pdf (Email)
  - L763274_INV.pdf (Email)
  - EM1817421_COC.pdf (Email)

2

Environmental Site Assessment (V9) 52 New Town Road, New Town. June 2025.

ALS Environmental



CHAIN OF CUSTODY

FREIGHT

CLIENT:	GEOENVIRONMENTAL SOLUTIONS
OFFICE:	29 Kirksway Pl, Battery Point TAS 7004
PROJECT:	48 - 52
ORDER NUMBER:	
PROJECT MANAGER:	JPC
CONTACT PH:	
SAMPLER:	AP
SAMPLER MOBILE:	
COC emailed to ALS? (YES (NO)	
EDD FORMAT (or default):	
Email Reports to: jcunning@geosolutions.net.au; sjoyce@geosolutions.net.au	
Email Invoice to: jcunning@geosolutions.net.au; mtan@geosolutions.net.au; sjoyce@geosolutions.net.au	
TURNAROUND REQUIREMENTS:	★ Standard TAT (List due date) ☐ Non Standard or urgent TAT (List due date)
ALS QUOTE NO.:	
COC SEQUENCE NUMBER (Circle)	COC: 1 2 3 4 5 6 7; SP: 1 2 3 4 5 6 7
RELINQUISHED BY:	DATE/TIME:
RECEIVED BY:	DATE/TIME:
RELINQUISHED BY:	DATE/TIME:
RECEIVED BY:	DATE/TIME: 1/11 9:40

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).

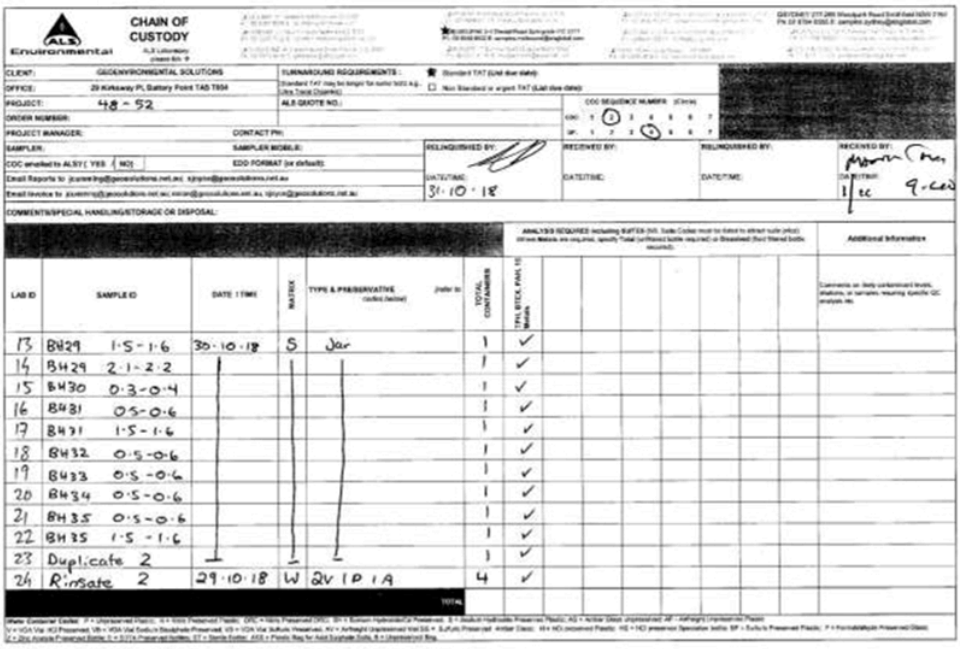
Additional Information: Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	TPH, BTEX, PAH, 15 Metals
1	BH26 0.1-0.2	29-10-18	S	Jar	1	✓
2	BH26 0.5-0.6					✓
3	BH27 0.1-0.2					✓
4	BH27 0.5-0.6					✓
5	BH27 1.0-1.1					✓
6	BH27 1.5-1.6					✓
7	BH27 1.9-2.0					✓
8	BH28 0.1-0.2					✓
9	BH28 0.5-0.6					✓
10	BH28 1.0-1.1					✓
11	BH28 1.2-1.3					✓
12	BH29 0.5-0.6	30-10-18				✓
					TOTAL	

Environmental Division Melbourne
Work Order Reference
EM1817564

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic; V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Specialtion bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Environmental



CHAIN OF CUSTODY

CLIENT:	GEOENVIRONMENTAL SOLUTIONS
OFFICE:	29 Kirksway Pl, Battery Point TAS 7004
PROJECT:	48 - 52
ORDER NUMBER:	
PROJECT MANAGER:	
CONTACT PH:	
SAMPLER:	
SAMPLER MOBILE:	
COC emailed to ALS? (YES (NO)	
EDD FORMAT (or default):	
Email Reports to: jcunning@geosolutions.net.au; sjoyce@geosolutions.net.au	
Email Invoice to: jcunning@geosolutions.net.au; mtan@geosolutions.net.au; sjoyce@geosolutions.net.au	
TURNAROUND REQUIREMENTS:	★ Standard TAT (List due date) ☐ Non Standard or urgent TAT (List due date)
ALS QUOTE NO.:	
COC SEQUENCE NUMBER (Circle)	COC: 1 2 3 4 5 6 7; SP: 1 2 3 4 5 6 7
RELINQUISHED BY:	DATE/TIME: 31.10.18
RECEIVED BY:	DATE/TIME:
RELINQUISHED BY:	DATE/TIME:
RECEIVED BY:	DATE/TIME: 1/11 9:40

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).

Additional Information: Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	TPH, BTEX, PAH, 15 Metals
13	BH29 1.5-1.6	30-10-18	S	Jar	1	✓
14	BH29 2.1-2.2				1	✓
15	BH30 0.3-0.4				1	✓
16	BH31 0.5-0.6				1	✓
17	BH31 1.5-1.6				1	✓
18	BH32 0.5-0.6				1	✓
19	BH33 0.5-0.6				1	✓
20	BH34 0.5-0.6				1	✓
21	BH35 0.5-0.6				1	✓
22	BH35 1.5-1.6				1	✓
23	Duplicate 2				1	✓
24	Rinsate 2	29.10.18	W	2V 1P 1A	4	✓
					TOTAL	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic; V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Specialtion bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.



CHAIN OF CUSTODY

CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 29 Kirksway Pl, Battery Point TAS 7004
PROJECT: 48 - 52
PROJECT MANAGER: JPC
SAMPLER: AP

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE	TOTAL CONTAINERS
25	Rinsate 3	30·10·18	W	2V 2P 1A	4
26	Rinsate 4	31·10·18	W	1	4
27	BH36 0·5-0·6		S	Jar	1
28	BH37 0·5-0·6				1
29	1·5-1·6				1
30	2·5-2·6				1
31	3·5-3·6				1
32	BH38 0·5-0·6				1
33	1·5-1·6				1
34	2·5-2·6				1
35	BH39 0·5-0·6				1
36	1·5-1·6				1



CHAIN OF CUSTODY

CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 29 Kirksway Pl, Battery Point TAS 7004
PROJECT: 48 - 52
RELINQUISHED BY: DATE/TIME: 31·10·18

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE	TOTAL CONTAINERS
37	BH39 2·5-2·6	31·10·18	S	Jar	1
38	BH40 0·5-0·6				1
39	1·5-1·6				1
40	2·5-2·6				1
41	3·5-3·6				1
42	Duplicate 3				1
43	Duplicate 4				1

Rebatch

Client / Client code: GEOENVSOL
Project: 48-52
Project Manager: John Paul Cumming
Date /time sample rec: 1/11 @ 9:40
Date/time instructions rec: 12/11 @ 1:08
Due date: 3 Day TAT
Due date surcharge: 10% surcharge

CS Contact: Kane
Additional Information:

URGENT

MS: U642 - 4643

New Lab ID	Client ID	Sampling Date / Time	Previous Work Order Reference	Previous ALS ID	Tray Number(s)	Container	Number of Containers	Analysis: Standard	Analysis: Leach TCLP	Analysis: Leach Leach PAH	Shortest Holding time expiry
1	BH27 1.0-1.1	29/10/2018 0:00	EM1817564	5	MS: 4483 - 85				X	X	
2	BH28 1.2-1.3	29/10/2018 0:00	EM1817564	11	MS: 4483 - 85				X	X	
3	BH29 0.5-0.6	30/10/2018 0:00	EM1817564	12	MS: 4483 - 85				X	X	
4	BH35 0.5-0.6	30/10/2018 0:00	EM1817564	21	MS: 4483 - 85				X	X	
5	BH37 0.5-0.6	31/10/2018 0:00	EM1817564	28	MS: 4483 - 85				X	X	
6	BH37 1.5-1.6	31/10/2018 0:00	EM1817564	29	MS: 4483 - 85				X	X	
7	BH37 2.5-2.6	31/10/2018 0:00	EM1817564	30	MS: 4483 - 85				X	X	
8	BH37 3.5-3.6	31/10/2018 0:00	EM1817564	31	MS: 4483 - 85				X	X	
9	BH39 1.5-1.6	31/10/2018 0:00	EM1817564	36	MS: 4483 - 85				X	X	
10	BH39 2.5-2.6	31/10/2018 0:00	EM1817564	37	MS: 4483 - 85				X	X	
11	BH40 0.5-0.6	31/10/2018 0:00	EM1817564	38	MS: 4483 - 85				X	X	
12	BH40 1.5-1.6	31/10/2018 0:00	EM1817564	39	MS: 4483 - 85				X	X	
13	BH40 3.5-3.6	31/10/2018 0:00	EM1817564	41	MS: 4483 - 85				X	X	

Environmental Division Melbourne
Work Order Reference
EM1818156

CHAIN OF CUSTODY

URGENT

CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 29 Kirksway Pl, Battery Point TAS 7004
PROJECT: 48-52
ORDER NUMBER:
PROJECT MANAGER: JPC
SAMPLER: AP
COC emailed to ALS? (YES / NO)
Email Reports to: jcumming@geosolutions.net.au; sjoyce@geosolutions.net.au
Email Invoice to: jcumming@geosolutions.net.au; mlee@geosolutions.net.au; sjoyce@geosolutions.net.au

TURNAROUND REQUIREMENTS: Standard TAT (List due date)
Non Standard or urgent TAT (List due date): 3 day turn around
ALS QUOTE NO.:
CONTACT PH:
SAMPLER MOBILE:
EDD FORMAT (or default):

COC SERVICE NUMBER (Circle): GEN 1 2 3 4 5 6 7; SP: 1 2 3 4 5 6 7

RELINQUISHED BY: DATE/TIME: 5/11/18 1500
RECEIVED BY: DATE/TIME:
RELINQUISHED BY: DATE/TIME:
RECEIVED BY: DATE/TIME: 9/11 9:15

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price). If Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).

FREIGHT

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PREVIOUS PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	TPH, BTEX, PAH, TS	Additional Information
1	BH41 0.5-0.6	5/11/18	S	Jar	1	✓	
2	BH42 0.5-0.6					✓	
3	BH42 1.5-1.6					✓	
4	BH42 2.5-2.6					✓	
5	BH43 0.5-0.6					✓	
6	BH43 1.5-1.6					✓	
7	BH43 2.5-2.6					✓	
8	BH43 3.5-3.6					✓	
9	BH44 0.5-0.6					✓	
10	BH44 1.5-1.6					✓	
11	BH44 2.5-2.6					✓	
12	BH44 3.5-3.6					✓	

TOTAL

Environmental Division Melbourne
Work Order Reference
EM1817824



CHAIN OF CUSTODY

ALS Environmental

CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 29 Kirkaway Pl, Battery Point TAS 7004
PROJECT: 48 - 52
ORDER NUMBER:
PROJECT MANAGER: JPC
SAMPLER: AP
COC emailed to ALS? (YES) (NO)
Email Reports to: jcanning@geosolutions.net.au; sjoyce@geosolutions.net.au
Email Invoice to: jcanning@geosolutions.net.au; mmer@geosolutions.net.au; sjoyce@geosolutions.net.au
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

TURNAROUND REQUIREMENTS: Standard TAT (List due date): 3 Day turn around
ALS QUOTE NO.:
CONTACT PH:
SAMPLER MOBILE:
EDD FORMAT (or default):
COC SEQUENCE NUMBER (Circle): 1 2 3 4 5 6 7 / 1 2 3 4 5 6 7

RELINQUISHED BY: DATE/TIME: 5/11/18
RECEIVED BY: DATE/TIME:
RELINQUISHED BY: DATE/TIME:
RECEIVED BY: DATE/TIME: 9-15

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	TPH, BTEX, PAH, VOC	Additional Information
13	BH45 0.5-0.6	5/11/18	S	Jar	1	✓	
14	BH46 0.5-0.6					✓	
15	BH47 0.5-0.6					✓	
16	BH47 1.5-1.6					✓	
17	BH48 0.5-0.6					✓	
18	BH48 1.5-1.6					✓	
19	BH49 0.5-0.6					✓	
20	BH49 1.5-1.6					✓	
21	BH50 0.5-0.6					✓	
22	BH50 1.5-1.6					✓	
23	BH51 0.5-0.6					✓	
24	BH51 1.5-1.6					✓	
	TOTAL						

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic; V = VOA Vial -HCl Preserved; VS = VOA Vial Sodium Bisulphate Preserved; VA = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; E = Ext. Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.



CHAIN OF CUSTODY

ALS Environmental

CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 29 Kirkaway Pl, Battery Point TAS 7004
PROJECT: 48 - 52
ORDER NUMBER:
PROJECT MANAGER:
SAMPLER:
COC emailed to ALS? (YES) (NO)
Email Reports to: jcanning@geosolutions.net.au; sjoyce@geosolutions.net.au
Email Invoice to: jcanning@geosolutions.net.au; mmer@geosolutions.net.au; sjoyce@geosolutions.net.au
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

TURNAROUND REQUIREMENTS: Standard TAT (List due date): 3 Day turn around
ALS QUOTE NO.:
CONTACT PH:
SAMPLER MOBILE:
EDD FORMAT (or default):
COC SEQUENCE NUMBER (Circle): 1 2 3 4 5 6 7 / 1 2 3 4 5 6 7

RELINQUISHED BY: DATE/TIME: 5/11/18
RECEIVED BY: DATE/TIME:
RELINQUISHED BY: DATE/TIME:
RECEIVED BY: DATE/TIME: 9-15

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	TPH, BTEX, PAH, VOC	Additional Information
25	BH52 0.5-0.6	5/11/18	S	Jar	1	✓	
26	BH52 1.5-1.6				1	✓	
27	BH53 0.5-0.6				1	✓	
28	BH53 1.5-1.6				1	✓	
29	Rinsate 5		W	2V 1P, 1A	4	✓	
	TOTAL						

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic; V = VOA Vial -HCl Preserved; VS = VOA Vial Sodium Bisulphate Preserved; VA = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; E = Ext. Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

Rebatch

Client / Client code: GEOENVSOL
Project: 48-52
Project Manger: Sarah Joyce, John Paul Cumming
Date /time sample rec: 7/11 @ 9:15
Date/time instructions rec: 14/11 @ 9:12
Due date: ASAP
Due date surcharge: TBA 3day ✓

CS Contact: L Burns
Additional Information:

URGENT URGI

Environmental Division Melbourne
Work Order Reference
EM1818266

New Lab ID	Sample information: Client ID	Sampling Date / Time	Previous Work Order Reference	Previous ALS ID	Tray Number(s)	Container	Number of Containers	Analysis: Standard: TCLP PAH	Analysis: Leach	Shortest holding time expiry
1	BH42 0.5-0.6	5/11/2018 0:00	EM1817824	2	MS:4554-4556	150		X		19-Nov-18
2	BH42 1.5-1.6	5/11/2018 0:00	EM1817824	3	MS:4554-4556	150		X		19-Nov-18
3	BH43 0.5-0.6	5/11/2018 0:00	EM1817824	5	MS:4554-4556	150		X		19-Nov-18
4	BH43 1.5-1.6	5/11/2018 0:00	EM1817824	6	MS:4554-4556	150		X		19-Nov-18
5	BH43 2.5-2.6	5/11/2018 0:00	EM1817824	7	MS:4554-4556	150		X		19-Nov-18
6	BH43 3.5-.36	5/11/2018 0:00	EM1817824	8	MS:4554-4556	150		X		19-Nov-18
7	BH44 0.5-0.6	5/11/2018 0:00	EM1817824	9	MS:4554-4556	150		X		19-Nov-18
8	BH44 1.5-1.6	5/11/2018 0:00	EM1817824	10	MS:4554-4556	150		X		19-Nov-18
9	BH44 2.5-2.6	5/11/2018 0:00	EM1817824	11	MS:4554-4556	150		X		19-Nov-18
10	BH44 3.5-3.6	5/11/2018 0:00	EM1817824	12	MS:4554-4556	150		X		19-Nov-18
11	BH45 0.5-0.6	5/11/2018 0:00	EM1817824	13	MS:4554-4556	150		X		19-Nov-18
12	BH46 0.5-0.6	5/11/2018 0:00	EM1817824	14	MS:4554-4556	150		X		19-Nov-18
13	BH47 0.5-0.6	5/11/2018 0:00	EM1817824	15	MS:4554-4556	150		X		19-Nov-18
14	BH47 1.5-1.6	5/11/2018 0:00	EM1817824	16	MS:4554-4556	150		X		19-Nov-18
15	BH48 0.5-0.6	5/11/2018 0:00	EM1817824	17	MS:4554-4556	150		X		19-Nov-18
16	BH48 1.5-1.6	5/11/2018 0:00	EM1817824	18	MS:4554-4556	150		X		19-Nov-18
17	BH51 1.5-1.6	5/11/2018 0:00	EM1817824	24	MS:4554-4556	150		X		19-Nov-18
						TOTALS	0			

Kane Vorwerk

From: Sarah Joyce <sjoyce@geosolutions.net.au>
Sent: Wednesday, 14 November 2018 9:12 AM
To: Kane Vorwerk
Cc: ALS Enviro Melbourne; JP Cumming
Subject: Rebatch EM1817824
Attachments: Rebatch for EM1817824.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Hello Kane,

Another rebatch please.

TCLP Leach for PAHs on 17 Samples see attached scan of SRN.

I understand you guys have a lot of sample analysis to conduct at the moment but the fastest turn around possible would be appreciated.

Kind Regards,

Sarah Joyce
Environmental Scientist
GEO-ENVIRONMENTAL SOLUTIONS P/L
29 Kirksway Place, Battery Point, 7004
P: 0362231839
E: sjoyce@geosolutions.net.au

GES

Issue Date	07-Nov-2018
Page	2 of 3
Work Order	EM1817824 Amendment 0
Client	GEO-ENVIRONMENTAL SOLUTIONS

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

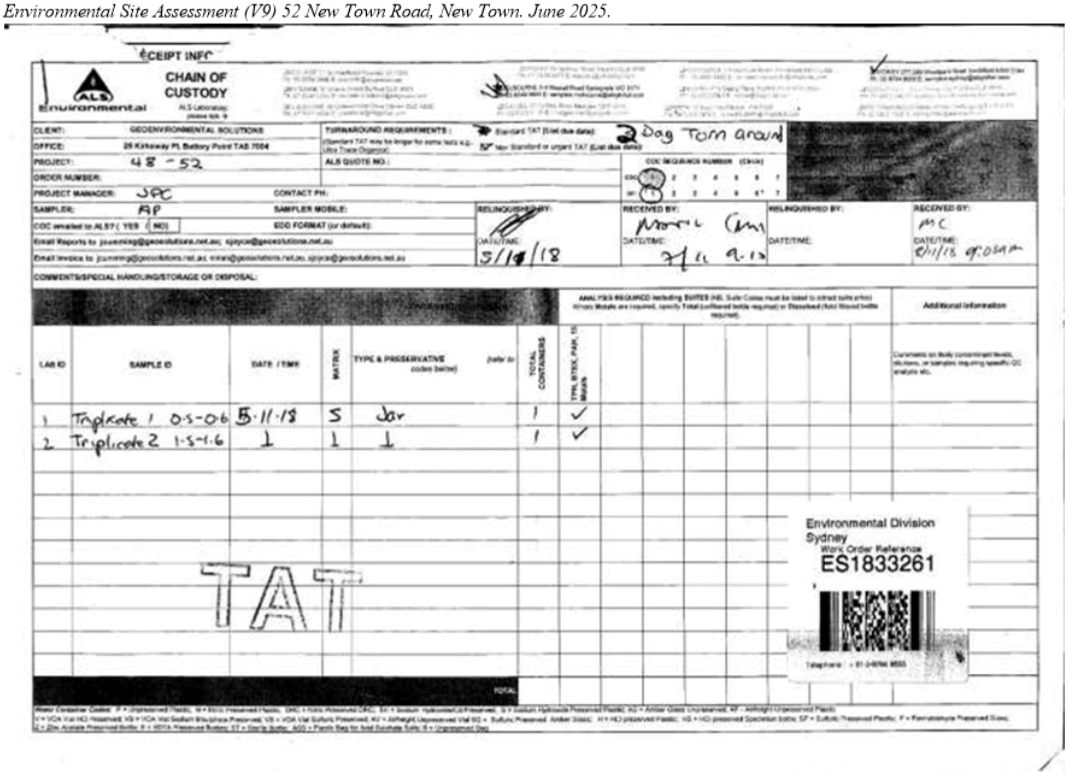
Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

	Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA055-103 Moisture Content	SOIL - S-03 15 Metals (NEPM 2013 Suite - incl. Digestion)	SOIL - S-07 TRH/BTEX/PAH (SIM)
	EM1817824-001	05-Nov-2018 00:00	BH41 0.5-0.6	✓	✓	✓
1	EM1817824-002	05-Nov-2018 00:00	BH42 0.5-0.6	✓	✓	✓
2	EM1817824-003	05-Nov-2018 00:00	BH42 1.5-1.6	✓	✓	✓
	EM1817824-004	05-Nov-2018 00:00	BH42 2.5-2.6	✓	✓	✓
3	EM1817824-005	05-Nov-2018 00:00	BH43 0.5-0.6	✓	✓	✓
4	EM1817824-006	05-Nov-2018 00:00	BH43 1.5-1.6	✓	✓	✓
5	EM1817824-007	05-Nov-2018 00:00	BH43 2.5-2.6	✓	✓	✓
6	EM1817824-008	05-Nov-2018 00:00	BH43 3.5-3.6	✓	✓	✓
7	EM1817824-009	05-Nov-2018 00:00	BH44 0.5-0.6	✓	✓	✓
8	EM1817824-010	05-Nov-2018 00:00	BH44 1.5-1.6	✓	✓	✓
9	EM1817824-011	05-Nov-2018 00:00	BH44 2.5-2.6	✓	✓	✓
10	EM1817824-012	05-Nov-2018 00:00	BH44 3.5-3.6	✓	✓	✓
11	EM1817824-013	05-Nov-2018 00:00	BH45 0.5-0.6	✓	✓	✓
12	EM1817824-014	05-Nov-2018 00:00	BH46 0.5-0.6	✓	✓	✓
13	EM1817824-015	05-Nov-2018 00:00	BH47 0.5-0.6	✓	✓	✓
14	EM1817824-016	05-Nov-2018 00:00	BH47 1.5-1.6	✓	✓	✓
15	EM1817824-017	05-Nov-2018 00:00	BH48 0.5-0.6	✓	✓	✓
16	EM1817824-018	05-Nov-2018 00:00	BH48 1.5-1.6	✓	✓	✓
	EM1817824-019	05-Nov-2018 00:00	BH49 0.5-0.6	✓	✓	✓
	EM1817824-020	05-Nov-2018 00:00	BH49 1.5-1.6	✓	✓	✓
	EM1817824-021	05-Nov-2018 00:00	BH50 0.5-0.6	✓	✓	✓
	EM1817824-022	05-Nov-2018 00:00	BH50 1.5-1.6	✓	✓	✓
	EM1817824-023	05-Nov-2018 00:00	BH51 0.5-0.6	✓	✓	✓
17	EM1817824-024	05-Nov-2018 00:00	BH51 1.5-1.6	✓	✓	✓
	EM1817824-025	05-Nov-2018 00:00	BH52 0.5-0.6	✓	✓	✓
	EM1817824-026	05-Nov-2018 00:00	BH52 1.5-1.6	✓	✓	✓
	EM1817824-027	05-Nov-2018 00:00	BH53 0.5-0.6	✓	✓	✓
	EM1817824-028	05-Nov-2018 00:00	BH53 1.5-1.6	✓	✓	✓

- TCLP leach for PAHs



ÉCEIPT INFC

CHAIN OF CUSTODY

ALS Environmental

CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 29 Kelsaway Pl, Battery Point TAS 7004
PROJECT: 48 - 52
ORDER NUMBER:
PROJECT MANAGER: JPC
SAMPLER: AP
COC emailed to ALS? (YES / NO)
Email Reports to jcumming@geosolutions.net.au; sjoyce@geosolutions.net.au
Email invoice to jcumming@geosolutions.net.au; mkerr@geosolutions.net.au; sjoyce@geosolutions.net.au
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

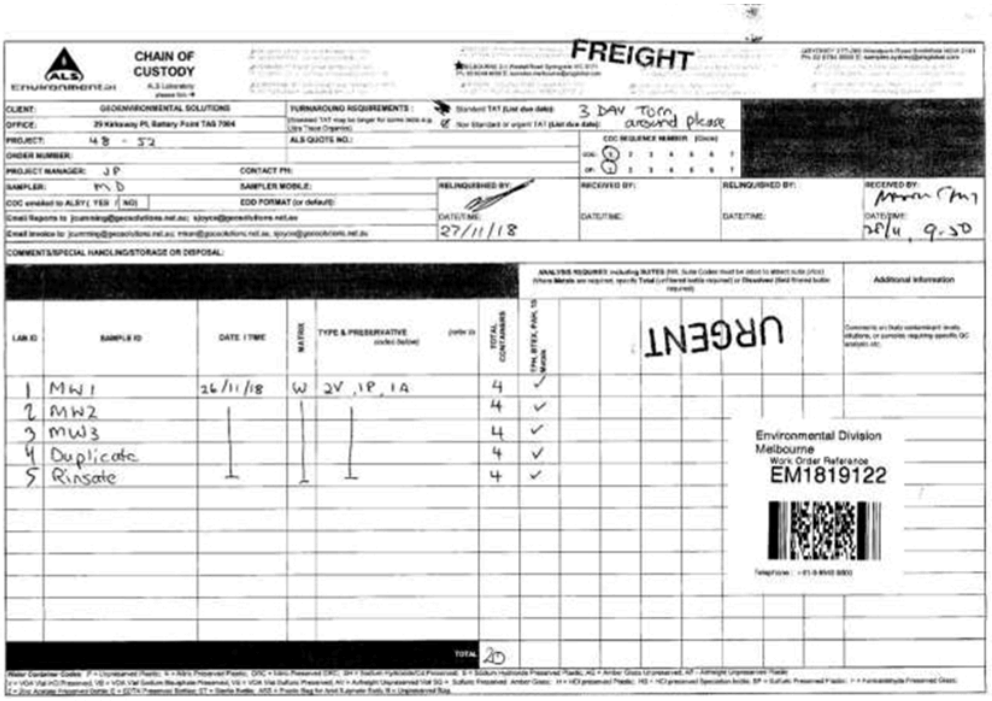
TURNAROUND REQUIREMENTS: Standard TAT (List due date); Non Standard or urgent TAT (List due date): 3 Day Turn around
ALS QUOTE NO.:
CONTACT PH:
SAMPLER MOBILE:
EDD FORMAT (or default):
RELINQUISHED BY: DATE/TIME: 5/11/18
RECEIVED BY: DATE/TIME: 7/11 9.15
RELINQUISHED BY: DATE/TIME:
RECEIVED BY: DATE/TIME: 8/11/18 9:00AM

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price)	Additional Information
1	Triplicate 1 0.5-0.6	5.11.18	S	Jar	1	✓	
2	Triplicate 2 1.5-1.6	1	1	1	1	✓	

TAT

Environmental Division
Sydney
Work Order Reference
ES1833261

Groundwater



CHAIN OF CUSTODY

ALS Environmental

FREIGHT

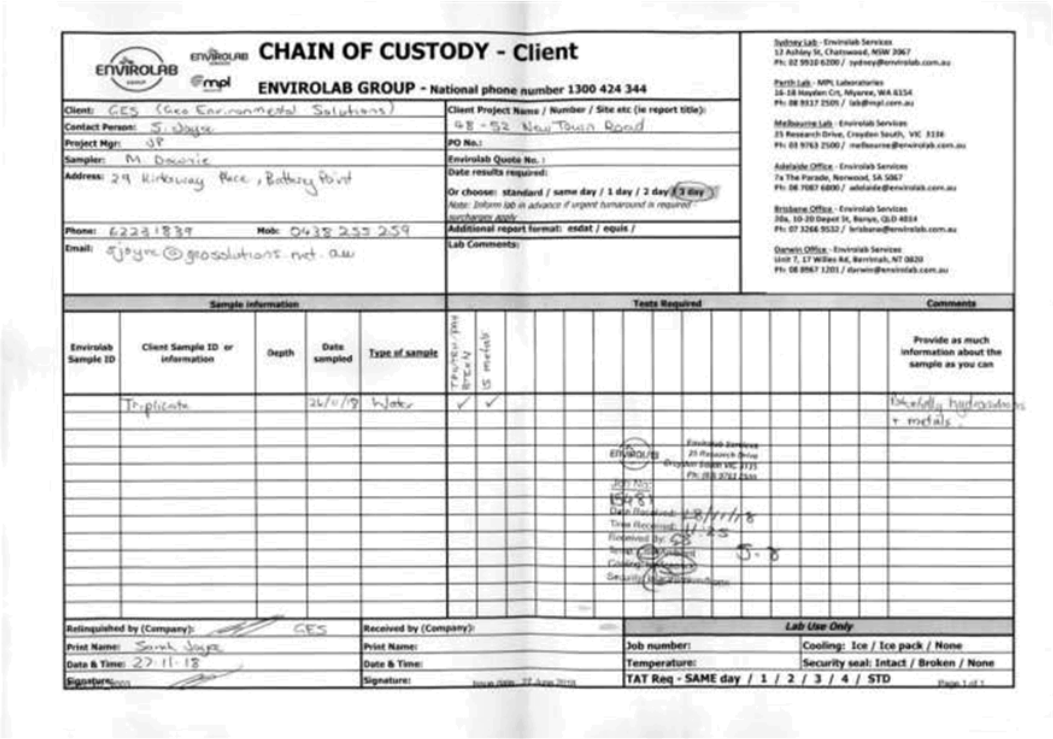
CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 29 Kelsaway Pl, Battery Point TAS 7004
PROJECT: 48 - 52
ORDER NUMBER:
PROJECT MANAGER: JP
SAMPLER: MD
COC emailed to ALS? (YES / NO)
Email Reports to jcumming@geosolutions.net.au; sjoyce@geosolutions.net.au
Email invoice to jcumming@geosolutions.net.au; mkerr@geosolutions.net.au; sjoyce@geosolutions.net.au
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

TURNAROUND REQUIREMENTS: Standard TAT (List due date); Non Standard or urgent TAT (List due date): 3 DAY Turn around please
ALS QUOTE NO.:
CONTACT PH:
SAMPLER MOBILE:
EDD FORMAT (or default):
RELINQUISHED BY: DATE/TIME: 27/11/18
RECEIVED BY: DATE/TIME:
RELINQUISHED BY: DATE/TIME:
RECEIVED BY: DATE/TIME: 28/11 9.30

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price)	Additional Information
1	MW1	26/11/18	W	2V, 1P, 1A	4	✓	
2	MW2				4	✓	
3	MW3				4	✓	
4	Duplicate				4	✓	
5	Rinsate				4	✓	
				TOTAL	20		

URGENT

Environmental Division
Melbourne
Work Order Reference
EM1819122



CHAIN OF CUSTODY - Client

ENVIROLAB GROUP - National phone number 1300 424 344

Client: GES (Geo Environmental Solutions)	Client Project Name / Number / Site etc (ie report title): 48-52 New Town Road
Contact Person: S. Joyce	PO No.:
Project Mgr: JP	Envirolab Quote No.:
Sampler: M. Downie	Date results required:
Address: 29 Kirkaway Place, Battery Point	Or choose: standard / same day / 1 day / 2 day / 3 day Note: Inform lab in advance if urgent turnaround is required - surcharges apply
Phone: 62231839 Mob: 0438 255 259	Additional report format: esdat / equis /
Email: sjoyce@geosolutions.net.au	Lab Comments:

Sydney Lab - Envirolab Services
12 Ashley St, Chatswood, NSW 2067
Ph: 02 9910 6200 / sydney@envirolab.com.au

Perth Lab - MPL Laboratories
16-18 Hayden Crt, Myaree, WA 6154
Ph: 08 9317 2505 / lab@mpl.com.au

Melbourne Lab - Envirolab Services
25 Research Drive, Croydon South, VIC 3136
Ph: 03 9763 2500 / melbourne@envirolab.com.au

Adelaide Office - Envirolab Services
7a The Parade, Norwood, SA 5067
Ph: 08 7087 6800 / adelaide@envirolab.com.au

Brisbane Office - Envirolab Services
20a, 10-20 Depot St, Banyo, QLD 4014
Ph: 07 3266 9532 / brisbane@envirolab.com.au

Darwin Office - Envirolab Services
Unit 7, 17 Willes Rd, Berrimah, NT 0820
Ph: 08 8967 1201 / darwin@envirolab.com.au

Sample Information					Tests Required													Comments
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	TPH/TRH/PAH BTEX 15 metals													Provide as much information about the sample as you can
	Triplicate		26/11/18	Water	✓	✓												Potentially hydrocarbons + metals.

Envirolab Services
25 Research Drive
Croydon South VIC 3136
Ph: 03 9763 2500
Job No: 15481
Date Received: 28/11/18
Time Received: 11:25
Received by: SS
Temp: 5.8
Cooling: Ice
Security: Intact

Relinquished by (Company): GES	Received by (Company):	Lab Use Only	
Print Name: Sarah Joyce	Print Name:	Job number:	Cooling: Ice / Ice pack / None
Date & Time: 27.11.18	Date & Time:	Temperature:	Security seal: Intact / Broken / None
Signature:	Signature:	TAT Req - SAME day / 1 / 2 / 3 / 4 / STD	Page 1 of 1

Appendix 9 Laboratory Sample Receipt Notification

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: EM1811858		
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: sjoyce@geosolutions.net.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Facsimile	: +61 03 6223 4539	Facsimile	: +61-3-8549 9626
Project	: Newtown Rd	Page	: 1 of 4
Order number	:	Quote number	: EB2017GEOENVSOL0001 (EN/222/17)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: SJ		

Dates

Date Samples Received	: 25-Jul-2018 09:05	Issue Date	: 26-Jul-2018
Client Requested Due Date	: 01-Aug-2018	Scheduled Reporting Date	: **01-Aug-2018**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 4	Temperature	: 3.9°C - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 59 / 23

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**

RIGHT SOLUTIONS RIGHT PARTNER

Issue Date	: 26-Jul-2018
Page	: 2 of 4
Work Order	: EM1811858 Amendment 0
Client	: GEO-ENVIRONMENTAL SOLUTIONS

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) SOIL - No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - S-03 15 Metals (NEPM 2013 Suite - Incl. Digestion)	SOIL - S-07 TRH/BTEX/NAPAH (SIM)
EM1811858-001	23-Jul-2018 00:00	BH01 0.0-0.1	✓			
EM1811858-002	23-Jul-2018 00:00	BH01 0.5-0.2	✓			
EM1811858-003	23-Jul-2018 00:00	BH01 1.0-1.1		✓	✓	✓
EM1811858-004	23-Jul-2018 00:00	BH01 1.5-1.6	✓			
EM1811858-005	23-Jul-2018 00:00	BH01 2.0-2.1	✓			
EM1811858-006	23-Jul-2018 00:00	BH01 2.5-2.6		✓	✓	✓
EM1811858-007	23-Jul-2018 00:00	BH01 3.0-3.1	✓			
EM1811858-008	23-Jul-2018 00:00	BH01 3.5-3.6	✓			
EM1811858-009	23-Jul-2018 00:00	BH01 4.0-4.1	✓			
EM1811858-010	23-Jul-2018 00:00	BH01 4.4-4.5		✓	✓	✓
EM1811858-011	23-Jul-2018 00:00	BH02 0.0-0.1	✓			
EM1811858-012	23-Jul-2018 00:00	BH02 0.5-0.6	✓			
EM1811858-013	23-Jul-2018 00:00	BH02 1.0-1.1		✓	✓	✓
EM1811858-014	23-Jul-2018 00:00	BH02 1.5-1.6	✓			
EM1811858-015	23-Jul-2018 00:00	BH02 2.0-2.1	✓			
EM1811858-016	23-Jul-2018 00:00	BH02 2.8-2.9		✓	✓	✓
EM1811858-017	23-Jul-2018 00:00	BH02 3.4-3.5	✓			
EM1811858-018	23-Jul-2018 00:00	BH02 4.0-4.1		✓	✓	✓
EM1811858-019	23-Jul-2018 00:00	BH03 0.0-0.1	✓			
EM1811858-020	23-Jul-2018 00:00	BH03 0.5-0.6		✓	✓	✓
EM1811858-021	23-Jul-2018 00:00	BH03 1.0-1.1	✓			
EM1811858-022	23-Jul-2018 00:00	BH03 1.5-1.6	✓			
EM1811858-024	23-Jul-2018 00:00	BH03 2.5-2.6		✓	✓	✓
EM1811858-025	23-Jul-2018 00:00	BH03 3.0-3.1	✓			
EM1811858-026	23-Jul-2018 00:00	BH03 3.5-3.6	✓			
EM1811858-027	23-Jul-2018 00:00	BH03 3.9-4.0		✓	✓	✓
EM1811858-028	23-Jul-2018 00:00	BH04 0.0-0.1	✓			
EM1811858-029	23-Jul-2018 00:00	BH04 0.5-0.6	✓			
EM1811858-030	23-Jul-2018 00:00	BH04 1.0-1.1	✓			
EM1811858-031	23-Jul-2018 00:00	BH04 1.5-1.6		✓	✓	✓
EM1811858-032	23-Jul-2018 00:00	BH04 2.0-2.1	✓			
EM1811858-033	23-Jul-2018 00:00	BH04 2.5-2.6	✓			
EM1811858-034	23-Jul-2018 00:00	BH04 3.0-3.1		✓	✓	✓
EM1811858-035	23-Jul-2018 00:00	BH04 3.5-3.6	✓			
EM1811858-036	23-Jul-2018 00:00	BH04 4.0-4.1	✓			

Issue Date	26-Jul-2018
Page	3 of 4
Work Order	EM1811858 Amendment 0
Client	GEO-ENVIRONMENTAL SOLUTIONS

			(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - S-03 15 Metals (NEPM 2013 Suite - Incl. Digestion)	SOIL - S-07 TRH/BTEX/PAH (SIM)
EM1811858-037	23-Jul-2018 00:00	BH04 4.5-4.6		✓	✓	✓
EM1811858-038	23-Jul-2018 00:00	BH05 0.0-0.1	✓			
EM1811858-039	23-Jul-2018 00:00	BH05 0.5-0.6	✓			
EM1811858-040	23-Jul-2018 00:00	BH05 1.0-1.1		✓	✓	✓
EM1811858-041	23-Jul-2018 00:00	BH05 1.5-1.6	✓			
EM1811858-042	23-Jul-2018 00:00	BH05 2.0-2.1	✓			
EM1811858-043	23-Jul-2018 00:00	BH05 2.5-2.6	✓			
EM1811858-044	23-Jul-2018 00:00	BH05 3.0-3.1		✓	✓	✓
EM1811858-045	23-Jul-2018 00:00	BH05 3.5-3.6	✓			
EM1811858-046	23-Jul-2018 00:00	BH05 4.0-4.1	✓			
EM1811858-047	23-Jul-2018 00:00	BH05 4.5-4.6		✓	✓	✓
EM1811858-048	23-Jul-2018 00:00	BH06 0.0-0.1	✓			
EM1811858-049	23-Jul-2018 00:00	BH06 0.2-0.3		✓	✓	✓
EM1811858-050	23-Jul-2018 00:00	BH07 0.0-0.1	✓			
EM1811858-051	23-Jul-2018 00:00	BH07 0.5-0.6	✓			
EM1811858-052	23-Jul-2018 00:00	BH07 1.0-1.1		✓	✓	✓
EM1811858-053	23-Jul-2018 00:00	BH07 1.5-1.6	✓			
EM1811858-054	23-Jul-2018 00:00	BH07 2.0-2.1	✓			
EM1811858-055	23-Jul-2018 00:00	BH07 2.2-2.3		✓	✓	✓
EM1811858-056	23-Jul-2018 00:00	Duplicate 1		✓	✓	✓
EM1811858-057	23-Jul-2018 00:00	Duplicate 2		✓	✓	✓
EM1811858-060	23-Jul-2018 00:00	Duplicate 3		✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-03T 15 Metals (Total) (NEPM)	WATER - W-07 TRH/BTEX/PAH
EM1811858-058	23-Jul-2018 00:00	Field Blank	✓		✓
EM1811858-059	23-Jul-2018 00:00	Rinsate Blank		✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Issue Date	26-Jul-2018
Page	4 of 4
Work Order	EM1811858 Amendment 0
Client	GEO-ENVIRONMENTAL SOLUTIONS

Requested Deliverables

All Invoices		
- A4 - AU Tax Invoice (INV)	Email	smcintosh@geosolutions.net.au
JOHN PAUL CUMMING		
- *AU Certificate of Analysis - NATA (COA)	Email	jcumming@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jcumming@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jcumming@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jcumming@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	jcumming@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	jcumming@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	jcumming@geosolutions.net.au
M IRAN		
- A4 - AU Tax Invoice (INV)	Email	miran@geosolutions.net.au
SARAH JOYCE		
- *AU Certificate of Analysis - NATA (COA)	Email	sjoyce@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sjoyce@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sjoyce@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sjoyce@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	sjoyce@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	sjoyce@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	sjoyce@geosolutions.net.au

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: ES1822218		
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Sydney
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA AUSTRALIA 7004	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: jcumming@geosolutions.net.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Facsimile	: +61 03 6223 4539	Facsimile	: +61-2-8784 8500
Project	: Newtown Rd	Page	: 1 of 2
Order number	:	Quote number	: EB2017GEOENVSOL0001 (EN/222/17)
C-O-C number	: ---	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ---		
Sampler	:		

Dates

Date Samples Received	: 27-Jul-2018 10:00	Issue Date	: 30-Jul-2018
Client Requested Due Date	: 02-Aug-2018	Scheduled Reporting Date	: **02-Aug-2018**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 5.6 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 3 / 3

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.

RIGHT SOLUTIONS RIGHT PARTNER

Issue Date	30-Jul-2018
Page	2 of 2
Work Order	ES1822218 Amendment 0
Client	GEO-ENVIRONMENTAL SOLUTIONS

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Matrix: SOIL

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA055-103 Moisture Content	SOIL - S-03 15 Metals (NEPM 2013 Suite - incl. Digestion)	SOIL - S-07 TRH/BTEX/PAH (GRM)
ES1822218-001	23-Jul-2018 00:00	Triplicate 1	✓	✓	✓
ES1822218-002	23-Jul-2018 00:00	Triplicate 2	✓	✓	✓
ES1822218-003	23-Jul-2018 00:00	Triplicate 3	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

All Invoices		
- A4 - AU Tax Invoice (INV)	Email	smcintosh@geosolutions.net.au
JOHN PAUL CUMMING		
- *AU Certificate of Analysis - NATA (COA)	Email	jcumming@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jcumming@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jcumming@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jcumming@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	jcumming@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	jcumming@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	jcumming@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	jcumming@geosolutions.net.au
M IRAN		
- A4 - AU Tax Invoice (INV)	Email	miran@geosolutions.net.au
SARAH JOYCE		
- *AU Certificate of Analysis - NATA (COA)	Email	sjoyce@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sjoyce@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sjoyce@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sjoyce@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	sjoyce@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	sjoyce@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	sjoyce@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	sjoyce@geosolutions.net.au

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EM1812173**		
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: sjoyce@geosolutions.net.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Facsimile	: +61 03 6223 4539	Facsimile	: +61-3-8549 9626
Project	: Newtown Rd	Page	: 1 of 2
Order number	:	Quote number	: EB2017GEOENVSOL0001 (EN/222/17)
C-O-C number	: ---	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ---		
Sampler	:		

Dates

Date Samples Received	: 25-Jul-2018 09:05	Issue Date	: 01-Aug-2018
Client Requested Due Date	: 07-Aug-2018	Scheduled Reporting Date	: **07-Aug-2018**

Delivery Details

Mode of Delivery	: Samples On Hand	Security Seal	: Not Available
No. of coolers/boxes	: ---	Temperature	: ---
Receipt Detail	:	No. of samples received / analysed	: 11 / 11

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- This is a rebatch of EM1811858.

RIGHT SOLUTIONS RIGHT PARTNER

Issue Date	01-Aug-2018
Page	2 of 2
Work Order	EM1812173 Amendment 0
Client	GEO-ENVIRONMENTAL SOLUTIONS

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA055-103 Moisture Content	SOIL - S-03 15 Metals (NEPM 2013 Suite - incl. Digestion)	SOIL - S-07 TRH-BTEX-NAPAH (GRM)
EM1812173-001	23-Jul-2018 00:00	BH01 1.5-1.6	✓	✓	✓
EM1812173-002	23-Jul-2018 00:00	BH01 3.5-3.6	✓	✓	✓
EM1812173-003	23-Jul-2018 00:00	BH02 0.5-0.6	✓	✓	✓
EM1812173-004	23-Jul-2018 00:00	BH02 2.0-2.1	✓	✓	✓
EM1812173-005	23-Jul-2018 00:00	BH03 1.0-1.1	✓	✓	✓
EM1812173-006	23-Jul-2018 00:00	BH03 3.0-3.1	✓	✓	✓
EM1812173-007	23-Jul-2018 00:00	BH04 0.5-0.6	✓	✓	✓
EM1812173-008	23-Jul-2018 00:00	BH04 2.5-2.6	✓	✓	✓
EM1812173-009	23-Jul-2018 00:00	BH04 3.5-3.6	✓	✓	✓
EM1812173-010	23-Jul-2018 00:00	BH05 2.0-2.1	✓	✓	✓
EM1812173-011	23-Jul-2018 00:00	BH05 4.0-4.1	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

All Invoices		
- A4 - AU Tax Invoice (INV)	Email	smcintosh@geosolutions.net.au
JOHN PAUL CUMMING		
- *AU Certificate of Analysis - NATA (COA)	Email	jcumming@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jcumming@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jcumming@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jcumming@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	jcumming@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	jcumming@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	jcumming@geosolutions.net.au
M IRAN		
- A4 - AU Tax Invoice (INV)	Email	miran@geosolutions.net.au
SARAH JOYCE		
- *AU Certificate of Analysis - NATA (COA)	Email	sjoyce@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sjoyce@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sjoyce@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sjoyce@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	sjoyce@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	sjoyce@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	sjoyce@geosolutions.net.au

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EM1811913**		
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: sjoyce@geosolutions.net.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Facsimile	: +61 03 6223 4539	Facsimile	: +61-3-8549 9626
Project	: Newtown Rd	Page	: 1 of 4
Order number	:	Quote number	: EB2017GEOENVSOL0001 (EN/222/17)
C-O-C number	: ---	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ---		
Sampler	: SARAH JOYCE		

Dates

Date Samples Received	: 26-Jul-2018 09:05	Issue Date	: 27-Jul-2018
Client Requested Due Date	: 02-Aug-2018	Scheduled Reporting Date	: **02-Aug-2018**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 2	Temperature	: 5.9°C - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 53 / 19

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**

RIGHT SOLUTIONS RIGHT PARTNER

Issue Date	27-Jul-2018
Page	2 of 4
Work Order	EM1811913 Amendment 0
Client	GEO-ENVIRONMENTAL SOLUTIONS

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) SOIL - No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - S-03 15 Metals (NEPM 2013 Suite - Incl. Digestion)	SOIL - S-07 TRH/BTEX/NAPAH (SIM)
EM1811913-001	24-Jul-2018 00:00	BH08_0.0-0.1	✓			
EM1811913-002	24-Jul-2018 00:00	BH08_0.5-0.6	✓			
EM1811913-003	24-Jul-2018 00:00	BH08_1.0-1.1		✓	✓	✓
EM1811913-004	24-Jul-2018 00:00	BH08_1.5-1.6	✓			
EM1811913-005	24-Jul-2018 00:00	BH08_2.0-2.1	✓			
EM1811913-006	24-Jul-2018 00:00	BH08_2.5-2.6		✓	✓	✓
EM1811913-007	24-Jul-2018 00:00	BH08_3.0-3.1	✓			
EM1811913-008	24-Jul-2018 00:00	BH08_3.5-3.6	✓			
EM1811913-009	24-Jul-2018 00:00	BH08_4.0-4.1	✓			
EM1811913-010	24-Jul-2018 00:00	BH08_4.5-4.6		✓	✓	✓
EM1811913-011	24-Jul-2018 00:00	BH09_0.2-0.3	✓			
EM1811913-012	24-Jul-2018 00:00	BH09_0.5-0.6	✓			
EM1811913-013	24-Jul-2018 00:00	BH09_1.0-1.1		✓	✓	✓
EM1811913-014	24-Jul-2018 00:00	BH09_1.5-1.6	✓			
EM1811913-015	24-Jul-2018 00:00	BH09_2.0-2.1	✓			
EM1811913-016	24-Jul-2018 00:00	BH09_2.5-2.6		✓	✓	✓
EM1811913-017	24-Jul-2018 00:00	BH09_3.0-3.1	✓			
EM1811913-018	24-Jul-2018 00:00	BH09_3.5-3.6	✓			
EM1811913-019	24-Jul-2018 00:00	BH09_4.0-4.1	✓			
EM1811913-020	24-Jul-2018 00:00	BH09_4.5-4.6		✓	✓	✓
EM1811913-021	24-Jul-2018 00:00	BH09_5.5-5.6	✓			
EM1811913-022	24-Jul-2018 00:00	BH09_6.0-6.1		✓	✓	✓
EM1811913-023	24-Jul-2018 00:00	BH09_6.3-6.5	✓			
EM1811913-024	24-Jul-2018 00:00	Duplicate 4		✓	✓	✓
EM1811913-025	24-Jul-2018 00:00	BH10_0.5-0.6	✓			
EM1811913-026	24-Jul-2018 00:00	BH10_1.0-1.1		✓	✓	✓
EM1811913-027	24-Jul-2018 00:00	BH10_1.5-1.6	✓			
EM1811913-028	24-Jul-2018 00:00	BH10_2.0-2.1	✓			
EM1811913-029	24-Jul-2018 00:00	BH10_2.5-2.6	✓			
EM1811913-030	24-Jul-2018 00:00	BH10_3.0-3.1		✓	✓	✓
EM1811913-031	24-Jul-2018 00:00	BH10_3.5-3.6	✓			
EM1811913-032	24-Jul-2018 00:00	BH10_4.0-4.1	✓			
EM1811913-033	24-Jul-2018 00:00	BH10_4.5-4.6	✓			
EM1811913-034	24-Jul-2018 00:00	BH10_5.0-5.1		✓	✓	✓
EM1811913-035	24-Jul-2018 00:00	BH10_5.4-5.5	✓			

Issue Date	27-Jul-2018
Page	3 of 4
Work Order	EM1811913 Amendment 0
Client	GEO-ENVIRONMENTAL SOLUTIONS

			(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - S-03 15 Metals (NEPM 2013 Suite - Incl. Digestion)	SOIL - S-07 TRH/BTEX/PAH (SIM)
EM1811913-036	24-Jul-2018 00:00	BH11_0.5-0.6	✓			
EM1811913-037	24-Jul-2018 00:00	BH11_1.0-1.1		✓	✓	✓
EM1811913-038	24-Jul-2018 00:00	BH11_1.5-1.6	✓			
EM1811913-039	24-Jul-2018 00:00	BH11_2.0-2.1	✓			
EM1811913-040	24-Jul-2018 00:00	BH11_2.5-2.6		✓	✓	✓
EM1811913-041	24-Jul-2018 00:00	BH11_3.0-3.1	✓			
EM1811913-042	24-Jul-2018 00:00	BH11_3.3-3.4		✓	✓	✓
EM1811913-043	24-Jul-2018 00:00	BH12_0.5-0.6	✓			
EM1811913-044	24-Jul-2018 00:00	BH12_1.0-1.1		✓	✓	✓
EM1811913-045	24-Jul-2018 00:00	BH12_1.5-1.6	✓			
EM1811913-046	24-Jul-2018 00:00	BH12_2.0-2.1	✓			
EM1811913-047	24-Jul-2018 00:00	BH12_2.5-2.6		✓	✓	✓
EM1811913-048	24-Jul-2018 00:00	BH12_3.0-3.1	✓			
EM1811913-049	24-Jul-2018 00:00	BH12_3.5-3.6		✓	✓	✓
EM1811913-050	24-Jul-2018 00:00	BH12_4.0-4.1	✓			
EM1811913-051	24-Jul-2018 00:00	BH12_4.5-4.6	✓			

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - W-03T 15 Metals (Total) (NEPM)	WATER - W-07 TRH/BTEX/PAH
EM1811913-052	24-Jul-2018 00:00	Field Blank 2	✓	✓
EM1811913-053	24-Jul-2018 00:00	Rinsate 2	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Issue Date	27-Jul-2018
Page	4 of 4
Work Order	EM1811913 Amendment 0
Client	GEO-ENVIRONMENTAL SOLUTIONS

Requested Deliverables

All Invoices		
- A4 - AU Tax Invoice (INV)	Email	smcintosh@geosolutions.net.au
JOHN PAUL CUMMING		
- *AU Certificate of Analysis - NATA (COA)	Email	jcumming@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jcumming@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jcumming@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jcumming@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	jcumming@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	jcumming@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	jcumming@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	jcumming@geosolutions.net.au
M IRAN		
- A4 - AU Tax Invoice (INV)	Email	miran@geosolutions.net.au
SARAH JOYCE		
- *AU Certificate of Analysis - NATA (COA)	Email	sjoyce@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sjoyce@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sjoyce@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sjoyce@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	sjoyce@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	sjoyce@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	sjoyce@geosolutions.net.au

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: ES1822455		
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Sydney
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: sjoyce@geosolutions.net.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Facsimile	: +61 03 6223 4539	Facsimile	: +61-2-8784 8500
Project	: Newtown Rd	Page	: 1 of 2
Order number	:	Quote number	: EB2017GEOENVSOL0001 (EN/222/17)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: SARAH JOYCE		

Dates

Date Samples Received	: 31-Jul-2018 23:30	Issue Date	: 31-Jul-2018
Client Requested Due Date	: 07-Aug-2018	Scheduled Reporting Date	: **07-Aug-2018**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 4.4'C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 1 / 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.

RIGHT SOLUTIONS RIGHT PARTNER

Issue Date	: 31-Jul-2018
Page	: 2 of 2
Work Order	: ES1822455 Amendment 0
Client	: GEO-ENVIRONMENTAL SOLUTIONS

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Matrix: SOIL

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA055-103 Moisture Content	SOIL - S-03 HS Metals (NEPM 2013 Suite - incl. Digestion)	SOIL - S-07 TRH/BTEX/PAH (GRA)
ES1822455-001	24-Jul-2018 00:00	Triplicate 4	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

All Invoices		
- A4 - AU Tax Invoice (INV)	Email	smcintosh@geosolutions.net.au
JOHN PAUL CUMMING		
- *AU Certificate of Analysis - NATA (COA)	Email	jcumming@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jcumming@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jcumming@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jcumming@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	jcumming@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	jcumming@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	jcumming@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	jcumming@geosolutions.net.au
M IRAN		
- A4 - AU Tax Invoice (INV)	Email	miran@geosolutions.net.au
SARAH JOYCE		
- *AU Certificate of Analysis - NATA (COA)	Email	sjoyce@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sjoyce@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sjoyce@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sjoyce@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	sjoyce@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	sjoyce@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	sjoyce@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	sjoyce@geosolutions.net.au

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EM1812174**		
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: sjoyce@geosolutions.net.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Facsimile	: +61 03 6223 4539	Facsimile	: +61-3-8549 9626
Project	: Newtown Rd	Page	: 1 of 2
Order number	:	Quote number	: EB2017GEOENVSOL0001 (EN/222/17)
C-O-C number	: ---	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ---		
Sampler	:		

Dates

Date Samples Received	: 26-Jul-2018 09:05	Issue Date	: 01-Aug-2018
Client Requested Due Date	: 07-Aug-2018	Scheduled Reporting Date	: **07-Aug-2018**

Delivery Details

Mode of Delivery	: Samples On Hand	Security Seal	: Not Available
No. of coolers/boxes	: ---	Temperature	: ---
Receipt Detail	:	No. of samples received / analysed	: 3 / 3

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- This is a rebatch of EM1811913.

RIGHT SOLUTIONS RIGHT PARTNER

Issue Date	01-Aug-2018
Page	2 of 2
Work Order	EM1812174 Amendment 0
Client	GEO-ENVIRONMENTAL SOLUTIONS

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Matrix: SOIL

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA055-103 Moisture Content	SOIL - S-03 15 Metals (NEPM 2013 Suite - incl. Digestion)	SOIL - S-07 TRH/BTEX/PAH (GRM)
EM1812174-001	24-Jul-2018 00:00	BH08_2.0-2.1	✓	✓	✓
EM1812174-002	24-Jul-2018 00:00	BH11_2.0-2.1	✓	✓	✓
EM1812174-003	24-Jul-2018 00:00	BH12_2.0-2.1	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

All Invoices		
- A4 - AU Tax Invoice (INV)	Email	smcintosh@geosolutions.net.au
JOHN PAUL CUMMING		
- *AU Certificate of Analysis - NATA (COA)	Email	jcumming@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jcumming@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jcumming@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jcumming@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	jcumming@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	jcumming@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	jcumming@geosolutions.net.au
M IRAN		
- A4 - AU Tax Invoice (INV)	Email	miran@geosolutions.net.au
SARAH JOYCE		
- *AU Certificate of Analysis - NATA (COA)	Email	sjoyce@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sjoyce@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sjoyce@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sjoyce@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	sjoyce@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	sjoyce@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	sjoyce@geosolutions.net.au

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EM1811891**		
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: sjoyce@geosolutions.net.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Facsimile	: +61 03 6223 4539	Facsimile	: +61-3-8549 9626
Project	: Newtown Rd	Page	: 1 of 3
Order number	:	Quote number	: EB2017GEOENVSOL0001 (EN/222/17)
C-O-C number	: ---	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ---		
Sampler	: SARAH JOYCE		

Dates

Date Samples Received	: 26-Jul-2018 09:05	Issue Date	: 26-Jul-2018
Client Requested Due Date	: 02-Aug-2018	Scheduled Reporting Date	: **02-Aug-2018**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 2	Temperature	: 6.4°C - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 27 / 14

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**

RIGHT SOLUTIONS RIGHT PARTNER

Issue Date	26-Jul-2018
Page	2 of 3
Work Order	EM1811891 Amendment 0
Client	GEO-ENVIRONMENTAL SOLUTIONS

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

Method / Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
Dissolved Mercury by FIMS : EG035F		
Field Blank 3	- Clear Plastic Bottle - Unfiltered; Lab-acidified	- Clear Plastic Bottle - Nitric Acid; Filtered
Rinsate 3	- Clear Plastic Bottle - Unfiltered; Lab-acidified	- Clear Plastic Bottle - Nitric Acid; Filtered
Dissolved Metals by ICP-MS - Suite A : EG020A-F		
Field Blank 3	- Clear Plastic Bottle - Unfiltered; Lab-acidified	- Clear Plastic Bottle - Nitric Acid; Filtered
Rinsate 3	- Clear Plastic Bottle - Unfiltered; Lab-acidified	- Clear Plastic Bottle - Nitric Acid; Filtered

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: SOIL

Laboratory sample ID	Client sampling date / time	Client sample ID	10h Hold) SOIL - No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - S-03 15 Metals (NEPM 2013 Suite - Incl. Digestion)	SOIL - S-07 (TRH/BTEX/NPAH/SIM)
EM1811891-001	25-Jul-2018 00:00	BH14 0.2-0.3	✓			
EM1811891-002	25-Jul-2018 00:00	BH14 0.4-0.5		✓	✓	✓
EM1811891-003	25-Jul-2018 00:00	BH15 0.2-0.3	✓			
EM1811891-004	25-Jul-2018 00:00	BH15 0.55-0.65		✓	✓	✓
EM1811891-005	25-Jul-2018 00:00	BH16 0.3-0.4		✓	✓	✓
EM1811891-006	25-Jul-2018 00:00	BH13 0.5-0.6	✓			
EM1811891-007	25-Jul-2018 00:00	BH13 1.0-1.1		✓	✓	✓
EM1811891-008	25-Jul-2018 00:00	BH13 1.5-1.6		✓	✓	✓
EM1811891-009	25-Jul-2018 00:00	BH13 2.0-2.1	✓			
EM1811891-010	25-Jul-2018 00:00	BH17 0.2-0.3	✓			
EM1811891-011	25-Jul-2018 00:00	BH17 0.5-0.6		✓	✓	✓
EM1811891-012	25-Jul-2018 00:00	BH17 1.0-1.1	✓			
EM1811891-013	25-Jul-2018 00:00	BH17 1.1-1.2		✓	✓	✓
EM1811891-014	25-Jul-2018 00:00	BH18 0.5-0.6	✓			
EM1811891-015	25-Jul-2018 00:00	BH18 1.0-1.1	✓			
EM1811891-016	25-Jul-2018 00:00	BH18 1.5-1.6		✓	✓	✓
EM1811891-017	25-Jul-2018 00:00	BH18 2.0-2.1	✓			
EM1811891-018	25-Jul-2018 00:00	BH18 2.5-2.6	✓			
EM1811891-019	25-Jul-2018 00:00	BH18 2.7-2.8		✓	✓	✓
EM1811891-020	25-Jul-2018 00:00	BH18 3.1-3.2	✓			
EM1811891-021	25-Jul-2018 00:00	BH18 3.5-3.6		✓	✓	✓
EM1811891-022	25-Jul-2018 00:00	BH19 0.5-0.6	✓			
EM1811891-023	25-Jul-2018 00:00	BH19 1.0-1.1		✓	✓	✓
EM1811891-024	25-Jul-2018 00:00	BH19 1.5-1.6	✓			
EM1811891-025	25-Jul-2018 00:00	BH19 2.1-2.2		✓	✓	✓

Issue Date	26-Jul-2018
Page	3 of 3
Work Order	EM1811891 Amendment 0
Client	GEO-ENVIRONMENTAL SOLUTIONS

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-07 TRH/BTEX/PAH
EM1811891-026	25-Jul-2018 00:00	Field Blank 3	✓	✓
EM1811891-027	25-Jul-2018 00:00	Rinsate 3	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

All Invoices		
- A4 - AU Tax Invoice (INV)	Email	smcintosh@geosolutions.net.au
JOHN PAUL CUMMING		
- *AU Certificate of Analysis - NATA (COA)	Email	jcumming@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jcumming@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jcumming@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jcumming@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	jcumming@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	jcumming@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	jcumming@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	jcumming@geosolutions.net.au
M IRAN		
- A4 - AU Tax Invoice (INV)	Email	miran@geosolutions.net.au
SARAH JOYCE		
- *AU Certificate of Analysis - NATA (COA)	Email	sjoyce@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sjoyce@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sjoyce@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sjoyce@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	sjoyce@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	sjoyce@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	sjoyce@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	sjoyce@geosolutions.net.au

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EM1812175**		
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: sjoyce@geosolutions.net.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Facsimile	: +61 03 6223 4539	Facsimile	: +61-3-8549 9626
Project	: Newtown Rd	Page	: 1 of 2
Order number	:	Quote number	: EB2017GEOENVSOL0001 (EN/222/17)
C-O-C number	: ---	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ---		
Sampler	:		

Dates

Date Samples Received	: 26-Jul-2018 09:05	Issue Date	: 01-Aug-2018
Client Requested Due Date	: 07-Aug-2018	Scheduled Reporting Date	: **07-Aug-2018**

Delivery Details

Mode of Delivery	: Samples On Hand	Security Seal	: Not Available
No. of coolers/boxes	: ---	Temperature	: ---
Receipt Detail	:	No. of samples received / analysed	: 4 / 4

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- This is a rebatch of EM1811891.

RIGHT SOLUTIONS RIGHT PARTNER

Issue Date	01-Aug-2018
Page	2 of 2
Work Order	EM1812175 Amendment 0
Client	GEO-ENVIRONMENTAL SOLUTIONS

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA055-103 Moisture Content	SOIL - S-03 15 Metals (NEPM 2013 Suite - incl. Digestion)	SOIL - S-07 TRH/BTEX/PAH (GRM)
EM1812175-001	25-Jul-2018 00:00	BH13 2.0-2.1	✓	✓	✓
EM1812175-002	25-Jul-2018 00:00	BH18 0.5-0.6	✓	✓	✓
EM1812175-003	25-Jul-2018 00:00	BH18 2.5-2.6	✓	✓	✓
EM1812175-004	25-Jul-2018 00:00	BH18 3.1-3.2	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

All Invoices		
- A4 - AU Tax Invoice (INV)	Email	smcintosh@geosolutions.net.au
JOHN PAUL CUMMING		
- *AU Certificate of Analysis - NATA (COA)	Email	jcumming@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jcumming@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jcumming@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jcumming@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	jcumming@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	jcumming@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	jcumming@geosolutions.net.au
M IRAN		
- A4 - AU Tax Invoice (INV)	Email	miran@geosolutions.net.au
SARAH JOYCE		
- *AU Certificate of Analysis - NATA (COA)	Email	sjoyce@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sjoyce@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sjoyce@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sjoyce@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	sjoyce@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	sjoyce@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	sjoyce@geosolutions.net.au

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EM1812116**		
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: sjoyce@geosolutions.net.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Facsimile	: +61 03 6223 4539	Facsimile	: +61-3-8549 9626
Project	: New Town Road	Page	: 1 of 3
Order number	: 30 July 2018	Quote number	: EB2017GEOENVSOL0001 (EN/222/17)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: SJ		

Dates

Date Samples Received	: 31-Jul-2018 09:25	Issue Date	: 31-Jul-2018
Client Requested Due Date	: 07-Aug-2018	Scheduled Reporting Date	: **07-Aug-2018**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 4.6°C - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 5 / 4

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**

RIGHT SOLUTIONS RIGHT PARTNER

Issue Date	: 31-Jul-2018
Page	: 2 of 3
Work Order	: EM1812116 Amendment 0
Client	: GEO-ENVIRONMENTAL SOLUTIONS

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) SOIL - No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - S-03 15 Metals (NEPM 2013 Suite - incl. Digestion)	SOIL - S-07 TRH/BTEX/NPAH (SIM)
EM1812116-003	30-Jul-2018 00:00	BH20 0.5-0.6		✓	✓	✓
EM1812116-004	30-Jul-2018 00:00	BH20 1.0-1.1		✓	✓	✓
EM1812116-005	30-Jul-2018 00:00	Duplicate 5	✓			

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - W-03T 15 Metals (Total) (NEPM)	WATER - W-07 TRH/BTEX/NPAH
EM1812116-001	30-Jul-2018 00:00	Field Blank 4	✓	✓
EM1812116-002	30-Jul-2018 00:00	Rinsate 4	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Issue Date	31-Jul-2018
Page	3 of 3
Work Order	EM1812116 Amendment 0
Client	GEO-ENVIRONMENTAL SOLUTIONS

Requested Deliverables

All Invoices		
- A4 - AU Tax Invoice (INV)	Email	smcintosh@geosolutions.net.au
JOHN PAUL CUMMING		
- *AU Certificate of Analysis - NATA (COA)	Email	jcumming@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jcumming@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jcumming@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jcumming@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	jcumming@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	jcumming@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	jcumming@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	jcumming@geosolutions.net.au
M IRAN		
- A4 - AU Tax Invoice (INV)	Email	miran@geosolutions.net.au
SARAH JOYCE		
- *AU Certificate of Analysis - NATA (COA)	Email	sjoyce@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sjoyce@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sjoyce@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sjoyce@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	sjoyce@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	sjoyce@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	sjoyce@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	sjoyce@geosolutions.net.au

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EM1814666**		
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: sjoyce@geosolutions.net.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Facsimile	: +61 03 6223 4539	Facsimile	: +61-3-8549 9626
Project	: New Town Rd	Page	: 1 of 2
Order number	:	Quote number	: EB2017GEOENVSOL0001 (EN/222)
C-O-C number	: ---	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ---		
Sampler	: AARON PLUMMER		

Dates

Date Samples Received	: 13-Sep-2018 09:25	Issue Date	: 13-Sep-2018
Client Requested Due Date	: 17-Sep-2018	Scheduled Reporting Date	: **17-Sep-2018**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 7.2°C - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 4 / 4

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**

RIGHT SOLUTIONS RIGHT PARTNER

Issue Date	13-Sep-2018
Page	2 of 2
Work Order	EM1814666 Amendment 0
Client	GEO-ENVIRONMENTAL SOLUTIONS

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - W-03 10 Metals (NEPM Suite)	WATER - W-07 TRH-BTEXN/PAH
EM1814666-001	11-Sep-2018 00:00	MW1	✓	✓
EM1814666-002	11-Sep-2018 00:00	DUPLICATE	✓	✓
EM1814666-003	11-Sep-2018 00:00	TRIPLICATE	✓	✓
EM1814666-004	11-Sep-2018 00:00	FIELD BLANK		✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

JOHN PAUL CUMMING		
- *AU Certificate of Analysis - NATA (COA)	Email	jcumming@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jcumming@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jcumming@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jcumming@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	jcumming@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	jcumming@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	jcumming@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	jcumming@geosolutions.net.au
M IRAN		
- A4 - AU Tax Invoice (INV)	Email	miran@geosolutions.net.au
SARAH JOYCE		
- *AU Certificate of Analysis - NATA (COA)	Email	sjoyce@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sjoyce@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sjoyce@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sjoyce@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	sjoyce@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	sjoyce@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	sjoyce@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	sjoyce@geosolutions.net.au

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: ES1827248		
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Sydney
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA AUSTRALIA 7004	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: sjoyce@geosolutions.net.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Facsimile	: +61 03 6223 4539	Facsimile	: +61-2-8784 8500
Project	: New Town Rd	Page	: 1 of 2
Order number	:	Quote number	: EB2017GEOENVSOL0001 (EN/222)
C-O-C number	: ---	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ---		
Sampler	: A. Plummer		

Dates

Date Samples Received	: 14-Sep-2018 09:00	Issue Date	: 14-Sep-2018
Client Requested Due Date	: 18-Sep-2018	Scheduled Reporting Date	: **18-Sep-2018**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 11.4'C - Ice present
Receipt Detail	: ICE MELTED	No. of samples received / analysed	: 1 / 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.

RIGHT SOLUTIONS RIGHT PARTNER

Issue Date	14-Sep-2018
Page	2 of 2
Work Order	ES1827248 Amendment 0
Client	GEO-ENVIRONMENTAL SOLUTIONS

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

Method Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
Dissolved Mercury by FIMS : EG035F		
TRIPLICATE	- Clear Plastic Bottle - Unfiltered; Lab-acidified	- Clear Plastic Bottle - Nitric Acid; Filtered
Dissolved Metals by ICP-MS - Suite A : EG020A-F		
TRIPLICATE	- Clear Plastic Bottle - Unfiltered; Lab-acidified	- Clear Plastic Bottle - Nitric Acid; Filtered

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - W-03 (8 Metals (NEPM Suite))	WATER - W-07 TRH/BTEX/NAPAH
ES1827248-001	11-Sep-2018 00:00	TRIPLICATE	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

All Invoices		
- A4 - AU Tax Invoice (INV)	Email	smcintosh@geosolutions.net.au
JOHN PAUL CUMMING		
- *AU Certificate of Analysis - NATA (COA)	Email	jcumming@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jcumming@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jcumming@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jcumming@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	jcumming@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	jcumming@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	jcumming@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	jcumming@geosolutions.net.au
M IRAN		
- A4 - AU Tax Invoice (INV)	Email	miran@geosolutions.net.au
SARAH JOYCE		
- *AU Certificate of Analysis - NATA (COA)	Email	sjoyce@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sjoyce@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sjoyce@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sjoyce@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	sjoyce@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	sjoyce@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	sjoyce@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	sjoyce@geosolutions.net.au

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EM1816786**		
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: jcumming@geosolutions.net.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Facsimile	: +61 03 6223 4539	Facsimile	: +61-3-8549 9626
Project	: New Town Road	Page	: 1 of 2
Order number	:	Quote number	: EB2017GEOENVSOL0001 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: SJ		

Dates

Date Samples Received	: 18-Oct-2018 09:10	Issue Date	: 19-Oct-2018
Client Requested Due Date	: 25-Oct-2018	Scheduled Reporting Date	: **25-Oct-2018**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 5.0°C - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 3 / 3

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**

RIGHT SOLUTIONS | RIGHT PARTNER

Issue Date	: 19-Oct-2018
Page	: 2 of 2
Work Order	: EM1816786 Amendment 0
Client	: GEO-ENVIRONMENTAL SOLUTIONS

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA055-103 Moisture Content	SOIL - EN33a TCLP Leachate	SOIL - EP075 SIM PAH only SIM - PAH only
EM1816786-001	17-Oct-2018 00:00	GT02	✓	✓	✓
EM1816786-002	17-Oct-2018 00:00	GT01	✓	✓	✓
EM1816786-003	17-Oct-2018 00:00	GT03	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

All Invoices		
- A4 - AU Tax Invoice (INV)	Email	smcintosh@geosolutions.net.au
JOHN PAUL CUMMING		
- *AU Certificate of Analysis - NATA (COA)	Email	jcumming@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jcumming@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jcumming@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jcumming@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	jcumming@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	jcumming@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	jcumming@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	jcumming@geosolutions.net.au
M IRAN		
- A4 - AU Tax Invoice (INV)	Email	miran@geosolutions.net.au
SARAH JOYCE		
- *AU Certificate of Analysis - NATA (COA)	Email	sjoyce@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sjoyce@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sjoyce@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sjoyce@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	sjoyce@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	sjoyce@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	sjoyce@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	sjoyce@geosolutions.net.au

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EM1817421**

Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: jcumming@geosolutions.net.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Facsimile	: +61 03 6223 4539	Facsimile	: +61-3-8549 9626
Project	: 48-52	Page	: 1 of 3
Order number	:	Quote number	: EB2017GEOENVSOL0001 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: GM		

Dates

Date Samples Received	: 30-Oct-2018 09:40	Issue Date	: 30-Oct-2018
Client Requested Due Date	: 07-Nov-2018	Scheduled Reporting Date	: **07-Nov-2018**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 7.3°C - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 28 / 28

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**

RIGHT SOLUTIONS | RIGHT PARTNER

Issue Date	: 30-Oct-2018
Page	: 2 of 3
Work Order	: EM1817421 Amendment 0
Client	: GEO-ENVIRONMENTAL SOLUTIONS

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA055-103 Moisture Content	SOIL - S-03 15 Metals (NEPM 2013 Suite - incl. Digestion)	SOIL - S-07 TRH+BTEXN/PAH (SIM)
EM1817421-001	24-Oct-2018 00:00	BH21 0.5-0.6	✓	✓	✓
EM1817421-002	24-Oct-2018 00:00	BH21 1.5-1.6	✓	✓	✓
EM1817421-003	24-Oct-2018 00:00	BH21 2.5-2.6	✓	✓	✓
EM1817421-004	24-Oct-2018 00:00	BH21 3.5-3.6	✓	✓	✓
EM1817421-005	24-Oct-2018 00:00	BH21 4.5-4.6	✓	✓	✓
EM1817421-006	24-Oct-2018 00:00	BH21 5.5-5.6	✓	✓	✓
EM1817421-007	24-Oct-2018 00:00	BH22 0.5-0.6	✓	✓	✓
EM1817421-008	24-Oct-2018 00:00	BH22 1.5-1.6	✓	✓	✓
EM1817421-009	24-Oct-2018 00:00	BH22 2.5-2.6	✓	✓	✓
EM1817421-010	24-Oct-2018 00:00	BH22 3.4-3.5	✓	✓	✓
EM1817421-011	24-Oct-2018 00:00	BH23 0.5-0.6	✓	✓	✓
EM1817421-012	24-Oct-2018 00:00	BH23 1.5-1.6	✓	✓	✓
EM1817421-013	24-Oct-2018 00:00	BH23 2.5-2.6	✓	✓	✓
EM1817421-014	24-Oct-2018 00:00	BH23 3.5-3.6	✓	✓	✓
EM1817421-015	24-Oct-2018 00:00	BH23 4.5-4.6	✓	✓	✓
EM1817421-016	24-Oct-2018 00:00	BH23 5.5-5.6	✓	✓	✓
EM1817421-017	24-Oct-2018 00:00	BH24 0.5-0.6	✓	✓	✓
EM1817421-018	24-Oct-2018 00:00	BH24 1.5-1.6	✓	✓	✓
EM1817421-019	24-Oct-2018 00:00	BH24 2.5-2.6	✓	✓	✓
EM1817421-020	24-Oct-2018 00:00	BH24 3.3-3.4	✓	✓	✓
EM1817421-021	24-Oct-2018 00:00	BH25 0.5-0.6	✓	✓	✓
EM1817421-022	24-Oct-2018 00:00	BH25 1.5-1.6	✓	✓	✓
EM1817421-023	24-Oct-2018 00:00	BH25 2.5-2.6	✓	✓	✓
EM1817421-024	24-Oct-2018 00:00	BH25 3.5-3.6	✓	✓	✓
EM1817421-025	24-Oct-2018 00:00	BH25 4.5-4.6	✓	✓	✓
EM1817421-026	24-Oct-2018 00:00	BH25 5.5-5.6	✓	✓	✓
EM1817421-027	24-Oct-2018 00:00	DUPLICATE 1	✓	✓	✓

Issue Date	: 30-Oct-2018
Page	: 3 of 3
Work Order	: EM1817421 Amendment 0
Client	: GEO-ENVIRONMENTAL SOLUTIONS

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - W-05 15 Metals (NEPM Suite)	WATER - W-07 TRH/BTEX/PAH
EM1817421-028	24-Oct-2018 00:00	Rinsate Blank	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

JOHN PAUL CUMMING		
- *AU Certificate of Analysis - NATA (COA)	Email	jcumming@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jcumming@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jcumming@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jcumming@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	jcumming@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	jcumming@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	jcumming@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	jcumming@geosolutions.net.au
M IRAN		
- A4 - AU Tax Invoice (INV)	Email	miran@geosolutions.net.au
SARAH JOYCE		
- *AU Certificate of Analysis - NATA (COA)	Email	sjoyce@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sjoyce@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sjoyce@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sjoyce@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	sjoyce@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	sjoyce@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	sjoyce@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	sjoyce@geosolutions.net.au

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EM1817821**		
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: jcumming@geosolutions.net.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Facsimile	: +61 03 6223 4539	Facsimile	: +61-3-8549 9626
Project	: 48-52	Page	: 1 of 3
Order number	:	Quote number	: EB2017GEOENVSOL0001 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	:		

Dates

Date Samples Received	: 30-Oct-2018 09:40	Issue Date	: 07-Nov-2018
Client Requested Due Date	: 09-Nov-2018	Scheduled Reporting Date	: **09-Nov-2018**

Delivery Details

Mode of Delivery	: Samples On Hand	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: ----
Receipt Detail	:	No. of samples received / analysed	: 13 / 13

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- This is a rebatch of EM1817421

RIGHT SOLUTIONS | RIGHT PARTNER

Issue Date	: 07-Nov-2018
Page	: 2 of 3
Work Order	: EM1817821 Amendment 0
Client	: GEO-ENVIRONMENTAL SOLUTIONS

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EG005C Leachate Metals by ICPAES	SOIL - EN33a TCLP Leachate	SOIL - EP075 SIM PAH only SIM - PAH only
EM1817821-001	24-Oct-2018 00:00	BH21 0.5-0.6		✓	✓
EM1817821-002	24-Oct-2018 00:00	BH21 4.5-4.6		✓	✓
EM1817821-003	24-Oct-2018 00:00	BH21 5.5-5.6		✓	✓
EM1817821-004	24-Oct-2018 00:00	BH22 0.5-0.6		✓	✓
EM1817821-005	24-Oct-2018 00:00	BH23 0.5-0.6		✓	✓
EM1817821-006	24-Oct-2018 00:00	BH23 1.5-1.6		✓	✓
EM1817821-007	24-Oct-2018 00:00	BH23 2.5-2.6		✓	✓
EM1817821-008	24-Oct-2018 00:00	BH23 3.5-3.6	✓	✓	✓
EM1817821-009	24-Oct-2018 00:00	BH23 4.5-4.6		✓	✓
EM1817821-010	24-Oct-2018 00:00	BH23 5.5-5.6		✓	✓
EM1817821-011	24-Oct-2018 00:00	BH24 0.5-0.6		✓	✓
EM1817821-012	24-Oct-2018 00:00	BH25 3.5-3.6		✓	✓
EM1817821-013	24-Oct-2018 00:00	BH25 4.5-4.6		✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Issue Date	: 07-Nov-2018
Page	: 3 of 3
Work Order	: EM1817821 Amendment 0
Client	: GEO-ENVIRONMENTAL SOLUTIONS

Requested Deliverables

All Invoices		
- A4 - AU Tax Invoice (INV)	Email	smcintosh@geosolutions.net.au
JOHN PAUL CUMMING		
- *AU Certificate of Analysis - NATA (COA)	Email	jcumming@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jcumming@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jcumming@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jcumming@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	jcumming@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	jcumming@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	jcumming@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	jcumming@geosolutions.net.au
M IRAN		
- A4 - AU Tax Invoice (INV)	Email	miran@geosolutions.net.au
SARAH JOYCE		
- *AU Certificate of Analysis - NATA (COA)	Email	sjoyce@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sjoyce@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sjoyce@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sjoyce@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	sjoyce@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	sjoyce@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	sjoyce@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	sjoyce@geosolutions.net.au

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EM1817564**		
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: jcumming@geosolutions.net.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Facsimile	: +61 03 6223 4539	Facsimile	: +61-3-8549 9626
Project	: 48-52	Page	: 1 of 4
Order number	:	Quote number	: EB2017GEOENVSOL0001 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: AARON PLUMMER		

Dates

Date Samples Received	: 01-Nov-2018 09:40	Issue Date	: 01-Nov-2018
Client Requested Due Date	: 09-Nov-2018	Scheduled Reporting Date	: **09-Nov-2018**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 2	Temperature	: 8.2°C - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 43 / 43

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**

RIGHT SOLUTIONS | RIGHT PARTNER

Issue Date	: 01-Nov-2018
Page	: 2 of 4
Work Order	: EM1817564 Amendment 0
Client	: GEO-ENVIRONMENTAL SOLUTIONS

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA055-103 Moisture Content	SOIL - S-03 15 Metals (NEPM 2013 Suite - incl. Digestion)	SOIL - S-07 TRH+BTEXN/PAH (SIM)
EM1817564-001	29-Oct-2018 00:00	BH26 0.1-0.2	✓	✓	✓
EM1817564-002	29-Oct-2018 00:00	BH26 0.5-0.6	✓	✓	✓
EM1817564-003	29-Oct-2018 00:00	BH27 0.1-0.2	✓	✓	✓
EM1817564-004	29-Oct-2018 00:00	BH27 0.5-0.6	✓	✓	✓
EM1817564-005	29-Oct-2018 00:00	BH27 1.0-1.1	✓	✓	✓
EM1817564-006	29-Oct-2018 00:00	BH27 1.5-1.6	✓	✓	✓
EM1817564-007	29-Oct-2018 00:00	BH27 1.9-2.0	✓	✓	✓
EM1817564-008	29-Oct-2018 00:00	BH28 0.1-0.2	✓	✓	✓
EM1817564-009	29-Oct-2018 00:00	BH28 0.5-0.6	✓	✓	✓
EM1817564-010	29-Oct-2018 00:00	BH28 1.0-1.1	✓	✓	✓
EM1817564-011	29-Oct-2018 00:00	BH28 1.2-1.3	✓	✓	✓
EM1817564-012	30-Oct-2018 00:00	BH29 0.5-0.6	✓	✓	✓
EM1817564-013	30-Oct-2018 00:00	BH29 1.5-1.6	✓	✓	✓
EM1817564-014	30-Oct-2018 00:00	BH29 2.1-2.2	✓	✓	✓
EM1817564-015	30-Oct-2018 00:00	BH30 0.3-0.4	✓	✓	✓
EM1817564-016	30-Oct-2018 00:00	BH31 0.5-0.6	✓	✓	✓
EM1817564-017	30-Oct-2018 00:00	BH31 1.5-1.6	✓	✓	✓
EM1817564-018	30-Oct-2018 00:00	BH32 0.5-0.6	✓	✓	✓
EM1817564-019	30-Oct-2018 00:00	BH33 0.5-0.6	✓	✓	✓
EM1817564-020	30-Oct-2018 00:00	BH34 0.5-0.6	✓	✓	✓
EM1817564-021	30-Oct-2018 00:00	BH35 0.5-0.6	✓	✓	✓
EM1817564-022	30-Oct-2018 00:00	BH35 1.5-1.6	✓	✓	✓
EM1817564-023	30-Oct-2018 00:00	Duplicate 2	✓	✓	✓
EM1817564-027	31-Oct-2018 00:00	BH36 0.5-0.6	✓	✓	✓
EM1817564-028	31-Oct-2018 00:00	BH37 0.5-0.6	✓	✓	✓
EM1817564-029	31-Oct-2018 00:00	BH37 1.5-1.6	✓	✓	✓
EM1817564-030	31-Oct-2018 00:00	BH37 2.5-2.6	✓	✓	✓
EM1817564-031	31-Oct-2018 00:00	BH37 3.5-3.6	✓	✓	✓
EM1817564-032	31-Oct-2018 00:00	BH38 0.5-0.6	✓	✓	✓
EM1817564-033	31-Oct-2018 00:00	BH38 1.5-1.6	✓	✓	✓
EM1817564-034	31-Oct-2018 00:00	BH38 2.5-2.6	✓	✓	✓
EM1817564-035	31-Oct-2018 00:00	BH39 0.5-0.6	✓	✓	✓
EM1817564-036	31-Oct-2018 00:00	BH39 1.5-1.6	✓	✓	✓
EM1817564-037	31-Oct-2018 00:00	BH39 2.5-2.6	✓	✓	✓
EM1817564-038	31-Oct-2018 00:00	BH40 0.5-0.6	✓	✓	✓

Issue Date	: 01-Nov-2018
Page	: 3 of 4
Work Order	: EM1817564 Amendment 0
Client	: GEO-ENVIRONMENTAL SOLUTIONS

			SOIL - EA055-103 Moisture Content	SOIL - S-03 15 Metals (NEPM 2013 Suite - incl. Digestion)	SOIL - S-07 TRH/BTEX/NPAH (SIM)
EM1817564-039	31-Oct-2018 00:00	BH40 1.5-1.6	✓	✓	✓
EM1817564-040	31-Oct-2018 00:00	BH40 2.5-2.6	✓	✓	✓
EM1817564-041	31-Oct-2018 00:00	BH40 3.5-3.6	✓	✓	✓
EM1817564-042	31-Oct-2018 00:00	Duplicate 3	✓	✓	✓
EM1817564-043	31-Oct-2018 00:00	Duplicate 4	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-07 TRH/BTEX/NPAH
EM1817564-024	29-Oct-2018 00:00	Rinsate 2	✓	✓
EM1817564-025	30-Oct-2018 00:00	Rinsate 3	✓	✓
EM1817564-026	31-Oct-2018 00:00	Rinsate 4	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Issue Date	: 01-Nov-2018
Page	: 4 of 4
Work Order	: EM1817564 Amendment 0
Client	: GEO-ENVIRONMENTAL SOLUTIONS

Requested Deliverables

JOHN PAUL CUMMING		
- *AU Certificate of Analysis - NATA (COA)	Email	jcumming@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jcumming@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jcumming@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jcumming@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	jcumming@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	jcumming@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	jcumming@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	jcumming@geosolutions.net.au
M IRAN		
- A4 - AU Tax Invoice (INV)	Email	miran@geosolutions.net.au
SARAH JOYCE		
- *AU Certificate of Analysis - NATA (COA)	Email	sjoyce@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sjoyce@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sjoyce@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sjoyce@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	sjoyce@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	sjoyce@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	sjoyce@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	sjoyce@geosolutions.net.au

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EM1818156**		
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: jcumming@geosolutions.net.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Facsimile	: +61 03 6223 4539	Facsimile	: +61-3-8549 9626
Project	: 48-52	Page	: 1 of 3
Order number	:	Quote number	: EB2017GEOENVSOL0001 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	:		

Dates

Date Samples Received	: 01-Nov-2018 09:40	Issue Date	: 12-Nov-2018
Client Requested Due Date	: 15-Nov-2018	Scheduled Reporting Date	: **15-Nov-2018**

Delivery Details

Mode of Delivery	: Samples On Hand	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: ----
Receipt Detail	:	No. of samples received / analysed	: 13 / 13

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- This is a rebatch of EM1817564

RIGHT SOLUTIONS | RIGHT PARTNER

Issue Date	: 12-Nov-2018
Page	: 2 of 3
Work Order	: EM1818156 Amendment 0
Client	: GEO-ENVIRONMENTAL SOLUTIONS

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EN33a TCLP Leachate	SOIL - EP075 SIM PAH only SIM - PAH only
EM1818156-001	29-Oct-2018 00:00	BH27 1.0-1.1	✓	✓
EM1818156-002	29-Oct-2018 00:00	BH28 1.2-1.3	✓	✓
EM1818156-003	30-Oct-2018 00:00	BH29 0.5-0.6	✓	✓
EM1818156-004	30-Oct-2018 00:00	BH35 0.5-0.6	✓	✓
EM1818156-005	31-Oct-2018 00:00	BH37 0.5-0.6	✓	✓
EM1818156-006	31-Oct-2018 00:00	BH37 1.5-1.6	✓	✓
EM1818156-007	31-Oct-2018 00:00	BH37 2.5-2.6	✓	✓
EM1818156-008	31-Oct-2018 00:00	BH37 3.5-3.6	✓	✓
EM1818156-009	31-Oct-2018 00:00	BH39 1,5-1.6	✓	✓
EM1818156-010	31-Oct-2018 00:00	BH39 2.5-2.6	✓	✓
EM1818156-011	31-Oct-2018 00:00	BH40 0.5-0.6	✓	✓
EM1818156-012	31-Oct-2018 00:00	BH40 1.5-1.6	✓	✓
EM1818156-013	31-Oct-2018 00:00	BH40 3.5-3.6	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Issue Date	: 12-Nov-2018
Page	: 3 of 3
Work Order	: EM1818156 Amendment 0
Client	: GEO-ENVIRONMENTAL SOLUTIONS

Requested Deliverables

All Invoices		
- A4 - AU Tax Invoice (INV)	Email	smcintosh@geosolutions.net.au
JOHN PAUL CUMMING		
- *AU Certificate of Analysis - NATA (COA)	Email	jcumming@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jcumming@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jcumming@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jcumming@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	jcumming@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	jcumming@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	jcumming@geosolutions.net.au
M IRAN		
- *AU Certificate of Analysis - NATA (COA)	Email	miran@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	miran@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	miran@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	miran@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	miran@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	miran@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	miran@geosolutions.net.au
SARAH JOYCE		
- *AU Certificate of Analysis - NATA (COA)	Email	sjoyce@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sjoyce@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sjoyce@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sjoyce@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	sjoyce@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	sjoyce@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	sjoyce@geosolutions.net.au

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EM1817824**		
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: jcumming@geosolutions.net.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Facsimile	: +61 03 6223 4539	Facsimile	: +61-3-8549 9626
Project	: 48-52	Page	: 1 of 3
Order number	:	Quote number	: EB2017GEOENVSOL0001 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: AP		

Dates

Date Samples Received	: 07-Nov-2018 09:15	Issue Date	: 07-Nov-2018
Client Requested Due Date	: 12-Nov-2018	Scheduled Reporting Date	: **12-Nov-2018**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 2	Temperature	: 17.5°C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 29 / 29

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**

RIGHT SOLUTIONS | RIGHT PARTNER

Issue Date	: 07-Nov-2018
Page	: 2 of 3
Work Order	: EM1817824 Amendment 0
Client	: GEO-ENVIRONMENTAL SOLUTIONS

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA055-103 Moisture Content	SOIL - S-03 15 Metals (NEPM 2013 Suite - incl. Digestion)	SOIL - S-07 TRH+BTEXN/PAH (SIM)
EM1817824-001	05-Nov-2018 00:00	BH41 0.5-0.6	✓	✓	✓
EM1817824-002	05-Nov-2018 00:00	BH42 0.5-0.6	✓	✓	✓
EM1817824-003	05-Nov-2018 00:00	BH42 1.5-1.6	✓	✓	✓
EM1817824-004	05-Nov-2018 00:00	BH42 2.5-2.6	✓	✓	✓
EM1817824-005	05-Nov-2018 00:00	BH43 0.5-0.6	✓	✓	✓
EM1817824-006	05-Nov-2018 00:00	BH43 1.5-1.6	✓	✓	✓
EM1817824-007	05-Nov-2018 00:00	BH43 2.5-2.6	✓	✓	✓
EM1817824-008	05-Nov-2018 00:00	BH43 3.5-3.6	✓	✓	✓
EM1817824-009	05-Nov-2018 00:00	BH44 0,5-0.6	✓	✓	✓
EM1817824-010	05-Nov-2018 00:00	BH44 1.5-1.6	✓	✓	✓
EM1817824-011	05-Nov-2018 00:00	BH44 2.5-2.6	✓	✓	✓
EM1817824-012	05-Nov-2018 00:00	BH44 3.5-3.6	✓	✓	✓
EM1817824-013	05-Nov-2018 00:00	BH45 0.5-0.6	✓	✓	✓
EM1817824-014	05-Nov-2018 00:00	BH46 0.5-0.6	✓	✓	✓
EM1817824-015	05-Nov-2018 00:00	BH47 0.5-0.6	✓	✓	✓
EM1817824-016	05-Nov-2018 00:00	BH47 1.5-1.6	✓	✓	✓
EM1817824-017	05-Nov-2018 00:00	BH48 0.5-0.6	✓	✓	✓
EM1817824-018	05-Nov-2018 00:00	BH48 1.5-1.6	✓	✓	✓
EM1817824-019	05-Nov-2018 00:00	BH49 0.5-0.6	✓	✓	✓
EM1817824-020	05-Nov-2018 00:00	BH49 1.5-1.6	✓	✓	✓
EM1817824-021	05-Nov-2018 00:00	BH50 0.5-0.6	✓	✓	✓
EM1817824-022	05-Nov-2018 00:00	BH50 1.5-1.6	✓	✓	✓
EM1817824-023	05-Nov-2018 00:00	BH51 0.5-0.6	✓	✓	✓
EM1817824-024	05-Nov-2018 00:00	BH51 1.5-1.6	✓	✓	✓
EM1817824-025	05-Nov-2018 00:00	BH52 0.5-0.6	✓	✓	✓
EM1817824-026	05-Nov-2018 00:00	BH52 1.5-1.6	✓	✓	✓
EM1817824-027	05-Nov-2018 00:00	BH53 0.5-0.6	✓	✓	✓
EM1817824-028	05-Nov-2018 00:00	BH53 1.5-1.6	✓	✓	✓

Issue Date	: 07-Nov-2018
Page	: 3 of 3
Work Order	: EM1817824 Amendment 0
Client	: GEO-ENVIRONMENTAL SOLUTIONS

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - W-05 15 Metals (NEPM Suite)	WATER - W-07 TRH/BTEX/NAPAH
EM1817824-029	05-Nov-2018 00:00	Rinsate 5	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

All Invoices		
- A4 - AU Tax Invoice (INV)	Email	smcintosh@geosolutions.net.au
JOHN PAUL CUMMING		
- *AU Certificate of Analysis - NATA (COA)	Email	jcumming@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jcumming@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jcumming@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jcumming@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	jcumming@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	jcumming@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	jcumming@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	jcumming@geosolutions.net.au
M IRAN		
- A4 - AU Tax Invoice (INV)	Email	miran@geosolutions.net.au
SARAH JOYCE		
- *AU Certificate of Analysis - NATA (COA)	Email	sjoyce@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sjoyce@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sjoyce@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sjoyce@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	sjoyce@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	sjoyce@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	sjoyce@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	sjoyce@geosolutions.net.au

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EM1818266**		
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: jcumming@geosolutions.net.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Facsimile	: +61 03 6223 4539	Facsimile	: +61-3-8549 9626
Project	: 48-52	Page	: 1 of 3
Order number	: ----	Quote number	: EB2017GEOENVSOL0001 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	:		

Dates

Date Samples Received	: 07-Nov-2018 09:15	Issue Date	: 14-Nov-2018
Client Requested Due Date	: 19-Nov-2018	Scheduled Reporting Date	: **19-Nov-2018**

Delivery Details

Mode of Delivery	: Samples On Hand	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: ----
Receipt Detail	:	No. of samples received / analysed	: 17 / 17

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- This is a rebatch of EM1817824.

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Issue Date	: 14-Nov-2018
Page	: 2 of 3
Work Order	: EM1818266 Amendment 0
Client	: GEO-ENVIRONMENTAL SOLUTIONS

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EN33a TCLP Leachate	SOIL - EP075 SIM PAH only SIM - PAH only
EM1818266-001	05-Nov-2018 00:00	BH42 0.5-0.6	✓	✓
EM1818266-002	05-Nov-2018 00:00	BH42 1.5-1.6	✓	✓
EM1818266-003	05-Nov-2018 00:00	BH43 0.5-0.6	✓	✓
EM1818266-004	05-Nov-2018 00:00	BH43 1.5-1.6	✓	✓
EM1818266-005	05-Nov-2018 00:00	BH43 2.5-2.6	✓	✓
EM1818266-006	05-Nov-2018 00:00	BH43 3.5-3.6	✓	✓
EM1818266-007	05-Nov-2018 00:00	BH44 0.5-0.6	✓	✓
EM1818266-008	05-Nov-2018 00:00	BH44 1.5-1.6	✓	✓
EM1818266-009	05-Nov-2018 00:00	BH44 2.5-2.6	✓	✓
EM1818266-010	05-Nov-2018 00:00	BH44 3.5-3.6	✓	✓
EM1818266-011	05-Nov-2018 00:00	BH45 0.5-0.6	✓	✓
EM1818266-012	05-Nov-2018 00:00	BH46 0.5-0.6	✓	✓
EM1818266-013	05-Nov-2018 00:00	BH47 0.5-0.6	✓	✓
EM1818266-014	05-Nov-2018 00:00	BH47 1.5-1.6	✓	✓
EM1818266-015	05-Nov-2018 00:00	BH48 0.5-0.6	✓	✓
EM1818266-016	05-Nov-2018 00:00	BH48 1.5-1.6	✓	✓
EM1818266-017	05-Nov-2018 00:00	BH51 1.5-1.6	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Issue Date	: 14-Nov-2018
Page	: 3 of 3
Work Order	: EM1818266 Amendment 0
Client	: GEO-ENVIRONMENTAL SOLUTIONS

Requested Deliverables

All Invoices		
- A4 - AU Tax Invoice (INV)	Email	smcintosh@geosolutions.net.au
JOHN PAUL CUMMING		
- *AU Certificate of Analysis - NATA (COA)	Email	jcumming@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jcumming@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jcumming@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jcumming@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	jcumming@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	jcumming@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	jcumming@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	jcumming@geosolutions.net.au
M IRAN		
- A4 - AU Tax Invoice (INV)	Email	miran@geosolutions.net.au
SARAH JOYCE		
- *AU Certificate of Analysis - NATA (COA)	Email	sjoyce@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sjoyce@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sjoyce@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sjoyce@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	sjoyce@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	sjoyce@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	sjoyce@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	sjoyce@geosolutions.net.au

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **ES1833261**		
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Sydney
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: jcumming@geosolutions.net.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Facsimile	: +61 03 6223 4539	Facsimile	: +61-2-8784 8500
Project	: 48 - 52	Page	: 1 of 2
Order number	:	Quote number	: EB2017GEOENVSOL0001 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: AP		

Dates

Date Samples Received	: 08-Nov-2018 09:00	Issue Date	: 08-Nov-2018
Client Requested Due Date	: 12-Nov-2018	Scheduled Reporting Date	: **12-Nov-2018**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 7.8° C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 2 / 2

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.

RIGHT SOLUTIONS | RIGHT PARTNER

Issue Date	: 08-Nov-2018
Page	: 2 of 2
Work Order	: ES1833261 Amendment 0
Client	: GEO-ENVIRONMENTAL SOLUTIONS

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

ES1833261-001 : [05-Nov-2018] : Triplicate 1 0.5-0.6
ES1833261-002 : [05-Nov-2018] : Triplicate 2 1.5-1.6

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA055-103 Moisture Content	SOIL - S-04 15 Metals (NEPM 2013 Suite - incl. Digestion)	SOIL - S-07 TRH/BTEX/PAH (SIM)
ES1833261-001	05-Nov-2018 00:00	Triplicate 1 0.5-0.6	✓	✓	✓
ES1833261-002	05-Nov-2018 00:00	Triplicate 2 1.5-1.6	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

All Invoices		
- A4 - AU Tax Invoice (INV)	Email	smcintosh@geosolutions.net.au
JOHN PAUL CUMMING		
- *AU Certificate of Analysis - NATA (COA)	Email	jcumming@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jcumming@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jcumming@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jcumming@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	jcumming@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	jcumming@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	jcumming@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	jcumming@geosolutions.net.au
M IRAN		
- A4 - AU Tax Invoice (INV)	Email	miran@geosolutions.net.au
SARAH JOYCE		
- *AU Certificate of Analysis - NATA (COA)	Email	sjoyce@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sjoyce@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sjoyce@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sjoyce@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	sjoyce@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	sjoyce@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	sjoyce@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	sjoyce@geosolutions.net.au

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EM1819122**		
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: jcumming@geosolutions.net.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Facsimile	: +61 03 6223 4539	Facsimile	: +61-3-8549 9626
Project	: 48-52	Page	: 1 of 2
Order number	:	Quote number	: EB2017GEOENVSOL0001 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: MD		

Dates

Date Samples Received	: 28-Nov-2018 09:50	Issue Date	: 28-Nov-2018
Client Requested Due Date	: 03-Dec-2018	Scheduled Reporting Date	: **03-Dec-2018**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 5.1°C - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 5 / 5

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**

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Issue Date	: 28-Nov-2018
Page	: 2 of 2
Work Order	: EM1819122 Amendment 0
Client	: GEO-ENVIRONMENTAL SOLUTIONS

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - W-03 (15 Metals (NEPM Suite))	WATER - W-07 TRH/BTEXN/PAH
EM1819122-001	26-Nov-2018 00:00	MW1	✓	✓
EM1819122-002	26-Nov-2018 00:00	MW2	✓	✓
EM1819122-003	26-Nov-2018 00:00	MW3	✓	✓
EM1819122-004	26-Nov-2018 00:00	Duplicate	✓	✓
EM1819122-005	26-Nov-2018 00:00	Rinsate	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

All Invoices		
- A4 - AU Tax Invoice (INV)	Email	smcintosh@geosolutions.net.au
JOHN PAUL CUMMING		
- *AU Certificate of Analysis - NATA (COA)	Email	jcumming@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jcumming@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jcumming@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jcumming@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	jcumming@geosolutions.net.au
- Attachment - Report (SUBCO)	Email	jcumming@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	jcumming@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	jcumming@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	jcumming@geosolutions.net.au
M IRAN		
- A4 - AU Tax Invoice (INV)	Email	miran@geosolutions.net.au
SARAH JOYCE		
- *AU Certificate of Analysis - NATA (COA)	Email	sjoyce@geosolutions.net.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sjoyce@geosolutions.net.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sjoyce@geosolutions.net.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sjoyce@geosolutions.net.au
- A4 - AU Tax Invoice (INV)	Email	sjoyce@geosolutions.net.au
- Attachment - Report (SUBCO)	Email	sjoyce@geosolutions.net.au
- Chain of Custody (CoC) (COC)	Email	sjoyce@geosolutions.net.au
- EDI Format - ENMRG (ENMRG)	Email	sjoyce@geosolutions.net.au
- EDI Format - XTab (XTAB)	Email	sjoyce@geosolutions.net.au

Envirolab Services Pty Ltd
ABN 37 112 535 645 - 002
25 Research Drive Croydon South VIC 3136
ph 03 9763 2500 fax 03 9763 2633
melbourne@envirolab.com.au
www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details	
Client	Geo-Environmental Solutions Pty Ltd
Attention	S Joyce

Sample Login Details	
Your reference	48-52 New Town Road
Envirolab Reference	15481
Date Sample Received	28/11/2018
Date Instructions Received	28/11/2018
Date Results Expected to be Reported	03/12/2018

Sample Condition	
Samples received in appropriate condition for analysis	YES
No. of Samples Provided	1
Turnaround Time Requested	72hr
Temperature on Receipt (°C)	5.8
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments
Nil

Please direct any queries to:

Pamela Adams	Analisa Mathrick
Phone: 03 9763 2500	**Phone: 03 9763 2500**
Fax: 03 9763 2633	**Fax: 03 9763 2633**
Email: padams@envirolab.com.au	**Email: amathrick@envirolab.com.au**

Invoice will be emailed separately. Results will be reported only if payment has been made. Details of analysis on the following page:

Envirolab Services Pty Ltd
ABN 37 112 535 645 - 002
25 Research Drive Croydon South VIC 3136
ph 03 9763 2500 fax 03 9763 2633
melbourne@envirolab.com.au
www.envirolab.com.au

Sample ID	VTCG(C6-C10)/BTEXN in Water	TRH Water(C10-C40) NEPM	PAHs in Water	HM in water - dissolved
Triplicate	✓	✓	✓	✓

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**

Additional Info
Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.

Appendix 10 Quality Assurance and Quality Control Documentation

Soil Duplicate

Duplicate Comparrison	Sample	Moisture Content (dried @ 103°C)	Arsenic	Barium	Beryllium	Cadmium	Chromium Total	Cobalt	Copper	Lead	Manganese	Nickel	Vanadium	Zinc	Mercury	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benz[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-cd]pyrene	Dibenz[a,h]anthracene	Benzo[g,h,i]perylene	Sum of polycyclic aromatic hydrocarbons	Benzo[a]pyrene TEQ (WHO)	Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Sum of BTEX	Total Xylenes	Naphthalene	C6 - C9 Fraction	C10 - C14 Fraction	C15 - C28 Fraction	C29 - C36 Fraction	C10 - C36 Fraction (sum)	>C6 - C10 Fraction	F1	>C10 - C16 Fraction	>C16 - C34 Fraction	>C34 - C40 Fraction	>C10 - C40 Fraction (sum)	F2	Selenium	Boron	Benzo(a)pyrene TEQ (half LOR)	Benzo(a)pyrene TEQ (LOR)
Unit		%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23/07/2018	BH04 1.5-1.6	10.3	<5	130	<1	<1	14	10	35	128	301	14	43	113	0.2	<0.5	2.1	2.3	3.4	37	10.7	55.9	52.6	20.2	18.8	28.8	9.6	25.6	15.6	3.4	20	306	36.8	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<1	<10	<50	810	550	1360	<10	<10	<50	1190	300	1490	<50	<5	<50	36.8	36.8
23/07/2018	Duplicate 1	8.8	<5	140	<1	<1	12	10	37	116	216	13	42	111	0.2	<0.5	0.8	2.8	3.3	29.6	7.6	31.6	29.3	10.9	10.1	12.7	5.3	11.5	6.7	1.5	8.6	172	16.7	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<1	<10	<50	410	270	680	<10	<10	<50	600	150	750	<50	<5	<50	16.7	16.7
Relative Percentage Difference (RPD)	%	15.7	NA	7.4	NA	NA	15.4	0.0	5.6	9.8	32.9	7.4	2.4	1.8	0.0	NA	89.7	19.6	3.0	22.2	33.9	55.5	56.9	59.8	60.2	77.6	57.7	76.0	79.8	77.6	79.7	56.1	75.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	65.9	66.7	66.1	NA	NA	NA	75.1	75.1
Method Detection Limit (MDL)		>0	NA	>0	NA	NA	>0	>0	>0	>0	>0	>0	>0	>0	>0	NA	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	>0	>0	>0	NA	NA	NA	>0	>0
MDL Class		HIGH	NONE	HIGH	NONE	NONE	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	NONE	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	HIGH	HIGH	HIGH	HIGH	NONE	NONE	NONE	HIGH	HIGH	NONE	NONE	NONE	HIGH	HIGH
RPD Compliance With MDL?	29/56 (52%)	NO	YES	YES	YES	YES	NO	YES	YES	YES	NO	YES	YES	YES	YES	YES	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	NO	YES	YES	YES	NO	NO	NO	YES	YES	YES	NO	NO
Deviation from MDL (%)		-1	NONE	8	NONE	NONE	0	15	9	5	-18	8	13	13	15	NONE	-75	-5	12	-7	-19	-41	-42	-45	-45	-63	-43	-61	-65	-63	-65	-41	-60	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	-51	-53	-52	NONE	NONE	NONE	-51	-52	-51	NONE	NONE	NONE	-60	-60
23/07/2018	BH04 1.5-1.6	10.3	<5	130	<1	<1	14	10	35	128	301	14	43	113	0.2	<0.5	2.1	2.3	3.4	37	10.7	55.9	52.6	20.2	18.8	28.8	9.6	25.6	15.6	3.4	20	306	36.8	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<1	<10	<50	810	550	1360	<10	<10	<50	1190	300	1490	<50	<5	<50	36.8	36.8
23/07/2018	Triplicate 1	10.1	<5	120	<1	<1	14	10	28	122	231	12	39	99	0.2	<0.5	2	0.9	1.4	13.1	3.6	22.2	20.7	8.4	7.8	10.6	3.8	10	5.7	1.1	8.4	120	14.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<1	<10	<50	610	370	980	<10	<10	<50	900	310	1210	<50	<5	<50	14.1	14.1
Relative Percentage Difference (RPD)	%	2.0	NA	8.0	NA	NA	0.0	0.0	22.2	4.8	26.3	15.4	9.8	13.2	0.0	NA	4.9	87.5	83.3	95.4	99.3	86.3	87.0	82.5	82.7	92.4	86.6	87.6	93.0	102.2	81.7	87.3	89.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	28.2	39.1	32.5	NA	NA	NA	27.8	3.3	20.7	NA	NA	NA	89.2	89.2
Method Detection Limit (MDL)		>0	NA	>0	NA	NA	>0	>0	>0	>0	>0	>0	>0	>0	>0	NA	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	>0	>0	>0	NA	NA	NA	>0	>0	>0	NA	NA	NA	>0	>0
MDL Class		HIGH	NONE	HIGH	NONE	NONE	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	NONE	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	HIGH	HIGH	HIGH	HIGH	NONE	NONE	NONE	HIGH	HIGH	NONE	NONE	NONE	HIGH	HIGH
RPD Compliance With MDL?	30/56 (54%)	YES	YES	YES	YES	YES	YES	YES	NO	YES	NO	NO	YES	YES	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	NO	YES	YES	YES	NO	YES	NO	YES	YES	YES	NO	NO
Deviation from MDL (%)		13	NONE	7	NONE	NONE	15	15	-7	10	-11	0	5	2	15	NONE	10	-73	-68	-80	-84	-71	-72	-68	-68	-77	-72	-73	-78	-87	-67	-72	-74	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	-13	-24	-17	NONE	NONE	NONE	-13	12	-6	NONE	NONE	NONE	-74	-74
23/07/2018	BH05 1.0-1.1	19.9	<5	60	<1	<1	8	7	7	21	78	11	16	244	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	1.1	0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	3.1	<0.5	<0.2	<0.5	<0.5	<0.5	<0.2	<0.5	<1	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<5	<50	0.7	1.2
23/07/2018	Duplicate 2	18.6	<5	300	<1	<1	11	10	20	48	134	13	24	262	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.2	<0.5	<1	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<5	<50	0.6	1.2
Relative Percentage Difference (RPD)	%	6.8	NA	133.3	NA	NA	31.6	35.3	96.3	78.3	52.8	16.7	40.0	7.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	15.4	0.0
Method Detection Limit (MDL)		>0	NA	>0	NA	NA	>0	>0	>0	>0	>0	>0	>0	>0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	>0	>0
MDL Class		HIGH	NONE	HIGH	NONE	NONE	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
RPD Compliance With MDL?	47/56 (84%)	YES	YES	NO	YES	YES	NO	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES
Deviation from MDL (%)		8	NONE	-118	NONE	NONE	-17	-20	-81	-63	-38	-2	-25	8	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	0	15
23/07/2018	BH05 1.0-1.1	19.9	<5	60	<1	<1	8	7	7	21	78	11	16	244	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	1.1	0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	3.1	<0.5	<0.2	<0.5	<0.5	<0.5	<0.2	<0.5	<1	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<5	<50	0.7	1.2
23/07/2018	Triplicate 2	19.4	<5	100	2	<1	8	16	18	73	150	23	18	346	0.3	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	1	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.6	<0.5	<0.2	<0.5	<0.5	<0.5	<0.2	<0.5	<1	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<5	<50	0.6	1.2
Relative Percentage Difference (RPD)	%	2.5	NA	50.0	NA	NA	0.0	78.3	88.0	110.6	63.2	70.6	11.8	34.6	NA	NA	NA	NA	NA	NA	NA	10.5	20.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	15.4	0.0
Method Detection Limit (MDL)		>0	NA	>0	NA	NA	>0	>0	>0	>0	>0	>0	>0	>0	NA	NA	NA	NA	NA	NA	NA	>0	>0	NA	NA	NA	NA	NA	NA	NA	NA	NA	>0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	>0	>0
MDL Class		HIGH	NONE	HIGH	NONE	NONE	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	NONE	NONE	NONE	NONE	NONE	NONE	NONE	HIGH	HIGH	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	HIGH	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	HIGH	HIGH
RPD Compliance With MDL?	46/56 (82%)	YES	YES	NO	YES	YES	YES	NO	NO	NO	NO	NO	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES
Deviation from MDL (%)		12	NONE	-35	NONE	NONE	15	-63	-73	-96	-48	-56	3	-20	NONE	NONE	NONE	NONE	NONE	NONE	NONE	4	-5	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	-3	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	0	15
23/07/2018	BH03 1.0-1.1	22.1	6	140	<1	<1	19	16	44	93	308	17	63	176	0.1	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	1.5	1.6	1	0.7	1.1	<0.5	0.9	0.5	<0.5	0.7	8.6	1.2	<0.2	<0.5	<0.5	<0.5	<0.2	<0.5	<1	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<5	<50	1.4	1.7
23/07/2018	Duplicate 3	23	<5	140	<1	<1	20	25	40	57	443	19	98	130	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.2	<0.5	<1	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<5	<50	0.6	1.2
Relative Percentage Difference (RPD)	%	4.0	NA	0.0	NA	NA	5.1	43.9	9.5	48.0	36.0	11.1	43.5	30.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	80.0	34.5
Method Detection Limit (MDL)		>0	NA	>0	NA	NA	>0	>0	>0	>0	>0	>0	>0	>0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	>0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	>0	>0
MDL Class		HIGH	NONE	HIGH	NONE	NONE	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
RPD Compliance With MDL?	49/56 (88%)	YES	YES	YES	YES	YES	YES	NO	YES	NO	NO	YES	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO
Deviation from MDL (%)		11	NONE	15	NONE	NONE	10	-29	5	-33	-21	4	-28	-15	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	-65	-19
23/07/2018	BH03 1.0-1.1	22.1	6	140	<1	<1	19	16	44	93	308	17	63	176	0.1	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	1.5	1.6	1	0.7	1.1	<0.5	0.9	0.5	<0.5	0.7	8.6	1.2	<0.2	<0.5	<0.5	<0.5	<0.2	<0.5	<1	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<5	<50	1.4	1.7
23/07/2018	Triplicate 3	22	<5	120	<1	<1	17	23	34	85	500	17	93	288	0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.2	<0.5	<0.5	<0.5	<0.2	<0.5	<1	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<5	<50	0.6	1.2
Relative Percentage Difference (RPD)	%	0.5	NA	15.4	NA	NA	11.1	35.9	25.6	9.0	47.5	0.0	38.5	48.3	0.0	NA	NA	NA	NA	NA	NA	85.7	90.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	151.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	80.0	34.5
Method Detection Limit (MDL)		>0	NA	>0	NA	NA	>0	>0	>0	>0	>0	>0	>0	>0	>0	NA	NA	NA	NA	NA	NA	>0	>0	NA	NA	NA	NA	NA	NA	NA	NA	NA	>0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	>0	>0
MDL Class		HIGH	NONE	HIGH	NONE	NONE	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	NONE	NONE	NONE	NONE	NONE	NONE	HIGH	HIGH	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	HIGH	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	HIGH	HIGH
RPD Compliance With MDL?	45/56 (80%)	YES	YES	NO	YES	YES	YES	NO	NO	YES	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO
Deviation from MDL (%)		15	NONE	0	NONE	NONE	4	-21	-11	6	-33	15	-23	-33	15	NONE	NONE	NONE	NONE	NONE	NONE	-71	-76	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	-136	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	-65	-19
24/07/2018	BH09_4.5-4.6	20.9	<5	40	<1	<1	4	7	31	15	92	5	49	23	<0.1	2.8	7.8	0.9	5.9	38.7	11.6	38.6	41.9	21.1	19.6	22.3	7.4	22.8	10.4	2.9	13.1	268	32.1	<0.2	<0.5	<0.5	<0.5	<0.2	<0.5	<1	<10	<50	990	480	1470	<10	<10	<50	1300	190	1490	<50	<5	<50	32.1	32.1
24/07/2018	Duplicate 4	15.3	<5	40	<1	<1	4	8	45	13	137	8	35	26	<0.1	2.8	8.6	0.9	6	39	11.8	40.7	44.2	22.6	21.9	26.7	9.7	25.9	12.1	3.3	15	291	36.7	<0.2	<0.5	<0.5	<0.5	<0.2	<0.5	<1	<10	<50	1130	580	1710	<10	<10	<50	1500	270	1770	<50	<5	<50	36.7	36.7
Relative Percentage Difference (RPD)	%	30.9	NA	0.0	NA	NA	0.0	13.3	36.8	14.3	39.3	46.2	33.3	12.2	NA	0.0	9.8	0.0	1.7	0.8	1.7	5.3	5.3	6.9	11.1	18.0	26.9	12.7	15.1	12.9	13.5	8.2	13.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	13.2	18.9	15.1	NA	NA	NA	14.3	34.8	17.2	NA	NA	NA	13.4	13.4
Method Detection Limit (MDL)		>0	NA	>0	NA	NA	>0	>0	>0	>0	>0	>0	>0	>0	NA	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	>0	>0	>0	NA	NA	NA	>0	>0	>0	NA	NA	NA	>0	>0
MDL Class		HIGH	NONE	HIGH	NONE	NONE	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	NONE	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	HIGH	HIGH	HIGH	HIGH	NONE	NONE	NONE	HIGH	HIGH	NONE	NONE	NONE	HIGH	HIGH
RPD Compliance With MDL?	44/56 (79%)	NO	YES	YES	YES	YES	YES	YES	NO	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	NO	NO	YES	YES	YES	YES	YES	YES	YES	NO	NO	YES	YES	YES	YES	YES	YES	YES	NO	NO	YES	YES	YES	YES	NO	NO
Deviation from MDL (%)		-16	NONE	15	NONE	NONE	15	2	-22	1	-24	-31	-18	3	NONE	15	5	15	13	14	13	10	10	8	4	-3	-12	2	0	2	1	7	2	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	2	-4	0	NONE	NONE	NONE	1	-20	-2	NONE	NONE	NONE	2	2
24/07/2018	BH09_4.5-4.6	20.9	<5	40	<1	<1	4	7	31	15	92	5	49	23	<0.1	2.8	7.8	0.9	5.9	38.7	11.6	38.6	41.9	21.1	19.6	22.3	7.4	22.8	10.4	2.9	13.1	268	32.1	<0.2	<0.5	<0.5	<0.5	<0.2	<0.5	<1	<10	<50	990	480	1470	<10	<10	<50	1300	190	1490	<50	<5	<50	32.1	32.1
24/07/2018	Triplicate 4	21.2	<5	50	<1	<1	6	12	60	16	91	9	77	39	0.1	4.1	10.6	1.6	12	60.6	17.6	45.1	48.8	24.8	21.8	24.1	6.8	20.6	8.7	2.3	11	320	29.7	0.2	<0.5	<0.5	<0.5	0.2	<0.5	10	<10	<50	770	390	1160	<10	<10	60	990	280	1330	50	<5	<50	29.7	29.7
Relative Percentage Difference (RPD)	%	1.4	NA	22.2	NA	NA	40.0	52.6	63.7	6.5	1.1	57.1	44.4	51.6	NA	37.7	30.4	56.0	68.2	44.1	41.1	15.5	15.2	16.1	10.6	7.8	8.5	10.1	17.8	23.1	17.4	17.7	7.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	25.0	20.7	23.6	NA	NA	NA	27.1	38.3	11.3	NA	NA	NA	7.8	7.8
Method Detection Limit (MDL)		>0	NA	>0	NA	NA	>0	>0	>0	>0	>0	>0	>0	>0	NA	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	>0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	>0	>0	>0	NA	NA	NA	>0	>0	>0	NA	NA	NA	>0	>0
MDL Class		HIGH	NONE	HIGH	NONE	NONE	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	NONE	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	HIGH	HIGH	HIGH	HIGH	NONE	NONE	NONE	HIGH	HIGH	NONE	NONE	NONE	HIGH	HIGH
RPD Compliance With MDL?	31/56 (55%)	YES	YES	NO	YES	YES	NO	NO	NO	YES	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	NO	YES	YES	YES	YES	YES	YES	NO	NO	YES	YES	YES	YES	NO	NO
Deviation from MDL (%)		14	NONE	-7	NONE	NONE	-25	-38	-49	9	14	-42	-29	-37	NONE	-23	-15	-41	-53	-29	-26	-1	0	-1	4	7	7	5	-3	-8	-2	-3	7	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	-10	-6	-9	NONE	NONE	NONE	-12	-23	4	NONE	NONE	NONE	7	7

Duplicate/ triplicates BH21-BH53

| Duplicate Comparrison | Sample | Moisture Content (dried @ 103°C) | Arsenic | Barium | Beryllium | Cadmium | Chromium Total | Cobalt | Copper | Lead | Manganese | Nickel | Vanadium | Zinc | Mercury | Naphthalene | Acenaphthylene | Acenaphthene | Fluorene | Phenanthrene | Anthracene | Fluoranthene | Pyrene | Benz[a]anthracene | Chrysene | Benzo[b]fluoranthene | Benzo[k]fluoranthene | Benzo[a]pyrene | Indeno(1,2,3-cd)pyrene | Dibenz[a,h]anthracene | Benzo[g,h,i]perylene | Sum of polycyclic aromatic hydrocarbons | Benzo[a]pyrene TEQ (WHO) | Benzene | Toluene | Ethylbenzene | meta- & para-Xylene | ortho-Xylene | Sum of BTEX | Total Xylenes | Naphthalene | C6 - C9 Fraction | C10 - C14 Fraction | C15 - C28 Fraction | C29 - C36 Fraction | C10 - C36 Fraction (sum) | C6 - C10 Fraction | F1 | C10 - C16 Fraction | >C16 - C34 Fraction | >C34 - C40 Fraction | C10 - C40 Fraction (sum) | F2 | Selenium | Boron | Benzo(a)pyrene TEQ (half LOR) | Benzo(a)pyrene TEQ (LOR) |
|---|---|---

Field and Rinsate Blanks for Soil analysis

| Quality Control Blanks | | EG020F: Dissolved Metals by ICP-MS | | | | | | | | | | | | | | | EP080 | | | | | EP080/071 | | | | | | | | | | | | | | |

Groundwater QA/QC – Blanks 11/09/2018 & 26/11/2018

Sample Date	Client sample ID (Primary)	EG020F: Dissolved Metals by ICP-MS														EG035F	EP075(SIM)B: Polynuclear Aromatic Hydrocarbons															EP080: BTEXN							EP080/071:TPH					EP080/071: TRH - NEPM 2013						
		Arsenic	Beryllium	Barium	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Nickel	Selenium	Vanadium	Zinc	Boron	Mercury	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benz(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)anthracene	Benzo(g,h,i)perylene	Sum of polycyclic aromatic hydrocarbons	Benzo(a)pyrene TEQ (WHO)	Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Sum of BTEX	Naphthalene	C6 - C9 Fraction	C10 - C14 Fraction	C15 - C28 Fraction	C29 - C36 Fraction	C10 - C36 Fraction (sum)	C6 - C10 Fraction	F1	>C10 - C16 Fraction	>C16 - C34 Fraction	>C34 - C40 Fraction	>C10 - C40 Fraction (sum)	F2
	LOR	0.001	0.001	0.001	1E-04	0.001	0.001	0.001	0.001	0.001	0.001	0.01	0.01	0.005	0.05	1E-04	1	1	1	1	1	1	1	1	1	1	1	1	0.5	1	1	1	0.5	0.5	1	2	2	2	2	2	1	5	20	50	100	50	50	20	20	100	100	100	100	100
Blanks																																																			
11/09/2018	FIELD BLANK	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<0.5	<0.5	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100
26/11/2018	Rinsate	<0.001	<0.001	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.005	<0.05	<0.0001	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<0.5	<0.5	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100

Groundwater QA/QC – Splits 11/09/2018

Sample Date	Client sample ID (Primary)	EG020F: Dissolved Metals by ICP-MS														EG035F	EP075(SIM)B: Polynuclear Aromatic Hydrocarbons															EP080: BTEXN							EP080/071:TPH					EP080/071: TRH - NEPM 2013						
		Arsenic	Beryllium	Barium	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Nickel	Selenium	Vanadium	Zinc	Boron	Mercury	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benz(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)anthracene	Benzo(g,h,i)perylene	Sum of polycyclic aromatic hydrocarbons	Benzo(a)pyrene TEQ (WHO)	Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Sum of BTEX	Naphthalene	C6 - C9 Fraction	C10 - C14 Fraction	C15 - C28 Fraction	C29 - C36 Fraction	C10 - C36 Fraction (sum)	C6 - C10 Fraction	F1	>C10 - C16 Fraction	>C16 - C34 Fraction	>C34 - C40 Fraction	>C10 - C40 Fraction (sum)	F2
	LOR	0.001	0.001	0.001	0.0001	0.001	0.001	0.001	0.001	0.001	0	0.01	0.01	0.005	0.05	0.0001	1	1	1	1	1	1	1	1	1	1	1	1	0.5	1	1	1	0.5	0.5	1	2	2	2	2	2	1	5	20	50	100	50	50	20	20	100	100	100	100	100
Duplicate / Triplicate																																																			
Groundwater Splits - Fixed RPD Method (20%)																																																		
11/09/2018	DUPLICATE	0.002	<0.001	0.076	<0.0001	<0.001	0.001	<0.001	<0.001	0.512	0	<0.01	<0.01	<0.005	<0.05	<0.0001	104	315	34	121	983	426	1260	1390	593	556	872	241	779	352	118	408	8550	1110	<1	<2	<2	<2	<2	<2	<1	5	<20	1050	31800	20200	53000	<20	<20	1900	46200	10400	58500	1900
11/09/2018	MW1	0.002	<0.001	0.068	<0.0001	<0.001	0.001	<0.001	<0.001	0.476	0	<0.01	<0.01	<0.005	<0.05	<0.0001	112	339	43	157	1070	464	1390	1540	678	571	910	264	875	393	145	464	9420	1250	<1	<2	<2	<2	<2	<2	<1	6	<20	1400	43200	26700	71300	<20	<20	2540	62300	13200	78000	2530
RPD %		0	NA	11	NA	NA	NA	NA	NA	7	0	NA	NA	NA	NA	NA	7	7	23	26	8	9	10	10	13	3	4	9	12	11	21	13	10	12	NA	NA	NA	NA	NA	NA	NA	18	NA	29	30	28	29	NA	NA	29	30	24	29	28
11/09/2018	TRIPLICATE	0.001	<0.001	0.059	<0.0001	<0.001	<0.001	<0.001	<0.001	0.407	0	<0.01	<0.01	<0.005	<0.05	<0.0001	39.3	101	<10.2	35.5	292	132	349	399	120	105	96.7	48.1	136	65.9	20.7	80.2	2020	192	<1	<2	<2	<2	<2	<2	<1	<5	<20	80	8440	5350	13900	<20	<20	320	11800	3200	15300	320
11/09/2018	MW1	0.002	<0.001	0.068	<0.0001	<0.001	0.001	<0.001	<0.001	0.476	0	<0.01	<0.01	<0.005	<0.05	<0.0001	112	339	43	157	1070	464	1390	1540	678	571	910	264	875	393	145	464	9420	1250	<1	<2	<2	<2	<2	<2	<1	6	<20	1400	43200	26700	71300	<20	<20	2540	62300	13200	78000	2530
RPD %		NA	NA	14	NA	NA	NA	NA	NA	16	0	NA	NA	NA	NA	NA	96	108	NA	126	114	111	120	118	140	138	162	138	146	143	150	141	129	147	NA	NA	NA	NA	NA	NA	NA	NA	NA	178	135	133	135	NA	NA	155	136	122	134	155
Groundwater Splits - Mean Detection Limit (MDL) Method (Variable %)																																																		
LOR		<0.001	<0.001	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.01	<0.01	<0.005	<0.05	<0.0001	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<0.5	<0.5	<1.0	<2	<2	<2	<2	<2	<1.0	<5	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100
Duplicate																																																			
Level Calculation		LOW	NONE	MED	NONE	NONE	NONE	NONE	NONE	HIGH	LOW	NONE	NONE	NONE	NONE	NONE	HIGH	HIGH	MED	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	NA	NONE	NONE	NONE	NONE	NONE	NA	LOW	NONE	MED	HIGH	HIGH	HIGH	NONE	NONE	MED	HIGH	HIGH	HIGH	MED
Compliance?		YES	NA	YES	NA	NA	NA	NA	NA	YES	YES	NA	NA	NA	NA	NA	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	NA	NA	NA	NA	NA	NA	NA	<LOR	NA	YES	NO	NO	NO	NA	NA	YES	NO	NO	NO	YES
Triplicate																																																		
Level Calculation		NONE	NONE	MED	NONE	NONE	NONE	NONE	NONE	HIGH	LOW	NONE	NONE	NONE	NONE	NONE	MED	HIGH	NA	MED	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	MED	HIGH	HIGH	HIGH	NA	NONE	NONE	NONE	NONE	NONE	NA	NONE	NONE	LOW	HIGH	MED	HIGH	LOW	NONE	NONE	LOW	HIGH	MED	HIGH	LOW
Compliance?		<LOR	NA	YES	NA	NA	NA	NA	NA	NO	YES	NA	NA	NA	NA	NA	NO	NO	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NA	NA	NA	NA	NA	NA	NA	<LOR	NA	NO	NO	NO	NO	NA	NA	NO	NO	NO	NO	NO

Groundwater QA/QC – Splits 11/09/2018

		Arsenic	Beryllium	Barium	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Nickel	Selenium	Vanadium	Zinc	Boron	Mercury	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)anthracene	Benzo(g,h,i)perylene	Sum of polycyclic aromatic hydrocarbons	Benzo(a)pyrene TEQ (WHO)	Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Sum of BTEX	Naphthalene	C6 - C9 Fraction	C10 - C14 Fraction	C15 - C28 Fraction	C29 - C36 Fraction	C10 - C36 Fraction (sum)	C6 - C10 Fraction	F1	>C10 - C16 Fraction	>C16 - C34 Fraction	>C34 - C40 Fraction	>C10 - C40 Fraction (sum)	F2
	LOR	0.001	0.001	0.001	0.0001	0.001	0.001	0.001	0.001	0.001	0.001	0.01	0.01	0.005	0.05	0.0001	1	1	1	1	1	1	1	1	1	1	1	1	1	0.5	1	1	1	0.5	0.5	1	2	2	2	2	2	2	1	5	20	50	100	50	50	20	20	100	100	100	100	100
Duplicate / Triplicate																																																										
Groundwater Splits - Fixed RPD Method (20%)																																																									
26/11/2018	Duplicate	0.002	<0.001	0.04	<0.0001	0.002	<0.001	0.003	<0.001	0.167	0.002	<0.01	<0.01	<0.005	0.05	<0.0001	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<0.5	<0.5	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100
26/11/2018	MW2	0.002	<0.001	0.037	<0.0001	0.002	<0.001	0.003	<0.001	0.165	0.001	<0.01	<0.01	<0.005	0.07	<0.0001	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<0.5	<0.5	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100
RPD %		0	NA	8	NA	0	NA	0	NA	1	67	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
26/11/2018	Triplicate	0.002	<0.001	0.038	<0.0001	0.001	<0.001	0.003	<0.001	0.17	0.002	0.001	0.006	0.002	0.08	<0.0001	<1	<1	<1	<1	<1	<1	1	1	<1	<1	----	----	<1	<1	<1	<1	2	<5	<1	<2	<2	<2	<2	<2	<1	<5	<10	<50	<100	<100	<50	<10	<10	<10	<100	<100	<100	<50
26/11/2018	MW2	0.002	<0.001	0.037	<0.0001	0.002	<0.001	0.003	<0.001	0.165	0.001	<0.01	<0.01	<0.005	0.07	<0.0001	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<0.5	<0.5	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100
RPD %		0	NA	3	NA	NA	NA	0	NA	3	67	NA	NA	NA	13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Groundwater Splits - Mean Detection Limit (MDL) Method (Variable %)																																																									
LOR		<0.001	<0.001	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.005	<0.05	<0.0001	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<0.5	<0.5	<1.0	<2	<2	<2	<2	<2	<1.0	<5	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100
Duplicate																																																										
Level Calculation		LOW	NONE	MED	NONE	LOW	NONE	LOW	NONE	HIGH	LOW	NONE	NONE	NONE	LOW	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NA	NONE	NONE	NONE	NONE	NONE	NA	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
Compliance?		YES	NA	YES	NA	YES	NA	YES	NA	YES	<LOR	NA	NA	NA	<LOR	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Triplicate																																																									
Level Calculation		LOW	NONE	MED	NONE	LOW	NONE	LOW	NONE	HIGH	LOW	NONE	NONE	NONE	LOW	NONE	NA	NA	NA	NA	NA	NA	NONE	NONE	NA	NA	NA	NA	NA	NA	NA	NA	LOW	NA	NA	NONE	NONE	NONE	NONE	NA	NONE	NA	NA	NONE	NONE	NONE	NONE	NA	NONE	NA	NONE	NONE	NA	NONE	NA	NA	NA	NONE	NONE	NONE	NA
Compliance?		YES	NA	YES	NA	<LOR	NA	YES	NA	YES	<LOR	<LOR	<LOR	<LOR	YES	NA	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	NA	NA	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	NA	NA	NA	NA	NA	NA	NA	NA	NA	<LOR	NA	NA	<LOR	NA	<LOR	<LOR	<LOR	NA	NA	NA	<LOR

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM1811858**	Page	: 1 of 17
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Project	: Newtown Rd	Date Samples Received	: 25-Jul-2018
Order number	:	Date Analysis Commenced	: 26-Jul-2018
C-O-C number	: ----	Issue Date	: 31-Jul-2018
Sampler	: SJ		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 59		
No. of samples analysed	: 23		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

Page	: 2 of 17
Work Order	: EM1811858
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

						Laboratory Duplicate (DUP) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1830316)									
EM1811855-003	Anonymous	EA055: Moisture Content	----	0.1	%	20.4	20.0	1.96	0% - 20%
EM1811858-003	BH01 1.0-1.1	EA055: Moisture Content	----	0.1	%	18.3	17.8	2.60	0% - 50%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1830317)									
EM1811858-034	BH04 3.0-3.1	EA055: Moisture Content	----	0.1	%	6.1	6.5	5.86	No Limit
EM1811858-060	Duplicate 3	EA055: Moisture Content	----	0.1	%	23.0	23.1	0.00	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 1830274)									
EM1811858-003	BH01 1.0-1.1	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	50	70	30.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	8	8	0.00	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	5	6	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	7	7	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	8	12	39.8	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	35	47	28.4	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	82	100	19.4	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	21	22	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	45	49	8.39	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EM1811858-031	BH04 1.5-1.6	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	130	150	13.8	0% - 50%
		EG005T: Chromium	7440-47-3	2	mg/kg	14	14	0.00	No Limit

Page : 3 of 17
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

						Laboratory Duplicate (DUP) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005T: Total Metals by ICP-AES (QC Lot: 1830274) - continued									
EM1811858-031	BH04 1.5-1.6	EG005T: Cobalt	7440-48-4	2	mg/kg	10	13	28.3	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	14	15	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	35	41	16.3	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	128	116	9.48	0% - 20%
		EG005T: Manganese	7439-96-5	5	mg/kg	301	256	16.1	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	43	45	4.43	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	113	120	5.53	0% - 20%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 1830276)									
EM1811858-060	Duplicate 3	EG005T: Zinc	7440-66-6	5	mg/kg	130	131	0.00	0% - 20%
EM1811858-060	Duplicate 3	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	140	100	32.0	0% - 50%
		EG005T: Chromium	7440-47-3	2	mg/kg	20	22	13.9	0% - 50%
		EG005T: Cobalt	7440-48-4	2	mg/kg	25	25	0.00	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	19	22	11.6	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	40	39	3.67	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	57	54	4.90	0% - 50%
		EG005T: Manganese	7439-96-5	5	mg/kg	443	391	12.4	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	98	102	3.83	0% - 20%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1830275)									
EM1811858-003	BH01 1.0-1.1	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.1	0.00	No Limit
EM1811858-031	BH04 1.5-1.6	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.2	0.3	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1830277)									
EM1811858-060	Duplicate 3	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1830375)									
EM1811858-003	BH01 1.0-1.1	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	0.9	<0.5	55.9	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	1.5	0.5	93.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	1.6	0.6	89.1	No Limit

Page : 4 of 17
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1830375) - continued									
EM1811858-003	BH01 1.0-1.1	EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	0.7	<0.5	33.6	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	0.6	<0.5	24.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	0.8	<0.5	43.5	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	0.6	<0.5	21.4	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EM1811858-034	BH04 3.0-3.1	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	2.2	2.4	6.59	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	0.6	0.6	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	3.9	4.1	4.02	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	3.9	4.2	6.85	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	1.5	1.6	7.11	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	1.4	1.4	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	2.1	2.1	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	0.7	0.8	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	1.7	1.7	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	1.1	1.2	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	1.6	1.7	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1830383)									
EM1811636-003	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Page : 5 of 17
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1830383) - continued									
EM1811636-003	Anonymous	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1830301)									
EM1811858-003	BH01 1.0-1.1	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EM1811858-034	BH04 3.0-3.1	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1830302)									
EM1811775-003	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EM1811775-028	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1830377)									
EM1811858-003	BH01 1.0-1.1	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EM1811858-034	BH04 3.0-3.1	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1830382)									
EM1811855-002	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EM1811636-003	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1830301)									
EM1811858-003	BH01 1.0-1.1	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EM1811858-034	BH04 3.0-3.1	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1830302)									
EM1811775-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EM1811775-028	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1830377)									
EM1811858-003	BH01 1.0-1.1	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit

Page : 6 of 17
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1830377) - continued									
EM1811858-034	BH04 3.0-3.1	EP071: >C16 - C34 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	---	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1830382)									
EM1811855-002	Anonymous	EP071: >C16 - C34 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	---	50	mg/kg	<50	<50	0.00	No Limit
EM1811636-003	Anonymous	EP071: >C16 - C34 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	---	50	mg/kg	<50	<50	0.00	No Limit
EP080: BTEXN (QC Lot: 1830301)									
EM1811858-003	BH01 1.0-1.1	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EM1811858-034	BH04 3.0-3.1	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP080: BTEXN (QC Lot: 1830302)									
EM1811775-003	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EM1811775-028	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Page : 7 of 17
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080: BTEXN (QC Lot: 1830302) - continued									
EM1811775-028	Anonymous	EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1832824)									
EM1811857-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.014	0.013	0.00	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.018	0.017	0.00	0% - 50%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.087	0.084	3.70	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.035	0.034	5.06	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.28	0.28	0.00	No Limit
EM1811889-007	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.008	0.008	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.013	0.013	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1832788)									
EM1811858-059	Rinsate Blank	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Page : 8 of 17
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 1832788) - continued									
EM1811858-059	Rinsate Blank	EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EM1811880-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.007	0.006	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 1832823)									
EM1811653-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EM1811653-011	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1830516)									
EM1811547-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	0.0002	0.0002	0.00	No Limit
EM1811823-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1832678)									
EM1811898-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EM1811898-005	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	2020	1940	4.26	0% - 20%
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1832678)									
EM1811898-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EM1811898-005	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	1920	1840	4.12	0% - 20%
EP080: BTEXN (QC Lot: 1832678)									
EM1811898-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit

Page : 9 of 17
Work Order : EM1811856
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080: BTEXN (QC Lot: 1832678) - continued									
EM1811898-001	Anonymous	EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EM1811898-005	Anonymous	EP080: Benzene	71-43-2	1	µg/L	88	83	5.60	0% - 20%
		EP080: Toluene	108-88-3	2	µg/L	3	2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	6	6	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	9	9	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	46	42	9.34	No Limit

Page : 10 of 17
Work Order : EM1811856
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: SOIL

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 1830274)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	95.0	79	113
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	104	79	110
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	102	85	120
EG005T: Boron	7440-42-8	50	mg/kg	<50	33.2 mg/kg	109	82	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	89.8	85	109
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	95.7	83	109
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	92.6	78	112
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	90.9	78	108
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	105	78	106
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	97.6	82	107
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	97.8	82	111
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	97.4	93	109
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	94.4	80	109
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	97.6	82	111
EG005T: Total Metals by ICP-AES (QCLot: 1830276)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	92.5	79	113
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	104	79	110
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	102	85	120
EG005T: Boron	7440-42-8	50	mg/kg	<50	33.2 mg/kg	107	82	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	89.2	85	109
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	94.2	83	109
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	92.6	78	112
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	90.8	78	108
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	99.4	78	106
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	97.0	82	107
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	97.1	82	111
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	97.1	93	109
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	93.4	80	109
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	96.2	82	111
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1830275)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	93.4	77	104
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1830277)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	90.2	77	104
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1830376)								

Page : 11 of 17
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Laboratory Control Spike (LCS) Report: Spike Recovery (%): LCS	Laboratory Control Spike (LCS) Report: Recovery Limits (%): Low	Laboratory Control Spike (LCS) Report: Recovery Limits (%): High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1830376) - continued								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	108	75	131
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	119	70	132
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	103	80	128
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	102	70	128
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	107	80	128
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	1.8 mg/kg	98.0	72	126
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	110	70	128
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	116	80	125
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	102	70	130
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	104	80	126
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	94.8	71	124
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	102	75	125
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	82.8	70	125
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	85.2	71	128
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	91.0	72	126
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	81.4	68	127
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1830383)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	98.1	75	131
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	95.7	70	132
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	98.2	80	128
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	99.6	70	128
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	104	80	128
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	1.8 mg/kg	102	72	126
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	99.9	70	128
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	104	80	125
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	92.1	70	130
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	99.3	80	126
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	93.5	71	124
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	100	75	125
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	87.8	70	125
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	91.6	71	128
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	93.4	72	126
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	92.1	68	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1830301)								
EP080: C6 - C9 Fraction	---	10	mg/kg	<10	36 mg/kg	99.0	70	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1830302)								

Page : 12 of 17
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Laboratory Control Spike (LCS) Report: Spike Recovery (%): LCS	Laboratory Control Spike (LCS) Report: Recovery Limits (%): Low	Laboratory Control Spike (LCS) Report: Recovery Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1830302) - continued								
EP080: C6 - C9 Fraction	---	10	mg/kg	<10	36 mg/kg	82.0	70	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1830377)								
EP071: C10 - C14 Fraction	---	50	mg/kg	<50	806 mg/kg	84.1	80	120
EP071: C15 - C28 Fraction	---	100	mg/kg	<100	3006 mg/kg	91.6	84	115
EP071: C29 - C36 Fraction	---	100	mg/kg	<100	1584 mg/kg	85.5	80	112
EP071: C10 - C36 Fraction (sum)	---	50	mg/kg	<50	---	---	---	---
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1830382)								
EP071: C10 - C14 Fraction	---	50	mg/kg	<50	806 mg/kg	100	80	120
EP071: C15 - C28 Fraction	---	100	mg/kg	<100	3006 mg/kg	108	84	115
EP071: C29 - C36 Fraction	---	100	mg/kg	<100	1584 mg/kg	94.4	80	112
EP071: C10 - C36 Fraction (sum)	---	50	mg/kg	<50	---	---	---	---
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1830301)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	96.7	68	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1830302)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	78.7	68	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1830377)								
EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	1160 mg/kg	83.2	83	117
EP071: >C16 - C34 Fraction	---	100	mg/kg	<100	3978 mg/kg	89.3	82	114
EP071: >C34 - C40 Fraction	---	100	mg/kg	<100	313 mg/kg	81.6	73	115
EP071: >C10 - C40 Fraction (sum)	---	50	mg/kg	<50	---	---	---	---
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1830382)								
EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	1160 mg/kg	101	83	117
EP071: >C16 - C34 Fraction	---	100	mg/kg	<100	3978 mg/kg	101	82	114
EP071: >C34 - C40 Fraction	---	100	mg/kg	<100	313 mg/kg	94.2	73	115
EP071: >C10 - C40 Fraction (sum)	---	50	mg/kg	<50	---	---	---	---
EP080: BTEXN (QCLot: 1830301)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	96.9	74	124
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	93.2	77	125
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	105	73	125
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	99.2	77	128
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	107	81	128
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	116	66	130
EP080: BTEXN (QCLot: 1830302)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	77.8	74	124
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	81.2	77	125
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	78.6	73	125

Page : 13 of 17
Work Order : EM1811856
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP080: BTEXN (QCLot: 1830302) - continued								
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	88.4	77	128
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	91.3	81	128
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	95.4	66	130

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1832824)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	91	107
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	93.1	82	113
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	104	84	106
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	99.0	84	104
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	94.7	83	103
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	95.3	83	106
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	94.0	82	103
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.2	83	105
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	97.4	83	105
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	96.8	82	106
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	97.1	82	109
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	97.6	83	106
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	101	85	109
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	99.2	84	116
EG020T: Total Metals by ICP-MS (QCLot: 1832788)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	99.1	90	110
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	104	88	113
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	96.7	88	112
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.7	86	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	95.3	87	109
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	96.2	88	113
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.2	87	108
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	95.7	88	109
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	95.8	88	111
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	96.3	87	111
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	99.2	85	113
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	97.2	88	112
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	102	87	113
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	104	88	118
EG035F: Dissolved Mercury by FIMS (QCLot: 1832823)								

Page : 14 of 17
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: WATER

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG035F: Dissolved Mercury by FIMS (QCLot: 1832823) - continued								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	96.4	81	114
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1830516)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	94.7	81	114
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1830911)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	83.5	48	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	89.9	49	124
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	89.8	53	117
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	76.3	54	118
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	83.0	57	119
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	84.1	51	113
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	91.4	59	123
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	90.5	58	123
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	93.2	52	126
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	90.0	55	123
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	93.9	52	131
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	93.4	57	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	95.2	56	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	92.2	53	123
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	90.6	53	125
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	92.1	53	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1830912)								
EP071: C10 - C14 Fraction	---	50	µg/L	<50	4331 µg/L	74.5	58	134
EP071: C15 - C28 Fraction	---	100	µg/L	<100	16952 µg/L	77.0	60	133
EP071: C29 - C36 Fraction	---	50	µg/L	<50	8695 µg/L	77.4	54	137
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1832678)								
EP080: C6 - C9 Fraction	---	20	µg/L	<20	360 µg/L	90.5	68	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1830912)								
EP071: >C10 - C16 Fraction	---	100	µg/L	<100	6292 µg/L	75.1	58	122
EP071: >C16 - C34 Fraction	---	100	µg/L	<100	22143 µg/L	79.8	56	132
EP071: >C34 - C40 Fraction	---	100	µg/L	<100	1677 µg/L	78.7	58	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1832678)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	89.2	66	123
EP080: BTEXN (QCLot: 1832678)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	87.2	74	123
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	93.5	77	128
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	91.1	73	126

Page : 15 of 17
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Laboratory Control Spike (LCS) Report: Spike Recovery (%): LCS	Laboratory Control Spike (LCS) Report: Recovery Limits (%): Low	Laboratory Control Spike (LCS) Report: Recovery Limits (%): High
EP080: BTEXN (QCLot: 1832678) - continued								
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	94.9	72	131
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	96.2	74	131
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	84.5	74	124

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	Matrix Spike (MS) Report: SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005T: Total Metals by ICP-AES (QCLot: 1830274)							
EM1811858-006	BH01 2.5-2.6	EG005T: Arsenic	7440-38-2	50 mg/kg	106	78	124
		EG005T: Barium	7440-39-3	50 mg/kg	105	71	135
		EG005T: Beryllium	7440-41-7	50 mg/kg	105	85	125
		EG005T: Cadmium	7440-43-9	50 mg/kg	96.8	84	116
		EG005T: Chromium	7440-47-3	50 mg/kg	99.0	79	121
		EG005T: Copper	7440-50-8	50 mg/kg	106	82	124
		EG005T: Lead	7439-92-1	50 mg/kg	107	76	124
		EG005T: Manganese	7439-96-5	50 mg/kg	108	68	136
		EG005T: Nickel	7440-02-0	50 mg/kg	103	78	120
		EG005T: Selenium	7782-49-2	50 mg/kg	91.3	71	125
		EG005T: Vanadium	7440-62-2	50 mg/kg	101	76	124
		EG005T: Zinc	7440-66-6	50 mg/kg	# Not Determined	74	128
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1830275)							
EM1811858-006	BH01 2.5-2.6	EG035T: Mercury	7439-97-6	5 mg/kg	107	76	116
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1830376)							
EM1811858-010	BH01 4.4-4.5	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	99.2	67	117
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	# Not Determined	52	148
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1830383)							
EM1811825-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	101	67	117
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	108	52	148
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1830301)							
EM1811858-006	BH01 2.5-2.6	EP080: C6 - C9 Fraction	---	28 mg/kg	81.6	42	131

Page : 16 of 17
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1830302)							
EM1811775-004	Anonymous	EP080: C6 - C9 Fraction	----	28 mg/kg	82.2	42	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1830377)							
EM1811858-006	BH01 2.5-2.6	EP071: C10 - C14 Fraction	----	806 mg/kg	84.3	53	123
		EP071: C15 - C28 Fraction	----	3006 mg/kg	97.0	70	124
		EP071: C29 - C36 Fraction	----	1584 mg/kg	93.5	64	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1830382)							
EM1811636-008	Anonymous	EP071: C10 - C14 Fraction	----	806 mg/kg	106	53	123
		EP071: C15 - C28 Fraction	----	3006 mg/kg	112	70	124
		EP071: C29 - C36 Fraction	----	1584 mg/kg	97.9	64	118
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1830301)							
EM1811858-006	BH01 2.5-2.6	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	76.4	39	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1830302)							
EM1811775-004	Anonymous	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	77.7	39	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1830377)							
EM1811858-006	BH01 2.5-2.6	EP071: >C10 - C16 Fraction	----	1160 mg/kg	87.0	65	123
		EP071: >C16 - C34 Fraction	----	3978 mg/kg	95.5	67	121
		EP071: >C34 - C40 Fraction	----	313 mg/kg	88.6	44	126
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1830382)							
EM1811636-008	Anonymous	EP071: >C10 - C16 Fraction	----	1160 mg/kg	106	65	123
		EP071: >C16 - C34 Fraction	----	3978 mg/kg	104	67	121
		EP071: >C34 - C40 Fraction	----	313 mg/kg	97.9	44	126
EP080: BTEXN (QCLot: 1830301)							
EM1811858-006	BH01 2.5-2.6	EP080: Benzene	71-43-2	2 mg/kg	107	50	136
		EP080: Toluene	108-88-3	2 mg/kg	102	56	139
EP080: BTEXN (QCLot: 1830302)							
EM1811775-004	Anonymous	EP080: Benzene	71-43-2	2 mg/kg	96.7	50	136
		EP080: Toluene	108-88-3	2 mg/kg	106	56	139

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1832824)							
EM1811857-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	107	85	131
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	91.1	73	141
		EG020A-F: Barium	7440-39-3	0.2 mg/L	104	75	127
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	94.9	81	133
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	93.8	71	135

Page	: 17 of 17
Work Order	: EM1811858
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1832824) - continued							
EM1811857-001	Anonymous	EG020A-F: Cobalt	7440-48-4	0.2 mg/L	99.0	78	132
		EG020A-F: Copper	7440-50-8	0.2 mg/L	94.5	76	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	92.2	75	133
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	93.1	64	134
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	96.6	73	131
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	94.5	73	131
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	97.5	75	131
EG020T: Total Metals by ICP-MS (QCLot: 1832788)							
EM1811858-059	Rinsate Blank	EG020A-T: Arsenic	7440-38-2	1 mg/L	94.4	82	118
		EG020A-T: Beryllium	7440-41-7	1 mg/L	104	79	121
		EG020A-T: Barium	7440-39-3	1 mg/L	92.1	80	114
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	92.6	75	129
		EG020A-T: Chromium	7440-47-3	1 mg/L	95.2	80	118
		EG020A-T: Cobalt	7440-48-4	1 mg/L	88.9	82	120
		EG020A-T: Copper	7440-50-8	1 mg/L	92.2	81	115
		EG020A-T: Lead	7439-92-1	1 mg/L	86.6	83	121
		EG020A-T: Manganese	7439-96-5	1 mg/L	94.3	73	123
		EG020A-T: Nickel	7440-02-0	1 mg/L	95.6	80	118
		EG020A-T: Vanadium	7440-62-2	1 mg/L	94.9	81	119
		EG020A-T: Zinc	7440-66-6	1 mg/L	92.3	74	116
EG035F: Dissolved Mercury by FIMS (QCLot: 1832823)							
EM1811653-002	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	72.7	70	120
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1830516)							
EM1811547-002	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	71.9	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1832678)							
EM1811890-007	Anonymous	EP080: C6 - C9 Fraction	----	280 µg/L	84.1	43	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1832678)							
EM1811890-007	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	81.2	44	122
EP080: BTEXN (QCLot: 1832678)							
EM1811890-007	Anonymous	EP080: Benzene	71-43-2	20 µg/L	102	68	130
		EP080: Toluene	108-88-3	20 µg/L	107	72	132

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM1811858	Page	: 1 of 10
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Telephone	: +61-3-8549 9630
Project	: Newtown Rd	Date Samples Received	: 25-Jul-2018
Site	: ----	Issue Date	: 31-Jul-2018
Sampler	: SJ	No. of samples received	: 59
Order number	:	No. of samples analysed	: 23

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Page	: 2 of 10
Work Order	: EM1811858
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EG005T: Total Metals by ICP-AES	EM1811858--006	BH01 2.5-2.6	Zinc	7440-66-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1811858--010	BH01 4.4-4.5	Pyrene	129-00-0	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Matrix Spikes (MS)					
Total Mercury by FIMS	1	21	4.76	5.00	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	1	21	4.76	5.00	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	17	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	20	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	17	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	20	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation

Page : 3 of 10
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Matrix: SOIL — Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
BH01 1.0-1.1, BH01 2.5-2.6, BH01 4.4-4.5, BH02 1.0-1.1, BH02 2.8-2.9, BH02 4.0-4.1, BH03 0.5-0.6, BH03 2.5-2.6, BH03 3.9-4.0, BH04 1.5-1.6, BH04 3.0-3.1, BH04 4.5-4.6, BH05 1.0-1.1, BH05 3.0-3.1, BH05 4.5-4.6, BH06 0.2-0.3, Duplicate 1, BH07 1.0-1.1, BH07 2.2-2.3, Duplicate 2, Duplicate 3	23-Jul-2018	---	---	---	26-Jul-2018	06-Aug-2018	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
BH01 1.0-1.1, BH01 2.5-2.6, BH01 4.4-4.5, BH02 1.0-1.1, BH02 2.8-2.9, BH02 4.0-4.1, BH03 0.5-0.6, BH03 2.5-2.6, BH03 3.9-4.0, BH04 1.5-1.6, BH04 3.0-3.1, BH04 4.5-4.6, BH05 1.0-1.1, BH05 3.0-3.1, BH05 4.5-4.6, BH06 0.2-0.3, Duplicate 1, BH07 1.0-1.1, BH07 2.2-2.3, Duplicate 2, Duplicate 3	23-Jul-2018	26-Jul-2018	19-Jan-2019	✓	26-Jul-2018	19-Jan-2019	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
BH01 1.0-1.1, BH01 2.5-2.6, BH01 4.4-4.5, BH02 1.0-1.1, BH02 2.8-2.9, BH02 4.0-4.1, BH03 0.5-0.6, BH03 2.5-2.6, BH03 3.9-4.0, BH04 1.5-1.6, BH04 3.0-3.1, BH04 4.5-4.6, BH05 1.0-1.1, BH05 3.0-3.1, BH05 4.5-4.6, BH06 0.2-0.3, Duplicate 1, BH07 1.0-1.1, BH07 2.2-2.3, Duplicate 2, Duplicate 3	23-Jul-2018	26-Jul-2018	20-Aug-2018	✓	27-Jul-2018	20-Aug-2018	✓

Page : 4 of 10
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Matrix: SOIL — Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM))							
Duplicate 3	23-Jul-2018	26-Jul-2018	06-Aug-2018	✓	26-Jul-2018	04-Sep-2018	✓
Soil Glass Jar - Unpreserved (EP075(SIM))							
BH01 1.0-1.1, BH01 2.5-2.6, BH01 4.4-4.5, BH02 1.0-1.1, BH02 2.8-2.9, BH02 4.0-4.1, BH03 0.5-0.6, BH03 2.5-2.6, BH03 3.9-4.0, BH04 1.5-1.6, BH04 3.0-3.1, BH04 4.5-4.6, BH05 1.0-1.1, BH05 3.0-3.1, BH05 4.5-4.6, BH06 0.2-0.3, Duplicate 1, BH07 1.0-1.1, BH07 2.2-2.3, Duplicate 2	23-Jul-2018	27-Jul-2018	06-Aug-2018	✓	27-Jul-2018	05-Sep-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP071)							
BH01 1.0-1.1, BH01 2.5-2.6, BH01 4.4-4.5, BH02 1.0-1.1, BH02 2.8-2.9, BH02 4.0-4.1, BH03 0.5-0.6, BH03 2.5-2.6, BH03 3.9-4.0, BH04 1.5-1.6, BH04 3.0-3.1, BH04 4.5-4.6, BH05 1.0-1.1, BH05 3.0-3.1, BH05 4.5-4.6, BH06 0.2-0.3, Duplicate 1, BH07 1.0-1.1, BH07 2.2-2.3, Duplicate 2, Duplicate 3	23-Jul-2018	26-Jul-2018	06-Aug-2018	✓	26-Jul-2018	04-Sep-2018	✓
Soil Glass Jar - Unpreserved (EP080)							
Duplicate 3	23-Jul-2018	26-Jul-2018	06-Aug-2018	✓	27-Jul-2018	06-Aug-2018	✓
Soil Glass Jar - Unpreserved (EP071)							
BH01 1.0-1.1, BH01 2.5-2.6, BH01 4.4-4.5, BH02 1.0-1.1, BH02 2.8-2.9, BH02 4.0-4.1, BH03 0.5-0.6, BH03 2.5-2.6, BH03 3.9-4.0, BH04 1.5-1.6, BH04 3.0-3.1, BH04 4.5-4.6, BH05 1.0-1.1, BH05 3.0-3.1, BH05 4.5-4.6, BH06 0.2-0.3, Duplicate 1, BH07 1.0-1.1, BH07 2.2-2.3, Duplicate 2	23-Jul-2018	27-Jul-2018	06-Aug-2018	✓	27-Jul-2018	05-Sep-2018	✓

Page : 5 of 10
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Matrix: **SOIL** Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP071)							
BH01 1.0-1.1, BH01 2.5-2.6, BH01 4.4-4.5, BH02 1.0-1.1, BH02 2.8-2.9, BH02 4.0-4.1, BH03 0.5-0.6, BH03 2.5-2.6, BH03 3.9-4.0, BH04 1.5-1.6, BH04 3.0-3.1, BH04 4.5-4.6, BH05 1.0-1.1, BH05 3.0-3.1, BH05 4.5-4.6, BH06 0.2-0.3, Duplicate 1, BH07 1.0-1.1, BH07 2.2-2.3, Duplicate 2, Duplicate 3	23-Jul-2018	26-Jul-2018	06-Aug-2018	✓	26-Jul-2018	04-Sep-2018	✓
Soil Glass Jar - Unpreserved (EP080)							
Duplicate 3	23-Jul-2018	26-Jul-2018	06-Aug-2018	✓	27-Jul-2018	06-Aug-2018	✓
Soil Glass Jar - Unpreserved (EP071)							
BH01 1.0-1.1, BH01 2.5-2.6, BH01 4.4-4.5, BH02 1.0-1.1, BH02 2.8-2.9, BH02 4.0-4.1, BH03 0.5-0.6, BH03 2.5-2.6, BH03 3.9-4.0, BH04 1.5-1.6, BH04 3.0-3.1, BH04 4.5-4.6, BH05 1.0-1.1, BH05 3.0-3.1, BH05 4.5-4.6, BH06 0.2-0.3, Duplicate 1, BH07 1.0-1.1, BH07 2.2-2.3, Duplicate 2	23-Jul-2018	27-Jul-2018	06-Aug-2018	✓	27-Jul-2018	05-Sep-2018	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
BH01 1.0-1.1, BH01 2.5-2.6, BH01 4.4-4.5, BH02 1.0-1.1, BH02 2.8-2.9, BH02 4.0-4.1, BH03 0.5-0.6, BH03 2.5-2.6, BH03 3.9-4.0, BH04 1.5-1.6, BH04 3.0-3.1, BH04 4.5-4.6, BH05 1.0-1.1, BH05 3.0-3.1, BH05 4.5-4.6, BH06 0.2-0.3, Duplicate 1, BH07 1.0-1.1, BH07 2.2-2.3, Duplicate 2	23-Jul-2018	26-Jul-2018	06-Aug-2018	✓	26-Jul-2018	06-Aug-2018	✓
Soil Glass Jar - Unpreserved (EP080)							
Duplicate 3	23-Jul-2018	26-Jul-2018	06-Aug-2018	✓	27-Jul-2018	06-Aug-2018	✓

Matrix: **WATER** Evaluation: x = Holding time breach ; ✓ = Within holding time.

Page	: 6 of 10
Work Order	: EM1811858
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Matrix: **WATER** Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)							
Field Blank	23-Jul-2018	----	----	----	27-Jul-2018	19-Jan-2019	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Unspecified; Lab-acidified (EG020A-T)							
Rinsate Blank	23-Jul-2018	27-Jul-2018	19-Jan-2019	✓	27-Jul-2018	19-Jan-2019	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG035F)							
Field Blank	23-Jul-2018	----	----	----	27-Jul-2018	20-Aug-2018	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Unspecified; Lab-acidified (EG035T)							
Rinsate Blank	23-Jul-2018	----	----	----	27-Jul-2018	20-Aug-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
Field Blank, Rinsate Blank	23-Jul-2018	26-Jul-2018	30-Jul-2018	✓	30-Jul-2018	04-Sep-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
Field Blank, Rinsate Blank	23-Jul-2018	26-Jul-2018	30-Jul-2018	✓	30-Jul-2018	04-Sep-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
Field Blank, Rinsate Blank	23-Jul-2018	27-Jul-2018	06-Aug-2018	✓	27-Jul-2018	06-Aug-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
Field Blank, Rinsate Blank	23-Jul-2018	26-Jul-2018	30-Jul-2018	✓	30-Jul-2018	04-Sep-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
Field Blank, Rinsate Blank	23-Jul-2018	27-Jul-2018	06-Aug-2018	✓	27-Jul-2018	06-Aug-2018	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
Field Blank, Rinsate Blank	23-Jul-2018	27-Jul-2018	06-Aug-2018	✓	27-Jul-2018	06-Aug-2018	✓

Page : 7 of 10
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: x = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	4	31	12.90	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	3	29	10.34	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	3	21	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	4	21	19.05	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	21	4.76	5.00	x	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	21	4.76	5.00	x	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: x = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Dissolved Mercury by FIMS	EG035F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	17	0.00	10.00	x	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	20	0.00	10.00	x	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard

Page	: 8 of 10
Work Order	: EM1811858
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*	
Laboratory Control Samples (LCS)							
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	17	0.00	5.00	×	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	20	0.00	5.00	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Page	: 9 of 10
Work Order	: EM1811858
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house. A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A. Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)

Page : 10 of 10
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Methods	Method	Matrix	Method Description
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A. The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270D. Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B. Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Description
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion. 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B. 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3). ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1822218**	Page	: 1 of 7
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Sydney
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
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Project	: Newtown Rd	Date Samples Received	: 27-Jul-2018
Order number	:	Date Analysis Commenced	: 31-Jul-2018
C-O-C number	: ----	Issue Date	: 02-Aug-2018
Sampler	: ----		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 3		
No. of samples analysed	: 3		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW

RIGHT SOLUTIONS | RIGHT PARTNER

Page	: 2 of 7
Work Order	: ES1822218
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1840392)									
ES1822216-034	Anonymous	EA055: Moisture Content	----	0.1	%	21.3	20.6	3.34	0% - 20%
ES1822220-002	Anonymous	EA055: Moisture Content	----	0.1	%	8.9	9.0	1.52	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 1843083)									
ES1822065-049	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	<10	<10	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
ES1822292-002	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	240	220	5.63	0% - 20%
		EG005T: Chromium	7440-47-3	2	mg/kg	10	10	0.00	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	3	3	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	4	5	28.1	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	18	15	17.3	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	18	20	11.3	No Limit

Page : 3 of 7
Work Order : ES1822218
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005T: Total Metals by ICP-AES (QC Lot: 1843083) - continued									
ES1822292-002	Anonymous	EG005T: Lead	7439-92-1	5	mg/kg	46	57	21.7	0% - 50%
		EG005T: Manganese	7439-96-5	5	mg/kg	354	382	7.63	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	141	124	12.8	0% - 20%
		EG005T: Zinc	7440-66-6	5	mg/kg	295	# 471	46.0	0% - 20%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1843084)									
ES1822065-049	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1822292-002	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1839417)									
ES1822218-001	Triplicate 1	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	2.0	1.8	13.3	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	0.9	0.8	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	1.4	1.2	21.2	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	13.1	11.6	12.4	0% - 20%
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	3.6	3.1	12.9	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	22.2	18.9	16.0	0% - 20%
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	20.7	19.2	7.69	0% - 20%
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	8.4	7.8	6.67	0% - 50%
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	7.8	7.3	6.92	0% - 50%
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	10.6	9.3	12.2	0% - 20%
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	3.8	3.4	13.7	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	10.0	9.1	9.98	0% - 20%
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	5.7	5.1	12.0	0% - 50%
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	1.1	1.0	12.1	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	8.4	7.4	12.8	0% - 50%
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	120	107	11.2	0% - 20%
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	14.1	12.8	9.70	0% - 20%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1839404)									
ES1822218-001	Triplicate 1	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1839416)									
ES1822218-001	Triplicate 1	EP071: C15 - C28 Fraction	----	100	mg/kg	610	660	8.73	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	370	410	11.8	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1839404)									
ES1822218-001	Triplicate 1	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1839416)									

Page : 4 of 7
Work Order : ES1822218
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: **MOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/031: Tos8aRevoFer9l æ Hbdrov9rl oui - NEPS y01) 7r9vs6oui rQC Los 18) Xc14° - vousfut ed									
ES1822218-001	Triplicate 1	EP071: >C16 - C34 Fraction	---	100	mg/kg	900	910	1.71	No Limit
		EP071: >C34 - C40 Fraction	---	100	mg/kg	310	280	9.20	No Limit
		EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
EP080: BTE6N rQC Los 18) Xc0c°									
ES1822218-001	Triplicate 1	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Page : 5 of 7
Work Order : ES1822218
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **MOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG002T: TosBaMe9a l b ICP-AEM rQCLos 18c) 08) °								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	102	86	126
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	101	85	115
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	113	90	113
EG005T: Boron	7440-42-8	50	mg/kg	<50	----	----	----	----
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	104	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	99.0	76	128
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	106	88	120
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	99.8	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	105	80	114
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	105	85	117
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	108	87	123
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	110	75	131
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	109	92	122
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	121	80	122
EG0) 2T: TosBaRevoFer9l æ S ervt rb l b 7lS N rQCLos 18c) 08c°								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	76.3	70	105
EP032rMM°B: Poabut væ9r Arom9s&r Hbdrov9rl oui rQCLos 18) Xc13°								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	90.0	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	93.7	72	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	90.2	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	94.4	72	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	94.0	75	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	97.4	77	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	97.0	73	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	96.8	74	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	91.2	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	94.3	75	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	95.2	68	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	90.8	74	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	94.2	70	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	94.7	61	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	97.0	62	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	90.7	63	121

Page : 6 of 7
Work Order : ES1822218
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: **MOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/031: TosBaPesroæt m Hbdrov9rl oui rQCLos 18) Xc0c°								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	84.4	68	128
EP080/031: TosBaPesroæt m Hbdrov9rl oui rQCLos 18) Xc14°								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	107	75	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	103	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	92.0	71	129
EP080/031: TosBaRevoFer9l æ Hbdrov9rl oui - NEPS y01) 7r9vs6oui rQCLos 18) Xc0c°								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	88.6	68	128
EP080/031: TosBaRevoFer9l æ Hbdrov9rl oui - NEPS y01) 7r9vs6oui rQCLos 18) Xc14°								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	104	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	96.5	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	83.5	63	131
EP080: BTE6N rQCLos 18) Xc0c°								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	96.5	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	95.9	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	93.9	65	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	97.7	66	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	95.9	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	104	63	119

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **MOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG002T: TosBaMesBa I b ICP-AEM rQCLos 18c) 08) °							
ES1822065-049	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	101	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	103	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	102	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	102	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	103	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	103	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	108	70	130
EG0) 2T: TosBaRevoFer9l æ S ervt rb I b 7IS N rQCLos 18c) 08c°							
ES1822065-049	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	85.8	70	130

Page : 7 of 7
Work Order : ES1822218
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: **MOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP032nMM°B: Poabut vae9r Arom9s5r Hbdrov9rl oui rQCLos 18) Xc13°							
ES1822218-001	Triplicate 1	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	85.6	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	80.5	70	130
EP080/031: Tos9aPesroaet m Hbdrov9rl oui rQCLos 18) Xc0c°							
ES1822218-001	Triplicate 1	EP080: C6 - C9 Fraction	----	32.5 mg/kg	81.2	70	130
EP080/031: Tos9aPesroaet m Hbdrov9rl oui rQCLos 18) Xc14°							
ES1822218-001	Triplicate 1	EP071: C10 - C14 Fraction	----	523 mg/kg	78.1	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	67.7	53	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	80.8	52	132
EP080/031: Tos9aRevoFer9l æ Hbdrov9rl oui - NEPS y01) 7r9vs6oui rQCLos 18) Xc0c°							
ES1822218-001	Triplicate 1	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	80.8	70	130
EP080/031: Tos9aRevoFer9l æ Hbdrov9rl oui - NEPS y01) 7r9vs6oui rQCLos 18) Xc14°							
ES1822218-001	Triplicate 1	EP071: >C10 - C16 Fraction	----	860 mg/kg	88.0	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	65.6	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	81.4	52	132
EP080: BTE6N rQCLos 18) Xc0c°							
ES1822218-001	Triplicate 1	EP080: Benzene	71-43-2	2.5 mg/kg	84.2	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	83.9	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	82.7	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	81.6	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	84.3	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	84.7	70	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1822218	Page	: 1 of 5
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Sydney
Contact	: DR JOHN PAUL CUMMING	Telephone	: +61-3-8549 9630
Project	: Newtown Rd	Date Samples Received	: 27-Jul-2018
Site	: ----	Issue Date	: 02-Aug-2018
Sampler	: ----	No. of samples received	: 3
Order number	:	No. of samples analysed	: 3

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **Duplicate outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

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Page : 2 of 5
Work Order : ES1822218
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EG005T: Total Metals by ICP-AES	ES1822292--002	Anonymous	**Zinc**	7440-66-6	46.0 %	0% - 20%	**RPD exceeds LOR based limits**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
Triplicate 1, Triplicate 3	Triplicate 2,	23-Jul-2018	----	---	---	31-Jul-2018	06-Aug-2018	✓
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
Triplicate 1, Triplicate 3	Triplicate 2,	23-Jul-2018	01-Aug-2018	19-Jan-2019	✓	01-Aug-2018	19-Jan-2019	✓
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
Triplicate 1, Triplicate 3	Triplicate 2,	23-Jul-2018	01-Aug-2018	20-Aug-2018	✓	01-Aug-2018	20-Aug-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
Triplicate 1, Triplicate 3	Triplicate 2,	23-Jul-2018	31-Jul-2018	06-Aug-2018	✓	31-Jul-2018	09-Sep-2018	✓
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080)								
Triplicate 1, Triplicate 3	Triplicate 2,	23-Jul-2018	31-Jul-2018	06-Aug-2018	✓	31-Jul-2018	06-Aug-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP080)								
Triplicate 1, Triplicate 3	Triplicate 2,	23-Jul-2018	31-Jul-2018	06-Aug-2018	✓	31-Jul-2018	06-Aug-2018	✓

Page	: 3 of 5
Work Order	: ES1822218
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Matrix: **SOIL** Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
Triplicate 1, Triplicate 2, Triplicate 3	23-Jul-2018	31-Jul-2018	06-Aug-2018	✓	31-Jul-2018	06-Aug-2018	✓

Page	: 4 of 5
Work Order	: ES1822218
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: x = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	5	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	9	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Page	5 of 5
Work Order	ES1822218
Client	GEO-ENVIRONMENTAL SOLUTIONS
Project	Newtown Rd

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house. A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A. Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: EM1812173	Page	: 1 of 9
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Project	: Newtown Rd	Date Samples Received	: 25-Jul-2018
Order number	:	Date Analysis Commenced	: 01-Aug-2018
C-O-C number	: ----	Issue Date	: 06-Aug-2018
Sampler	: ----		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 11		
No. of samples analysed	: 11		

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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
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Page	: 2 of 9
Work Order	: EM1812173
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1843762)									
EM1812170-045	Anonymous	EA055: Moisture Content	----	0.1	%	22.5	23.2	2.94	0% - 20%
EM1812172-024	Anonymous	EA055: Moisture Content	----	0.1	%	14.2	17.8	22.5	0% - 50%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1843763)									
EM1812173-005	BH03 1.0-1.1	EA055: Moisture Content	----	0.1	%	22.1	22.8	3.43	0% - 20%
EM1812175-001	Anonymous	EA055: Moisture Content	----	0.1	%	11.8	11.9	1.18	0% - 50%
EG005T: Total Metals by ICP-AES (QC Lot: 1843748)									
EM1812172-024	Anonymous	EG005T: Manganese	7439-96-5	5	mg/kg	288	255	12.3	0% - 20%
EM1812170-046	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	2	2	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	60	100	44.1	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	24	30	20.0	0% - 50%
		EG005T: Cobalt	7440-48-4	2	mg/kg	14	19	27.3	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	24	31	24.8	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	6	7	27.3	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	10	12	13.2	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	66	76	13.3	0% - 50%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	31	44	34.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	5	6	18.9	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EM1812172-024	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	140	130	0.00	0% - 50%

Page : 3 of 9
Work Order : EM1812173
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005T: Total Metals by ICP-AES (QC Lot: 1843748) - continued									
EM1812172-024	Anonymous	EG005T: Chromium	7440-47-3	2	mg/kg	17	16	0.00	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	22	16	30.5	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	29	24	17.9	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	28	26	3.98	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	56	58	4.37	0% - 50%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	37	35	5.02	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	60	48	22.2	0% - 50%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 1843751)									
EM1812173-006	BH03 3.0-3.1	EG005T: Lead	7439-92-1	5	mg/kg	218	# 105	69.9	0% - 20%
		EG005T: Zinc	7440-66-6	5	mg/kg	573	# 216	90.6	0% - 20%
EM1812173-006	BH03 3.0-3.1	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	80	50	50.5	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	5	5	0.00	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	10	9	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	9	10	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	52	38	30.8	0% - 50%
		EG005T: Manganese	7439-96-5	5	mg/kg	263	316	18.4	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	59	36	48.7	0% - 50%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EM1812175-001	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	1	1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	100	90	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	22	22	0.00	0% - 50%
		EG005T: Cobalt	7440-48-4	2	mg/kg	16	14	17.6	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	13	13	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	11	10	11.9	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	9	9	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	30	30	0.00	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	552	496	10.8	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	28	26	8.18	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	33	32	3.18	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1843749)									

Page : 4 of 9
Work Order : EM1812173
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1843749) - continued									
EM1812170-046	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EM1812172-024	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.4	0.3	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1843750)									
EM1812173-006	BH03 3.0-3.1	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EM1812175-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1843424)									
EM1812173-001	BH01 1.5-1.6	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EM1812173-011	BH05 4.0-4.1	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	0.6	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	1.3	1.2	10.8	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	4.9	3.4	35.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	1.4	1.0	32.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	9.4	7.2	26.4	0% - 50%
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	9.7	7.7	22.8	0% - 50%
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	4.7	3.7	23.4	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	4.1	2.9	32.5	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	6.1	5.0	20.0	0% - 50%
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	1.9	1.6	16.5	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	4.9	4.1	18.8	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	2.5	2.1	16.1	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	0.6	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	3.2	2.7	16.1	No Limit

Page : 5 of 9
Work Order : EM1812173
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1843360)									
EM1812173-001	BH01 1.5-1.6	EP080: C6 - C9 Fraction	---	10	mg/kg	<10	<10	0.00	No Limit
EM1812173-011	BH05 4.0-4.1	EP080: C6 - C9 Fraction	---	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1843425)									
EM1812173-001	BH01 1.5-1.6	EP071: C15 - C28 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	---	50	mg/kg	<50	<50	0.00	No Limit
EM1812173-011	BH05 4.0-4.1	EP071: C15 - C28 Fraction	---	100	mg/kg	260	230	18.7	No Limit
		EP071: C29 - C36 Fraction	---	100	mg/kg	210	200	8.88	No Limit
		EP071: C10 - C14 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	---	50	mg/kg	490	430	13.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1843360)									
EM1812173-001	BH01 1.5-1.6	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EM1812173-011	BH05 4.0-4.1	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1843425)									
EM1812173-001	BH01 1.5-1.6	EP071: >C16 - C34 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	---	50	mg/kg	<50	<50	0.00	No Limit
EM1812173-011	BH05 4.0-4.1	EP071: >C16 - C34 Fraction	---	100	mg/kg	440	380	15.0	No Limit
		EP071: >C34 - C40 Fraction	---	100	mg/kg	100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	---	50	mg/kg	540	380	34.8	0% - 50%
EP080: BTEXN (QC Lot: 1843360)									
EM1812173-001	BH01 1.5-1.6	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EM1812173-011	BH05 4.0-4.1	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Page : 6 of 9
Work Order : EM1812173
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: SOIL

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 1843748)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	87.2	79	113
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	94.7	79	110
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	97.1	85	120
EG005T: Boron	7440-42-8	50	mg/kg	<50	33.2 mg/kg	97.5	82	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	105	85	109
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	86.8	83	109
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	84.4	78	112
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	85.7	78	108
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	84.7	78	106
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	88.2	82	107
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	90.2	82	111
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	97.8	93	109
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	86.3	80	109
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	93.3	82	111
EG005T: Total Metals by ICP-AES (QCLot: 1843751)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	87.5	79	113
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	94.7	79	110
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	97.3	85	120
EG005T: Boron	7440-42-8	50	mg/kg	<50	33.2 mg/kg	99.7	82	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	100.0	85	109
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	86.7	83	109
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	84.3	78	112
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	85.5	78	108
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	84.1	78	106
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	87.8	82	107
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	90.2	82	111
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	99.0	93	109
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	86.1	80	109
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	93.4	82	111
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1843749)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	88.3	77	104
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1843750)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	94.2	77	104
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1843424)								

Page : 7 of 9
Work Order : EM1812173
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Laboratory Control Spike (LCS) Report: Spike Recovery (%): LCS	Laboratory Control Spike (LCS) Report: Recovery Limits (%): Low	Laboratory Control Spike (LCS) Report: Recovery Limits (%): High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1843424) - continued								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	95.6	75	131
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	92.2	70	132
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	93.9	80	128
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	92.7	70	128
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	97.5	80	128
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	1.6 mg/kg	96.5	72	126
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	92.1	70	128
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	96.9	80	125
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	87.6	70	130
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	91.9	80	126
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	86.2	71	124
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	91.9	75	125
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	81.5	70	125
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	85.8	71	128
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	84.6	72	126
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	88.0	68	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1843360)								
EP080: C6 - C9 Fraction	---	10	mg/kg	<10	36 mg/kg	99.2	70	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1843425)								
EP071: C10 - C14 Fraction	---	50	mg/kg	<50	806 mg/kg	97.2	80	120
EP071: C15 - C28 Fraction	---	100	mg/kg	<100	3006 mg/kg	104	84	115
EP071: C29 - C36 Fraction	---	100	mg/kg	<100	1584 mg/kg	97.6	80	112
EP071: C10 - C36 Fraction (sum)	---	50	mg/kg	<50	---	---	---	---
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1843360)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	96.3	68	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1843425)								
EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	1160 mg/kg	99.3	83	117
EP071: >C16 - C34 Fraction	---	100	mg/kg	<100	3978 mg/kg	102	82	114
EP071: >C34 - C40 Fraction	---	100	mg/kg	<100	313 mg/kg	84.0	73	115
EP071: >C10 - C40 Fraction (sum)	---	50	mg/kg	<50	---	---	---	---
EP080: BTEXN (QCLot: 1843360)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	101	74	124
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	103	77	125
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	108	73	125
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	108	77	128
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	106	81	128

Page	: 8 of 9
Work Order	: EM1812173
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Sub-Matrix: SOIL

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP080: BTEXN (QCLot: 1843360) - continued								
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	96.3	66	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: SOIL

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 1843748)							
EM1812170-047	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	91.6	78	124
		EG005T: Barium	7440-39-3	50 mg/kg	119	71	135
		EG005T: Beryllium	7440-41-7	50 mg/kg	98.2	85	125
		EG005T: Cadmium	7440-43-9	50 mg/kg	88.6	84	116
		EG005T: Chromium	7440-47-3	50 mg/kg	91.4	79	121
		EG005T: Copper	7440-50-8	50 mg/kg	90.3	82	124
		EG005T: Lead	7439-92-1	50 mg/kg	93.2	76	124
		EG005T: Manganese	7439-96-5	50 mg/kg	111	68	136
		EG005T: Nickel	7440-02-0	50 mg/kg	91.3	78	120
		EG005T: Selenium	7782-49-2	50 mg/kg	84.8	71	125
		EG005T: Vanadium	7440-62-2	50 mg/kg	83.2	76	124
		EG005T: Zinc	7440-66-6	50 mg/kg	104	74	128
EG005T: Total Metals by ICP-AES (QCLot: 1843751)							
EM1812173-007	BH04 0.5-0.6	EG005T: Barium	7440-39-3	50 mg/kg	112	71	135
		EG005T: Lead	7439-92-1	50 mg/kg	109	76	124
		EG005T: Manganese	7439-96-5	50 mg/kg	# Not Determined	68	136
		EG005T: Vanadium	7440-62-2	50 mg/kg	98.1	76	124
		EG005T: Zinc	7440-66-6	50 mg/kg	# 12.1	74	128
EM1812173-007	BH04 0.5-0.6	EG005T: Arsenic	7440-38-2	50 mg/kg	88.8	78	124
		EG005T: Beryllium	7440-41-7	50 mg/kg	94.6	85	125
		EG005T: Cadmium	7440-43-9	50 mg/kg	84.6	84	116
		EG005T: Chromium	7440-47-3	50 mg/kg	85.5	79	121
		EG005T: Copper	7440-50-8	50 mg/kg	103	82	124
		EG005T: Nickel	7440-02-0	50 mg/kg	81.9	78	120
		EG005T: Selenium	7782-49-2	50 mg/kg	81.0	71	125
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1843749)							
EM1812170-047	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	85.5	76	116

Page : 9 of 9
Work Order : EM1812173
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1843750)							
EM1812173-007	BH04 0.5-0.6	EG035T: Mercury	7439-97-6	5 mg/kg	90.2	76	116
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1843424)							
EM1812173-003	BH02 0.5-0.6	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	94.4	67	117
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	105	52	148
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1843360)							
EM1812173-002	BH01 3.5-3.6	EP080: C6 - C9 Fraction	----	28 mg/kg	71.3	42	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1843425)							
EM1812173-002	BH01 3.5-3.6	EP071: C10 - C14 Fraction	----	806 mg/kg	94.8	53	123
		EP071: C15 - C28 Fraction	----	3008 mg/kg	100	70	124
		EP071: C29 - C36 Fraction	----	1584 mg/kg	97.6	64	118
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1843360)							
EM1812173-002	BH01 3.5-3.6	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	71.6	39	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1843425)							
EM1812173-002	BH01 3.5-3.6	EP071: >C10 - C16 Fraction	----	1160 mg/kg	96.5	65	123
		EP071: >C16 - C34 Fraction	----	3978 mg/kg	99.3	67	121
		EP071: >C34 - C40 Fraction	----	313 mg/kg	93.8	44	126
EP080: BTEXN (QCLot: 1843360)							
EM1812173-002	BH01 3.5-3.6	EP080: Benzene	71-43-2	2 mg/kg	79.1	50	136
		EP080: Toluene	108-88-3	2 mg/kg	86.2	56	139

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM1812173	Page	: 1 of 6
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Telephone	: +61-3-8549 9630
Project	: Newtown Rd	Date Samples Received	: 25-Jul-2018
Site	: ----	Issue Date	: 06-Aug-2018
Sampler	: ----	No. of samples received	: 11
Order number	:	No. of samples analysed	: 11

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- NO Method Blank value outliers occur.
- NO Laboratory Control outliers occur.
- Duplicate outliers exist - please see following pages for full details.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, NO surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- NO Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- NO Quality Control Sample Frequency Outliers exist.

Page : 2 of 6
Work Order : EM1812173
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EG005T: Total Metals by ICP-AES	EM1812173--006	BH03 3.0-3.1	**Lead**	7439-92-1	69.9 %	0% - 20%	**RPD exceeds LOR based limits**
EG005T: Total Metals by ICP-AES	EM1812173--006	BH03 3.0-3.1	**Zinc**	7440-66-6	90.6 %	0% - 20%	**RPD exceeds LOR based limits**
Matrix Spike (MS) Recoveries							
EG005T: Total Metals by ICP-AES	EM1812173--007	BH04 0.5-0.6	**Manganese**	7439-96-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG005T: Total Metals by ICP-AES	EM1812173--007	BH04 0.5-0.6	**Zinc**	7440-66-6	12.1 %	74-128%	**Recovery less than lower data quality objective**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
BH01 1.5-1.6,	BH01 3.5-3.6,	23-Jul-2018	----	----	----	01-Aug-2018	06-Aug-2018	✓
BH02 0.5-0.6,	BH02 2.0-2.1,							
BH03 1.0-1.1,	BH03 3.0-3.1,							
BH04 0.5-0.6,	BH04 2.5-2.6,							
BH04 3.5-3.6,	BH05 2.0-2.1,							
BH05 4.0-4.1								
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
BH01 1.5-1.6,	BH01 3.5-3.6,	23-Jul-2018	02-Aug-2018	19-Jan-2019	✓	02-Aug-2018	19-Jan-2019	✓
BH02 0.5-0.6,	BH02 2.0-2.1,							
BH03 1.0-1.1,	BH03 3.0-3.1,							
BH04 0.5-0.6,	BH04 2.5-2.6,							
BH04 3.5-3.6,	BH05 2.0-2.1,							
BH05 4.0-4.1								

Page	3 of 6
Work Order	EM1812173
Client	GEO-ENVIRONMENTAL SOLUTIONS
Project	Newtown Rd

Matrix: **SOIL**

Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
BH01 1.5-1.6,	BH01 3.5-3.6,	23-Jul-2018	02-Aug-2018	20-Aug-2018	✓	02-Aug-2018	20-Aug-2018	✓
BH02 0.5-0.6,	BH02 2.0-2.1,							
BH03 1.0-1.1,	BH03 3.0-3.1,							
BH04 0.5-0.6,	BH04 2.5-2.6,							
BH04 3.5-3.6,	BH05 2.0-2.1,							
BH05 4.0-4.1								
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
BH01 1.5-1.6,	BH01 3.5-3.6,	23-Jul-2018	01-Aug-2018	06-Aug-2018	✓	01-Aug-2018	10-Sep-2018	✓
BH02 0.5-0.6,	BH02 2.0-2.1,							
BH03 1.0-1.1,	BH03 3.0-3.1,							
BH04 0.5-0.6,	BH04 2.5-2.6,							
BH04 3.5-3.6,	BH05 2.0-2.1,							
BH05 4.0-4.1								
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP071)								
BH01 1.5-1.6,	BH01 3.5-3.6,	23-Jul-2018	01-Aug-2018	06-Aug-2018	✓	01-Aug-2018	10-Sep-2018	✓
BH02 0.5-0.6,	BH02 2.0-2.1,							
BH03 1.0-1.1,	BH03 3.0-3.1,							
BH04 0.5-0.6,	BH04 2.5-2.6,							
BH04 3.5-3.6,	BH05 2.0-2.1,							
BH05 4.0-4.1								
Soil Glass Jar - Unpreserved (EP080)								
BH01 1.5-1.6,	BH01 3.5-3.6,	23-Jul-2018	01-Aug-2018	06-Aug-2018	✓	03-Aug-2018	06-Aug-2018	✓
BH02 0.5-0.6,	BH02 2.0-2.1,							
BH03 1.0-1.1,	BH03 3.0-3.1,							
BH04 0.5-0.6,	BH04 2.5-2.6,							
BH04 3.5-3.6,	BH05 2.0-2.1,							
BH05 4.0-4.1								

Page	: 4 of 6
Work Order	: EM1812173
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP071)								
BH01 1.5-1.6,	BH01 3.5-3.6,	23-Jul-2018	01-Aug-2018	06-Aug-2018	✓	01-Aug-2018	10-Sep-2018	✓
BH02 0.5-0.6,	BH02 2.0-2.1,							
BH03 1.0-1.1,	BH03 3.0-3.1,							
BH04 0.5-0.6,	BH04 2.5-2.6,							
BH04 3.5-3.6,	BH05 2.0-2.1,							
BH05 4.0-4.1								
Soil Glass Jar - Unpreserved (EP080)								
BH01 1.5-1.6,	BH01 3.5-3.6,	23-Jul-2018	01-Aug-2018	06-Aug-2018	✓	03-Aug-2018	06-Aug-2018	✓
BH02 0.5-0.6,	BH02 2.0-2.1,							
BH03 1.0-1.1,	BH03 3.0-3.1,							
BH04 0.5-0.6,	BH04 2.5-2.6,							
BH04 3.5-3.6,	BH05 2.0-2.1,							
BH05 4.0-4.1								
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080)								
BH01 1.5-1.6,	BH01 3.5-3.6,	23-Jul-2018	01-Aug-2018	06-Aug-2018	✓	03-Aug-2018	06-Aug-2018	✓
BH02 0.5-0.6,	BH02 2.0-2.1,							
BH03 1.0-1.1,	BH03 3.0-3.1,							
BH04 0.5-0.6,	BH04 2.5-2.6,							
BH04 3.5-3.6,	BH05 2.0-2.1,							
BH05 4.0-4.1								

Page	: 5 of 6
Work Order	: EM1812173
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: x = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	4	37	10.81	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	6	39	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	37	5.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	37	5.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	37	5.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	3	39	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Page	6 of 6
Work Order	EM1812173
Client	GEO-ENVIRONMENTAL SOLUTIONS
Project	Newtown Rd

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house. A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A. Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: EM1811913	Page	: 1 of 12
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Project	: Newtown Rd	Date Samples Received	: 26-Jul-2018
Order number	:	Date Analysis Commenced	: 27-Jul-2018
C-O-C number	: ----	Issue Date	: 31-Jul-2018
Sampler	: SARAH JOYCE		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 53		
No. of samples analysed	: 19		

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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC

RIGHT SOLUTIONS | RIGHT PARTNER

Page	: 2 of 12
Work Order	: EM1811913
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1833305)									
EM1811832-001	Anonymous	EA055: Moisture Content	----	0.1	%	12.1	11.8	1.85	0% - 50%
EM1811913-030	BH10_3.0-3.1	EA055: Moisture Content	----	0.1	%	21.2	21.9	3.44	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 1833822)									
EM1811913-003	BH08_1.0-1.1	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	50	70	31.4	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	6	8	25.7	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	8	10	19.9	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	9	10	12.2	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	40	52	25.7	0% - 50%
		EG005T: Lead	7439-92-1	5	mg/kg	25	35	32.9	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	211	226	6.93	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	32	44	34.1	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	42	63	41.0	0% - 50%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EM1811913-030	BH10_3.0-3.1	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	140	140	0.00	0% - 50%
		EG005T: Chromium	7440-47-3	2	mg/kg	9	9	0.00	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	9	9	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	11	11	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	90	82	9.55	0% - 50%

Page : 3 of 12
Work Order : EM1811913
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005T: Total Metals by ICP-AES (QC Lot: 1833822) - continued									
EM1811913-030	BH10_3.0-3.1	EG005T: Lead	7439-92-1	5	mg/kg	114	114	0.00	0% - 20%
		EG005T: Manganese	7439-96-5	5	mg/kg	462	393	16.1	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	32	33	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	123	119	3.45	0% - 20%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1833823)									
EM1811913-003	BH08_1.0-1.1	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.1	0.00	No Limit
EM1811913-030	BH10_3.0-3.1	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.6	0.7	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1832298)									
EM1811913-003	BH08_1.0-1.1	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	1.1	<0.5	78.4	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	8.7	# 4.6	62.3	0% - 50%
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	0.6	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	3.1	1.3	83.3	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	39.3	# 25.4	42.8	0% - 20%
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	9.3	7.3	24.3	0% - 50%
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	45.6	44.4	2.68	0% - 20%
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	50.7	46.7	8.37	0% - 20%
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	24.8	22.3	10.9	0% - 20%
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	26.6	# 20.8	24.4	0% - 20%
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	26.3	24.2	8.40	0% - 20%
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	9.1	8.3	9.24	0% - 50%
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	25.5	23.0	10.2	0% - 20%
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	12.0	10.9	9.61	0% - 20%
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	3.3	3.1	5.94	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	14.9	13.6	9.00	0% - 20%
EM1811913-034	BH10_5.0-5.1	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Page : 4 of 12
Work Order : EM1811913
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1833298) - continued									
EM1811913-034	BH10_5.0-5.1	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1833294)									
EM1811913-003	BH08_1.0-1.1	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EM1811913-034	BH10_5.0-5.1	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1833299)									
EM1811913-003	BH08_1.0-1.1	EP071: C15 - C28 Fraction	----	100	mg/kg	1370	1080	23.3	0% - 50%
		EP071: C29 - C36 Fraction	----	100	mg/kg	710	700	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	2080	1780	15.5	0% - 20%
EM1811913-034	BH10_5.0-5.1	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1833294)									
EM1811913-003	BH08_1.0-1.1	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EM1811913-034	BH10_5.0-5.1	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1833299)									
EM1811913-003	BH08_1.0-1.1	EP071: >C16 - C34 Fraction	----	100	mg/kg	1840	1580	15.6	0% - 50%
		EP071: >C34 - C40 Fraction	----	100	mg/kg	300	300	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	2140	1880	12.9	0% - 20%
EM1811913-034	BH10_5.0-5.1	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EP080: BTEXN (QC Lot: 1833294)									
EM1811913-003	BH08_1.0-1.1	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EM1811913-034	BH10_5.0-5.1	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Page : 5 of 12
Work Order : EM1811913
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080: BTEXN (QC Lot: 1833294) - continued									
EM1811913-034	BH10_5.0-5.1	EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 1834578)									
EM1811913-052	Field Blank 2	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1833467)									
EM1811889-003	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EM1811900-009	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1833981)									
EM1811913-052	Field Blank 2	EP080: C6 - C9 Fraction	---	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1834186)									
EM1811950-005	Anonymous	EP071: C15 - C28 Fraction	---	100	µg/L	360	540	41.0	No Limit
		EP071: C10 - C14 Fraction	---	50	µg/L	970	1180	19.4	0% - 20%
		EP071: C29 - C36 Fraction	---	50	µg/L	<50	60	24.9	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1833981)									
EM1811913-052	Field Blank 2	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1834186)									
EM1811950-005	Anonymous	EP071: >C10 - C16 Fraction	---	100	µg/L	720	890	21.4	No Limit
		EP071: >C16 - C34 Fraction	---	100	µg/L	310	500	46.7	No Limit
		EP071: >C34 - C40 Fraction	---	100	µg/L	<100	<100	0.00	No Limit
EP080: BTEXN (QC Lot: 1833981)									
EM1811913-052	Field Blank 2	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit

Page : 6 of 12
Work Order : EM1811913
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080: BTEXN (QC Lot: 1833981) - continued									
EM1811913-052	Field Blank 2	EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Page	: 7 of 12
Work Order	: EM1811913
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 1833822)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	98.7	79	113
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	101	79	110
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	101	85	120
EG005T: Boron	7440-42-8	50	mg/kg	<50	33.2 mg/kg	116	82	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	91.8	85	109
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	92.6	83	109
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	91.6	78	112
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	93.8	78	108
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	90.3	78	106
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	94.5	82	107
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	96.9	82	111
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	98.2	93	109
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	94.7	80	109
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	96.6	82	111
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1833823)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	104	77	104
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1833298)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	99.7	75	131
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	103	70	132
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	99.6	80	128
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	100	70	128
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	106	80	128
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	1.6 mg/kg	106	72	126
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	104	70	128
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	108	80	125
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	96.7	70	130
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	99.7	80	126
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	93.2	71	124
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	96.5	75	125
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	88.6	70	125
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	87.6	71	128
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	89.3	72	126
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	87.2	68	127

Page : 8 of 12
Work Order : EM1811913
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Laboratory Control Spike (LCS) Report: Spike Recovery (%): LCS	Laboratory Control Spike (LCS) Report: Recovery Limits (%): Low	Laboratory Control Spike (LCS) Report: Recovery Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1833294)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	36 mg/kg	89.8	70	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1833299)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	806 mg/kg	86.9	80	120
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3006 mg/kg	100	84	115
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	1584 mg/kg	93.3	80	112
EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1833294)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	87.9	68	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1833299)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	1160 mg/kg	90.5	83	117
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	3978 mg/kg	97.5	82	114
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	313 mg/kg	77.6	73	115
EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080: BTEXN (QCLot: 1833294)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	81.7	74	124
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	89.5	77	125
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	88.9	73	125
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	87.7	77	128
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	92.8	81	128
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	77.5	66	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Laboratory Control Spike (LCS) Report: Spike Recovery (%): LCS	Laboratory Control Spike (LCS) Report: Recovery Limits (%): Low	Laboratory Control Spike (LCS) Report: Recovery Limits (%): High
EG020T: Total Metals by ICP-MS (QCLot: 1834578)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	104	90	110
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	100	88	113
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	103	88	112
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	101	86	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	101	87	109
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	101	88	113
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	99.3	87	108
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	101	88	109
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	103	88	111
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	101	87	111
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	105	85	113
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	101	88	112
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	102	87	113

Page : 9 of 12
Work Order : EM1811913
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Laboratory Control Spike (LCS) Report: Spike Recovery (%): LCS	Laboratory Control Spike (LCS) Report: Recovery Limits (%): Low	Laboratory Control Spike (LCS) Report: Recovery Limits (%): High
EG020T: Total Metals by ICP-MS (QCLot: 1834578) - continued								
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	105	88	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1833467)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	103	81	114
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1834185)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	88.7	48	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	87.7	49	124
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	93.0	53	117
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	94.1	54	118
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	94.3	57	119
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	110	51	113
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	96.8	59	123
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	93.8	58	123
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	95.9	52	126
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	95.7	55	123
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	94.7	52	131
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	94.4	57	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	95.5	56	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	92.1	53	123
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	92.4	53	125
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	95.5	53	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1833981)								
EP080: C6 - C9 Fraction	---	20	µg/L	<20	360 µg/L	123	68	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1834186)								
EP071: C10 - C14 Fraction	---	50	µg/L	<50	4331 µg/L	113	58	134
EP071: C15 - C28 Fraction	---	100	µg/L	<100	16952 µg/L	116	60	133
EP071: C29 - C36 Fraction	---	50	µg/L	<50	8695 µg/L	110	54	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1833981)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	122	66	123
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1834186)								
EP071: >C10 - C16 Fraction	---	100	µg/L	<100	6292 µg/L	112	58	122
EP071: >C16 - C34 Fraction	---	100	µg/L	<100	22143 µg/L	112	56	132
EP071: >C34 - C40 Fraction	---	100	µg/L	<100	1677 µg/L	111	58	137
EP080: BTEXN (QCLot: 1833981)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	114	74	123
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	119	77	128
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	123	73	126

Page : 10 of 12
Work Order : EM1811913
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Laboratory Control Spike (LCS) Report: Spike Recovery (%): LCS	Laboratory Control Spike (LCS) Report: Recovery Limits (%): Low	Laboratory Control Spike (LCS) Report: Recovery Limits (%): High
EP080: BTEXN (QCLot: 1833981) - continued								
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	128	72	131
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	129	74	131
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	99.6	74	124

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	Matrix Spike (MS) Report: SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005T: Total Metals by ICP-AES (QCLot: 1833822)							
EM1811913-006	BH08_2.5-2.6	EG005T: Arsenic	7440-38-2	50 mg/kg	90.8	78	124
		EG005T: Barium	7440-39-3	50 mg/kg	101	71	135
		EG005T: Beryllium	7440-41-7	50 mg/kg	99.6	85	125
		EG005T: Cadmium	7440-43-9	50 mg/kg	92.4	84	116
		EG005T: Chromium	7440-47-3	50 mg/kg	95.1	79	121
		EG005T: Copper	7440-50-8	50 mg/kg	92.1	82	124
		EG005T: Lead	7439-92-1	50 mg/kg	87.0	76	124
		EG005T: Manganese	7439-96-5	50 mg/kg	80.8	68	136
		EG005T: Nickel	7440-02-0	50 mg/kg	89.3	78	120
		EG005T: Selenium	7782-49-2	50 mg/kg	84.9	71	125
		EG005T: Vanadium	7440-62-2	50 mg/kg	94.1	76	124
		EG005T: Zinc	7440-66-6	50 mg/kg	87.5	74	128
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1833823)							
EM1811913-006	BH08_2.5-2.6	EG035T: Mercury	7439-97-6	5 mg/kg	111	76	116
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1833298)							
EM1811913-010	BH08_4.5-4.6	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	93.6	67	117
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	98.5	52	148
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1833294)							
EM1811913-006	BH08_2.5-2.6	EP080: C6 - C9 Fraction	---	28 mg/kg	90.1	42	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1833299)							
EM1811913-006	BH08_2.5-2.6	EP071: C10 - C14 Fraction	---	806 mg/kg	84.4	53	123
		EP071: C15 - C28 Fraction	---	3006 mg/kg	97.2	70	124
		EP071: C29 - C36 Fraction	---	1584 mg/kg	91.4	64	118
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1833294)							

Page	11 of 12
Work Order	EM1811913
Client	GEO-ENVIRONMENTAL SOLUTIONS
Project	Newtown Rd

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1833294) - continued							
EM1811913-006	BH08_2.5-2.6	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	89.1	39	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1833299)							
EM1811913-006	BH08_2.5-2.6	EP071: >C10 - C16 Fraction	---	1160 mg/kg	87.8	65	123
		EP071: >C16 - C34 Fraction	---	3978 mg/kg	95.0	67	121
		EP071: >C34 - C40 Fraction	---	313 mg/kg	76.3	44	126
EP080: BTEXN (QCLot: 1833294)							
EM1811913-006	BH08_2.5-2.6	EP080: Benzene	71-43-2	2 mg/kg	83.5	50	136
		EP080: Toluene	108-88-3	2 mg/kg	98.8	56	139

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 1834578)							
EM1811913-052	Field Blank 2	EG020A-T: Arsenic	7440-38-2	1 mg/L	97.6	82	118
		EG020A-T: Beryllium	7440-41-7	1 mg/L	98.0	79	121
		EG020A-T: Barium	7440-39-3	1 mg/L	97.5	80	114
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	96.6	75	129
		EG020A-T: Chromium	7440-47-3	1 mg/L	99.1	80	118
		EG020A-T: Cobalt	7440-48-4	1 mg/L	98.4	82	120
		EG020A-T: Copper	7440-50-8	1 mg/L	95.1	81	115
		EG020A-T: Lead	7439-92-1	1 mg/L	94.2	83	121
		EG020A-T: Manganese	7439-96-5	1 mg/L	100.0	73	123
		EG020A-T: Nickel	7440-02-0	1 mg/L	97.6	80	118
		EG020A-T: Vanadium	7440-62-2	1 mg/L	99.3	81	119
		EG020A-T: Zinc	7440-66-6	1 mg/L	94.9	74	116
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1833467)							
EM1811889-004	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	92.5	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1833981)							
EM1811913-053	Rinsate 2	EP080: C6 - C9 Fraction	---	280 µg/L	89.0	43	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1834186)							
EM1811950-005	Anonymous	EP071: C10 - C14 Fraction	---	4331 µg/L	111	50	130
		EP071: C15 - C28 Fraction	---	16952 µg/L	110	54	136
		EP071: C29 - C36 Fraction	---	8695 µg/L	105	50	142
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1833981)							
EM1811913-053	Rinsate 2	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	88.7	44	122
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1834186)							
EM1811950-005	Anonymous	EP071: >C10 - C16 Fraction	---	6292 µg/L	108	50	128

Page	: 12 of 12
Work Order	: EM1811913
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1834186) - continued							
EM1811950-005	Anonymous	EP071: >C16 - C34 Fraction	----	22143 µg/L	107	50	150
		EP071: >C34 - C40 Fraction	----	1677 µg/L	110	51	159
EP080: BTEXN (QCLot: 1833981)							
EM1811913-053	Rinsate 2	EP080: Benzene	71-43-2	20 µg/L	97.7	68	130
		EP080: Toluene	108-88-3	20 µg/L	101	72	132

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM1811913	Page	: 1 of 9
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Telephone	: +61-3-8549 9630
Project	: Newtown Rd	Date Samples Received	: 26-Jul-2018
Site	: ----	Issue Date	: 31-Jul-2018
Sampler	: SARAH JOYCE	No. of samples received	: 53
Order number	:	No. of samples analysed	: 19

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **Duplicate outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

RIGHT SOLUTIONS | RIGHT PARTNER

Page : 2 of 9
Work Order : EM1811913
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1811913--003	BH08_1.0-1.1	**Acenaphthylene**	208-96-8	62.3 %	0% - 50%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1811913--003	BH08_1.0-1.1	**Phenanthrene**	85-01-8	42.8 %	0% - 20%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1811913--003	BH08_1.0-1.1	**Chrysene**	218-01-9	24.4 %	0% - 20%	**RPD exceeds LOR based limits**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	7	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	1	14	7.14	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	7	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
BH08_1.0-1.1,	BH08_2.5-2.6,	**24-Jul-2018**	----	----	----	**27-Jul-2018**	07-Aug-2018	✓
BH08_4.5-4.6,	BH09_1.0-1.1,							
BH09_2.5-2.6,	BH09_4.5-4.6,							
BH09_6.0-6.1,	Duplicate 4,							
BH10_1.0-1.1,	BH10_3.0-3.1,							
BH10_5.0-5.1,	BH11_1.0-1.1,							
BH11_2.5-2.6,	BH11_3.3-3.4,							
BH12_1.0-1.1,	BH12_2.5-2.6,							
BH12_3.5-3.6								

Page	: 3 of 9
Work Order	: EM1811913
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Matrix: **SOIL**

Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
BH08_1.0-1.1, BH08_2.5-2.6, BH08_4.5-4.6, BH09_1.0-1.1, BH09_2.5-2.6, BH09_4.5-4.6, BH09_6.0-6.1, Duplicate 4, BH10_1.0-1.1, BH10_3.0-3.1, BH10_5.0-5.1, BH11_1.0-1.1, BH11_2.5-2.6, BH11_3.3-3.4, BH12_1.0-1.1, BH12_2.5-2.6, BH12_3.5-3.6	24-Jul-2018	27-Jul-2018	20-Jan-2019	✓	27-Jul-2018	20-Jan-2019	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
BH08_1.0-1.1, BH08_2.5-2.6, BH08_4.5-4.6, BH09_1.0-1.1, BH09_2.5-2.6, BH09_4.5-4.6, BH09_6.0-6.1, Duplicate 4, BH10_1.0-1.1, BH10_3.0-3.1, BH10_5.0-5.1, BH11_1.0-1.1, BH11_2.5-2.6, BH11_3.3-3.4, BH12_1.0-1.1, BH12_2.5-2.6, BH12_3.5-3.6	24-Jul-2018	27-Jul-2018	21-Aug-2018	✓	30-Jul-2018	21-Aug-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM))							
BH08_1.0-1.1, BH08_2.5-2.6, BH08_4.5-4.6, BH09_1.0-1.1, BH09_2.5-2.6, BH09_4.5-4.6, BH09_6.0-6.1, Duplicate 4, BH10_1.0-1.1, BH10_3.0-3.1, BH10_5.0-5.1, BH11_1.0-1.1, BH11_2.5-2.6, BH11_3.3-3.4, BH12_1.0-1.1, BH12_2.5-2.6, BH12_3.5-3.6	24-Jul-2018	27-Jul-2018	07-Aug-2018	✓	27-Jul-2018	05-Sep-2018	✓

Page	: 4 of 9
Work Order	: EM1811913
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Matrix: **SOIL** — Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP071)								
BH08_1.0-1.1,	BH08_2.5-2.6,	24-Jul-2018	27-Jul-2018	07-Aug-2018	✓	27-Jul-2018	05-Sep-2018	✓
BH08_4.5-4.6,	BH09_1.0-1.1,							
BH09_2.5-2.6,	BH09_4.5-4.6,							
BH09_6.0-6.1,	Duplicate 4,							
BH10_1.0-1.1,	BH10_3.0-3.1,							
BH10_5.0-5.1,	BH11_1.0-1.1,							
BH11_2.5-2.6,	BH11_3.3-3.4,							
BH12_1.0-1.1,	BH12_2.5-2.6,							
BH12_3.5-3.6								
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP071)								
BH08_1.0-1.1,	BH08_2.5-2.6,	24-Jul-2018	27-Jul-2018	07-Aug-2018	✓	27-Jul-2018	05-Sep-2018	✓
BH08_4.5-4.6,	BH09_1.0-1.1,							
BH09_2.5-2.6,	BH09_4.5-4.6,							
BH09_6.0-6.1,	Duplicate 4,							
BH10_1.0-1.1,	BH10_3.0-3.1,							
BH10_5.0-5.1,	BH11_1.0-1.1,							
BH11_2.5-2.6,	BH11_3.3-3.4,							
BH12_1.0-1.1,	BH12_2.5-2.6,							
BH12_3.5-3.6								
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080)								
BH08_1.0-1.1,	BH08_2.5-2.6,	24-Jul-2018	27-Jul-2018	07-Aug-2018	✓	27-Jul-2018	07-Aug-2018	✓
BH08_4.5-4.6,	BH09_1.0-1.1,							
BH09_2.5-2.6,	BH09_4.5-4.6,							
BH09_6.0-6.1,	Duplicate 4,							
BH10_1.0-1.1,	BH10_3.0-3.1,							
BH10_5.0-5.1,	BH11_1.0-1.1,							
BH11_2.5-2.6,	BH11_3.3-3.4,							
BH12_1.0-1.1,	BH12_2.5-2.6,							
BH12_3.5-3.6								

Matrix: **WATER** — Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T)								
Field Blank 2,	Rinsate 2	24-Jul-2018	27-Jul-2018	20-Jan-2019	✓	30-Jul-2018	20-Jan-2019	✓
EG035T: Total Recoverable Mercury by FIMS								
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG035T)								
Field Blank 2,	Rinsate 2	24-Jul-2018	---	---	---	27-Jul-2018	21-Aug-2018	✓

Page	: 5 of 9
Work Order	: EM1811913
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Matrix: **WATER**

Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP075(SIM))								
Field Blank 2.	Rinsate 2	24-Jul-2018	27-Jul-2018	31-Jul-2018	✓	30-Jul-2018	05-Sep-2018	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071)								
Field Blank 2.	Rinsate 2	24-Jul-2018	27-Jul-2018	31-Jul-2018	✓	30-Jul-2018	05-Sep-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)								
Field Blank 2.	Rinsate 2	24-Jul-2018	27-Jul-2018	07-Aug-2018	✓	27-Jul-2018	07-Aug-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber Glass Bottle - Unpreserved (EP071)								
Field Blank 2.	Rinsate 2	24-Jul-2018	27-Jul-2018	31-Jul-2018	✓	30-Jul-2018	05-Sep-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)								
Field Blank 2.	Rinsate 2	24-Jul-2018	27-Jul-2018	07-Aug-2018	✓	27-Jul-2018	07-Aug-2018	✓
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)								
Field Blank 2.	Rinsate 2	24-Jul-2018	27-Jul-2018	07-Aug-2018	✓	27-Jul-2018	07-Aug-2018	✓

Page : 6 of 9
Work Order : EM1811913
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*	
Laboratory Duplicates (DUP)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	7	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	7.14	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	4	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Page : 7 of 9
Work Order : EM1811913
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Matrix: **WATER**

Evaluation: x = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Total Mercury by FIMS	EG035T	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	7	0.00	5.00	x	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Page	: 8 of 9
Work Order	: EM1811913
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house. A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A. Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A. The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)

Page	9 of 9
Work Order	EM1811913
Client	GEO-ENVIRONMENTAL SOLUTIONS
Project	Newtown Rd

Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B. Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion. 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B. 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: ES1822455	Page	: 1 of U
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division c y2ney
Contadt	: c ARAH JOYCE	Contadt	: c hirley LeCornu
A22ress	: 97 KIRKc WAY PLACE BATTERY POINT TAc S ANIAMA, c TRALIA U004	A22ress	: 9UU9+7 Woo2- arz Roa2 c mithfiel2 Nc W Australia 9164
Tele- hone	: k61 0p 699p 1+p7	Tele- hone	: k615p5+347 76p0
Projed	: Newtown R2	Date c sam- les Redeive2	: p15Jul5901+
Or2er number	:	Date Analysis Commende2	: 015Aug5901+
C5D5C number	: 5555	Issue Date	: 065Aug5901+
c am- ler	: c ARAH JOYCE		
c ite	: 5555		
Quote number	: EN/999/1U		
No. of sam- les redeive2	: 1		
No. of sam- les analyse2	: 1		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This re- ort su- erse2es any - revious re- ort(s) with this referende. Results a- - ly to the sam- le(s) as submitte2. This 2odument shall not be re- ro2ude2Mexde- t in full.

This Quality Control Re- ort dontains the following information:

- Laboratory Du- lidate (D, P) Re- ort; Relative Perdentage Differende (RPD) an2 Adde- tande Limits
- S etho2 Blanz (S B) an2 Laboratory Control c- ize (LCc) Re- ort; Redovery an2 Adde- tande Limits
- S atrix c- ize (S c) Re- ort; Redovery an2 Adde- tande Limits

Signatories

This 2odument has been eledtronidally signe2 by the authoriGe2 signatories below. Eledtronid signing is darrie2 out in dom- liande with - rode2ures s- edifie2 in 91 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
E2wan2y Fa2jar	Organid Coor2inator	c y2ney InorganidsMc mithfiel2MNc W
E2wan2y Fa2jar	Organid Coor2inator	c y2ney OrganidsMc mithfiel2MNc W
Ivan Taylor	Analyst	c y2ney InorganidsMc mithfiel2MNc W

RIGHT SOLUTIONS | RIGHT PARTNER

Page	: 2 of 7
Work Order	: ES1822455
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1843964)									
ES1822340-001	Anonymous	EA055: Moisture Content	----	0.1	%	12.6	12.5	1.12	0% - 50%
ES1822467-002	Anonymous	EA055: Moisture Content	----	0.1	%	50.4	50.1	0.692	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 1847615)									
ES1822455-001	Triplicate 4	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	50	40	31.9	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	6	5	0.00	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	12	8	43.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	9	6	33.8	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	60	38	44.1	0% - 50%
		EG005T: Lead	7439-92-1	5	mg/kg	16	11	36.9	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	91	100	9.41	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	77	60	24.8	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	39	27	36.6	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EW1803034-001	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	70	70	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	19	16	14.6	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	5	4	30.2	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	6	5	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	30	22	28.8	No Limit

Page : 3 of 7
Work Order : ES1822455
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005T: Total Metals by ICP-AES (QC Lot: 1847615) - continued									
EW1803034-001	Anonymous	EG005T: Lead	7439-92-1	5	mg/kg	63	39	47.0	0% - 50%
		EG005T: Manganese	7439-96-5	5	mg/kg	93	77	19.1	0% - 50%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	50	47	6.49	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	90	60	40.6	0% - 50%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1847614)									
ES1822274-010	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1822455-001	Triplicate 4	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.1	<0.1	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1842647)									
ES1822434-001	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	---	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	---	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1842646)									
ES1822329-021	Anonymous	EP071: C15 - C28 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
ES1822434-001	Anonymous	EP071: C15 - C28 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1843422)									
ES1822300-003	Anonymous	EP080: C6 - C9 Fraction	---	10	mg/kg	<10	<10	0.00	No Limit

Page : 4 of 7
Work Order : ES1822455
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1842646)									
ES1822329-021	Anonymous	EP071: >C16 - C34 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
ES1822434-001	Anonymous	EP071: >C16 - C34 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1843422)									
ES1822300-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080: BTEXN (QC Lot: 1843422)									
ES1822300-003	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Page : 5 of U
Wor[Z] Order : E[P]1733455
Client : [q]EO-ENSIRONSENTAL [P]OL' TION[P]
Project : Newtown Rd

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The <uality control term Sethod / Laboratory Blan[Z] refers to sn analyte free matrix to which all reagents are added in the same volumes or ~ro~ortions ss used in standard sam~le ~re~arstion. The ~ur~ose of this QC ~arameter is to monitor ~otential laboratory contamination. The <uality control term Laboratory Control ~~iZe (LC~) refers to a certified reference material, or a Znown interference free matrix s~iZed with target analytes. The ~ur~ose of this QC ~arameter is to monitor method ~recision and accuracy inde~endent of sam~le matrix. Dynamic Recovery Limits are based on statistical evaluation of ~rocessed LC~.

~ub-Satrix: SOIL

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 1847615)								
EQ005T: Arsenic	U440-P7-3	5	mg/Zg	=5	31.Umg/Zg	11P	76	136
EQ005T: Barium	U440-P9-P	10	mg/Zg	=10	14P mg/Zg	11P	75	115
EQ005T: Beryllium	U440-41-U	1	mg/Zg	=1	5.6P mg/Zg	113	90	11P
EQ005T: Boron	U440-43-7	50	mg/Zg	=50	----	----	----	----
EQ005T: Cadmium	U440-4P-9	1	mg/Zg	=1	4.64 mg/Zg	104	7P	11P
EQ005T: Chromium	U440-4U-P	3	mg/Zg	=3	4P.9 mg/Zg	134	U8	137
EQ005T: Cobalt	U440-47-4	3	mg/Zg	=3	16 mg/Zg	113	77	130
EQ005T: Co~~er	U440-50-7	5	mg/Zg	=5	P3 mg/Zg	114	76	130
EQ005T: Lead	U4P9-93-1	5	mg/Zg	=5	40 mg/Zg	106	70	114
EQ005T: Sanganese	U4P9-96-5	5	mg/Zg	=5	1P0 mg/Zg	107	75	11U
EQ005T: NioZel	U440-03-0	3	mg/Zg	=3	55 mg/Zg	115	7U	13P
EQ005T: ~elenium	UU73-49-3	5	mg/Zg	=5	5.PUmg/Zg	13U	U5	1P1
EQ005T: Sanadium	U440-63-3	5	mg/Zg	=5	39.6 mg/Zg	115	93	133
EQ005T: ~inc	U440-66-6	5	mg/Zg	=5	60.7 mg/Zg	113	70	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1847614)								
EQ0P5T: Sercury	U4P9-9U-6	0.1	mg/Zg	=0.1	3.5Umg/Zg	70.9	UD	105
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1842647)								
EP0U5(~IS): Na~hthalene	91-30-P	0.5	mg/Zg	=0.5	6 mg/Zg	9UP	UU	135
EP0U5(~IS): Acena~hthylene	307-96-7	0.5	mg/Zg	=0.5	6 mg/Zg	9U6	U8	134
EP0U5(~IS): Acena~hthene	7P-P3-9	0.5	mg/Zg	=0.5	6 mg/Zg	99.3	UP	13U
EP0U5(~IS): Fluorene	76-UP-U	0.5	mg/Zg	=0.5	6 mg/Zg	96.1	U8	136
EP0U5(~IS): Phenanthrene	75-01-7	0.5	mg/Zg	=0.5	6 mg/Zg	79.5	U5	13U
EP0U5(~IS): Anthracene	130-13-U	0.5	mg/Zg	=0.5	6 mg/Zg	95.4	UU	13U
EP0U5(~IS): Fluoranthene	306-44-0	0.5	mg/Zg	=0.5	6 mg/Zg	9UP	UP	13U
EP0U5(~IS): Pyrene	139-00-0	0.5	mg/Zg	=0.5	6 mg/Zg	96.7	U4	137
EP0U5(~IS): Benr(a)anthracene	56-55-P	0.5	mg/Zg	=0.5	6 mg/Zg	93.7	69	13P
EP0U5(~IS): Chrysene	317-01-9	0.5	mg/Zg	=0.5	6 mg/Zg	97.5	U5	13U
EP0U5(~IS): Benro(bkj)fluoranthene	305-99-3 305-73-P	0.5	mg/Zg	=0.5	6 mg/Zg	95.6	67	116
EP0U5(~IS): Benro(Z)fluorsnthene	30U-07-9	0.5	mg/Zg	=0.5	6 mg/Zg	91.P	U4	136
EP0U5(~IS): Benro(a)~yrene	50-P3-7	0.5	mg/Zg	=0.5	6 mg/Zg	79.9	UD	136
EP0U5(~IS): Indeno(1.3.P.cd)~yrene	19P-P9-5	0.5	mg/Zg	=0.5	6 mg/Zg	9P.U	61	131
EP0U5(~IS): Dibenr(a.h)anthracene	5P-UD-P	0.5	mg/Zg	=0.5	6 mg/Zg	93.4	63	117
EP0U5(~IS): Benro(g.h.i)~erylene	191-34-3	0.5	mg/Zg	=0.5	6 mg/Zg	9U6	6P	131

Page : 6 of 7
Work Order : ES1822455
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1842646)								
EP071: C10 - C14 Fraction	---	50	mg/kg	<50	300 mg/kg	87.5	75	129
EP071: C15 - C28 Fraction	---	100	mg/kg	<100	450 mg/kg	102	77	131
EP071: C29 - C36 Fraction	---	100	mg/kg	<100	300 mg/kg	95.2	71	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1843422)								
EP080: C6 - C9 Fraction	---	10	mg/kg	<10	26 mg/kg	91.6	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1842646)								
EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	375 mg/kg	104	77	125
EP071: >C16 - C34 Fraction	---	100	mg/kg	<100	525 mg/kg	101	74	138
EP071: >C34 - C40 Fraction	---	100	mg/kg	<100	225 mg/kg	78.0	63	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1843422)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	94.5	68	128
EP080: BTEXN (QCLot: 1843422)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	90.5	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	94.8	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	87.5	65	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	93.2	66	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	91.9	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	83.2	63	119

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005T: Total Metals by ICP-AES (QCLot: 1847615)							
EW1803034-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	101	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	104	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	95.3	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	105	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	97.8	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	101	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	107	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1847614)							
ES1822274-010	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	90.7	70	130

Page : U of U
Work Order : E 1733455
Client : EO ENVIRONMENTAL COLLECTION
Project : Newtown Rd

Sub-Matrix: SOIL

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1842647)							
E 17334P4 001	Anonymous	EP0U5(IS): Acenaphthene	7P P3 9	10 mg/g	75.1	UD	1P0
		EP0U5(IS): Pyrene	139 00 0	10 mg/g	95.U	UD	1P0
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1842646)							
E 17334P4 001	Anonymous	EP0U1: C10 - C14 Fraction	----	53P mg/g	90.P	UP	1PU
		EP0U1: C15 - C37 Fraction	----	3P19 mg/g	10P	5P	1P1
		EP0U1: C39 - CP6 Fraction	----	1U14 mg/g	109	53	1P3
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1843422)							
E 1733P00 00P	Anonymous	EP070: C6 - C9 Fraction	----	P3.5 mg/g	105	UD	1P0
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1842646)							
E 17334P4 001	Anonymous	EP0U1: 7C10 - C16 Fraction	----	760 mg/g	90.5	UP	1PU
		EP0U1: 7C16 - CP4 Fraction	----	P33P mg/g	106	5P	1P1
		EP0U1: 7CP4 - C40 Fraction	----	1057 mg/g	106	53	1P3
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1843422)							
E 1733P00 00P	Anonymous	EP070: C6 - C10 Fraction	C6&C10	PU5 mg/g	103	UD	1P0
EP080: BTEXN (QCLot: 1843422)							
E 1733P00 00P	Anonymous	EP070: Benzene	U1 4P 3	3.5 mg/g	73.U	UD	1P0
		EP070: Toluene	107 77 P	3.5 mg/g	90.5	UD	1P0
		EP070: Ethylbenzene	100 41 4	3.5 mg/g	91.U	UD	1P0
		EP070: meta - X - ara -Xylene	107 P7 P 106 43 P	3.5 mg/g	9P.3	UD	1P0
		EP070: ortho -Xylene	95 4U 6	3.5 mg/g	9P.6	UD	1P0
		EP070: Naphthalene	91 30 P	3.5 mg/g	UD.7	UD	1P0

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1822455	Page	: 1 of 4
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Sydney
Contact	: SARAH JOYCE	Telephone	: +61-3-8549 9630
Project	: Newtown Rd	Date Samples Received	: 31-Jul-2018
Site	: ----	Issue Date	: 06-Aug-2018
Sampler	: SARAH JOYCE	No. of samples received	: 1
Order number	:	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

RIGHT SOLUTIONS | RIGHT PARTNER

Page	: 2 of 4
Work Order	: ES1822455
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055) Triplicate 4	24-Jul-2018	---	---	---	01-Aug-2018	07-Aug-2018	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T) Triplicate 4	24-Jul-2018	02-Aug-2018	20-Jan-2019	✓	02-Aug-2018	20-Jan-2019	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T) Triplicate 4	24-Jul-2018	02-Aug-2018	21-Aug-2018	✓	03-Aug-2018	21-Aug-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) Triplicate 4	24-Jul-2018	01-Aug-2018	07-Aug-2018	✓	02-Aug-2018	10-Sep-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080) Triplicate 4	24-Jul-2018	01-Aug-2018	07-Aug-2018	✓	02-Aug-2018	07-Aug-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080) Triplicate 4	24-Jul-2018	01-Aug-2018	07-Aug-2018	✓	02-Aug-2018	07-Aug-2018	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080) Triplicate 4	24-Jul-2018	01-Aug-2018	07-Aug-2018	✓	02-Aug-2018	07-Aug-2018	✓

Page	: 3 of 4
Work Order	: ES1822455
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: x = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	9	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Page	4 of 4
Work Order	ES1822455
Client	GEO-ENVIRONMENTAL SOLUTIONS
Project	Newtown Rd

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house. A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A. Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: EM1812174	Page	: 1 of 8
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Project	: Newtown Rd	Date Samples Received	: 26-Jul-2018
Order number	:	Date Analysis Commenced	: 01-Aug-2018
C-O-C number	: ----	Issue Date	: 06-Aug-2018
Sampler	: ----		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 3		
No. of samples analysed	: 3		

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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

Page	: 2 of 8
Work Order	: EM1812174
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1843763)									
EM1812173-005	Anonymous	EA055: Moisture Content	----	0.1	%	22.1	22.8	3.43	0% - 20%
EM1812175-001	Anonymous	EA055: Moisture Content	----	0.1	%	11.8	11.9	1.18	0% - 50%
EG005T: Total Metals by ICP-AES (QC Lot: 1843751)									
EM1812173-006	Anonymous	EG005T: Lead	7439-92-1	5	mg/kg	218	# 105	69.9	0% - 20%
		EG005T: Zinc	7440-66-6	5	mg/kg	573	# 216	90.6	0% - 20%
EM1812173-006	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	80	50	50.5	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	5	5	0.00	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	10	9	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	9	10	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	52	38	30.8	0% - 50%
		EG005T: Manganese	7439-96-5	5	mg/kg	263	316	18.4	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	59	36	48.7	0% - 50%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EM1812175-001	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	1	1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	100	90	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	22	22	0.00	0% - 50%
		EG005T: Cobalt	7440-48-4	2	mg/kg	16	14	17.6	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	13	13	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	11	10	11.9	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	9	9	0.00	No Limit

Page : 3 of 8
Work Order : EM1812174
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005T: Total Metals by ICP-AES (QC Lot: 1843751) - continued									
EM1812175-001	Anonymous	EG005T: Lead	7439-92-1	5	mg/kg	30	30	0.00	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	552	496	10.8	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	28	26	8.18	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	33	32	3.18	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1843750)									
EM1812173-006	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EM1812175-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1843424)									
EM1812173-001	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EM1812173-011	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	0.6	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	1.3	1.2	10.8	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	4.9	3.4	35.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	1.4	1.0	32.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	9.4	7.2	26.4	0% - 50%
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	9.7	7.7	22.8	0% - 50%
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	4.7	3.7	23.4	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	4.1	2.9	32.5	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	6.1	5.0	20.0	0% - 50%
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	1.9	1.6	16.5	No Limit

Page : 4 of 8
Work Order : EM1812174
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1843424) - continued									
EM1812173-011	Anonymous	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	4.9	4.1	18.8	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	2.5	2.1	16.1	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	0.6	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	3.2	2.7	16.1	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1843360)									
EM1812173-001	Anonymous	EP080: C6 - C9 Fraction	---	10	mg/kg	<10	<10	0.00	No Limit
EM1812173-011	Anonymous	EP080: C6 - C9 Fraction	---	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1843425)									
EM1812173-001	Anonymous	EP071: C15 - C28 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	---	50	mg/kg	<50	<50	0.00	No Limit
EM1812173-011	Anonymous	EP071: C15 - C28 Fraction	---	100	mg/kg	280	230	18.7	No Limit
		EP071: C29 - C36 Fraction	---	100	mg/kg	210	200	8.88	No Limit
		EP071: C10 - C14 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	---	50	mg/kg	490	430	13.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1843360)									
EM1812173-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EM1812173-011	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1843425)									
EM1812173-001	Anonymous	EP071: >C16 - C34 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	---	50	mg/kg	<50	<50	0.00	No Limit
EM1812173-011	Anonymous	EP071: >C16 - C34 Fraction	---	100	mg/kg	440	380	15.0	No Limit
		EP071: >C34 - C40 Fraction	---	100	mg/kg	100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	---	50	mg/kg	540	380	34.8	0% - 50%
EP080: BTEXN (QC Lot: 1843360)									
EM1812173-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EM1812173-011	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Page : 5 of 8
Work Order : EM1812174
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080: BTEXN (QC Lot: 1843360) - continued									
EM1812173-011	Anonymous	EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Page : 6 of 8
Work Order : EM1812174
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 1843751)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	87.5	79	113
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	94.7	79	110
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	97.3	85	120
EG005T: Boron	7440-42-8	50	mg/kg	<50	33.2 mg/kg	99.7	82	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	100.0	85	109
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	86.7	83	109
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	84.3	78	112
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	85.5	78	108
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	84.1	78	106
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	87.8	82	107
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	90.2	82	111
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	99.0	93	109
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	86.1	80	109
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	93.4	82	111
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1843750)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	94.2	77	104
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1843424)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	95.6	75	131
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	92.2	70	132
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	93.9	80	128
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	92.7	70	128
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	97.5	80	128
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	1.6 mg/kg	96.5	72	126
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	92.1	70	128
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	96.9	80	125
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	87.6	70	130
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	91.9	80	126
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	86.2	71	124
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	91.9	75	125
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	81.5	70	125
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	85.8	71	128
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	84.6	72	126
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	88.0	68	127

Page : 7 of 8
Work Order : EM1812174
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1843360)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	36 mg/kg	99.2	70	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1843425)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	806 mg/kg	97.2	80	120
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3006 mg/kg	104	84	115
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	1584 mg/kg	97.6	80	112
EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1843360)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	96.3	68	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1843425)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	1160 mg/kg	99.3	83	117
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	3978 mg/kg	102	82	114
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	313 mg/kg	84.0	73	115
EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080: BTEXN (QCLot: 1843360)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	101	74	124
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	103	77	125
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	108	73	125
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	108	77	128
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	106	81	128
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	96.3	66	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005T: Total Metals by ICP-AES (QCLot: 1843751)							
EM1812173-007	Anonymous	EG005T: Barium	7440-39-3	50 mg/kg	112	71	135
		EG005T: Lead	7439-92-1	50 mg/kg	109	76	124
		EG005T: Manganese	7439-96-5	50 mg/kg	# Not Determined	68	136
		EG005T: Vanadium	7440-62-2	50 mg/kg	98.1	76	124
		EG005T: Zinc	7440-66-6	50 mg/kg	# 12.1	74	128
EM1812173-007	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	88.8	78	124
		EG005T: Beryllium	7440-41-7	50 mg/kg	94.6	85	125

Page : 8 of 8
Work Order : EM1812174
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 1843751) - continued							
EM1812173-007	Anonymous	EG005T: Cadmium	7440-43-9	50 mg/kg	84.6	84	116
		EG005T: Chromium	7440-47-3	50 mg/kg	85.5	79	121
		EG005T: Copper	7440-50-8	50 mg/kg	103	82	124
		EG005T: Nickel	7440-02-0	50 mg/kg	81.9	78	120
		EG005T: Selenium	7782-49-2	50 mg/kg	81.0	71	125
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1843750)							
EM1812173-007	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	90.2	76	116
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1843424)							
EM1812173-003	Anonymous	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	94.4	67	117
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	105	52	148
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1843360)							
EM1812173-002	Anonymous	EP080: C6 - C9 Fraction	---	28 mg/kg	71.3	42	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1843425)							
EM1812173-002	Anonymous	EP071: C10 - C14 Fraction	---	806 mg/kg	94.8	53	123
		EP071: C15 - C28 Fraction	---	3006 mg/kg	100	70	124
		EP071: C29 - C36 Fraction	---	1584 mg/kg	97.6	64	118
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1843360)							
EM1812173-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	71.6	39	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1843425)							
EM1812173-002	Anonymous	EP071: >C10 - C16 Fraction	---	1160 mg/kg	96.5	65	123
		EP071: >C16 - C34 Fraction	---	3978 mg/kg	99.3	67	121
		EP071: >C34 - C40 Fraction	---	313 mg/kg	93.8	44	126
EP080: BTEXN (QCLot: 1843360)							
EM1812173-002	Anonymous	EP080: Benzene	71-43-2	2 mg/kg	79.1	50	136
		EP080: Toluene	108-88-3	2 mg/kg	86.2	56	139

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM1812174	Page	: 1 of 5
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Telephone	: +61-3-8549 9630
Project	: Newtown Rd	Date Samples Received	: 26-Jul-2018
Site	: ----	Issue Date	: 06-Aug-2018
Sampler	: ----	No. of samples received	: 3
Order number	:	No. of samples analysed	: 3

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Duplicate outliers exist - please see following pages for full details.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Page : 2 of 5
Work Order : EM1812174
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EG005T: Total Metals by ICP-AES	EM1812173--006	Anonymous	**Lead**	7439-92-1	69.9 %	0% - 20%	**RPD exceeds LOR based limits**
EG005T: Total Metals by ICP-AES	EM1812173--006	Anonymous	**Zinc**	7440-66-6	90.6 %	0% - 20%	**RPD exceeds LOR based limits**
Matrix Spike (MS) Recoveries							
EG005T: Total Metals by ICP-AES	EM1812173--007	Anonymous	**Manganese**	7439-96-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG005T: Total Metals by ICP-AES	EM1812173--007	Anonymous	**Zinc**	7440-66-6	12.1 %	74-128%	**Recovery less than lower data quality objective**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days, others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
BH08_2.0-2.1, BH12_2.0-2.1	BH11_2.0-2.1,	24-Jul-2018	----	----	----	01-Aug-2018	07-Aug-2018	✓
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
BH08_2.0-2.1, BH12_2.0-2.1	BH11_2.0-2.1,	24-Jul-2018	02-Aug-2018	20-Jan-2019	✓	02-Aug-2018	20-Jan-2019	✓
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
BH08_2.0-2.1, BH12_2.0-2.1	BH11_2.0-2.1,	24-Jul-2018	02-Aug-2018	21-Aug-2018	✓	02-Aug-2018	21-Aug-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
BH08_2.0-2.1, BH12_2.0-2.1	BH11_2.0-2.1,	24-Jul-2018	01-Aug-2018	07-Aug-2018	✓	01-Aug-2018	10-Sep-2018	✓

Page	: 3 of 5
Work Order	: EM1812174
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Matrix: **SOIL**

Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP071) BH08_2.0-2.1, BH11_2.0-2.1, BH12_2.0-2.1	24-Jul-2018	01-Aug-2018	07-Aug-2018	✓	01-Aug-2018	10-Sep-2018	✓
Soil Glass Jar - Unpreserved (EP080) BH08_2.0-2.1, BH11_2.0-2.1, BH12_2.0-2.1	24-Jul-2018	01-Aug-2018	07-Aug-2018	✓	03-Aug-2018	07-Aug-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP071) BH08_2.0-2.1, BH11_2.0-2.1, BH12_2.0-2.1	24-Jul-2018	01-Aug-2018	07-Aug-2018	✓	01-Aug-2018	10-Sep-2018	✓
Soil Glass Jar - Unpreserved (EP080) BH08_2.0-2.1, BH11_2.0-2.1, BH12_2.0-2.1	24-Jul-2018	01-Aug-2018	07-Aug-2018	✓	03-Aug-2018	07-Aug-2018	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080) BH08_2.0-2.1, BH11_2.0-2.1, BH12_2.0-2.1	24-Jul-2018	01-Aug-2018	07-Aug-2018	✓	03-Aug-2018	07-Aug-2018	✓

Page	: 4 of 5
Work Order	: EM1812174
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	3	19	15.79	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	19	10.53	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Page	5 of 5
Work Order	EM1812174
Client	GEO-ENVIRONMENTAL SOLUTIONS
Project	Newtown Rd

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house. A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A. Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: EM1811891	Page	: 1 of 14
Client	: - EOVENSIRONMENTAL 0OLUTION0	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Project	: Newtown Rd	Date Samples Received	: 26-Jul-2018
Order number	:	Date Analysis Commenced	: 26-Jul-2018
C-O-C number	: ----	Issue Date	: 31-Jul-2018
Sampler	: SARAH JOYCE		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 27		
No. of samples analysed	: 14		

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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC

RIGHT SOLUTIONS | RIGHT PARTNER

Page	: 2 of 14
Work Order	: EM1811891
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1831020)									
EM1811890-003	Anonymous	EA055: Moisture Content	----	0.1	%	7.8	8.0	2.72	No Limit
EM1811891-013	BH17 1.1-1.2	EA055: Moisture Content	----	0.1	%	9.4	9.4	0.00	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 1830954)									
EM1811855-002	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	2	1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	40	80	54.7	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	19	17	11.6	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	14	17	24.8	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	11	11	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	9	8	0.00	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	37	52	32.3	0% - 50%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	29	23	24.1	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	6	5	0.00	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EM1811855-016	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	100	100	0.00	0% - 50%
		EG005T: Chromium	7440-47-3	2	mg/kg	23	20	12.5	0% - 50%
		EG005T: Cobalt	7440-48-4	2	mg/kg	7	6	16.6	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	12	10	11.1	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	6	6	0.00	No Limit

Page : 3 of 14
Work Order : EM1811891
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005T: Total Metals by ICP-AES (QC Lot: 1830954) - continued									
EM1811855-016	Anonymous	EG005T: Lead	7439-92-1	5	mg/kg	10	10	0.00	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	20	16	26.1	No Limit
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	24	20	18.8	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	7	6	24.2	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 1830956)									
EM1811891-021	BH18 3.5-3.6	EG005T: Manganese	7439-96-5	5	mg/kg	256	288	10.8	0% - 20%
EM1811891-021	BH18 3.5-3.6	EG005T: Beryllium	7440-41-7	1	mg/kg	1	2	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	130	100	34.3	0% - 50%
		EG005T: Chromium	7440-47-3	2	mg/kg	11	11	0.00	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	18	26	36.8	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	19	20	8.34	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	6	5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	11	13	10.6	No Limit
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	24	28	14.7	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	27	28	0.00	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1830953)									
EM1811855-002	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EM1811855-016	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1830955)									
EM1811891-021	BH18 3.5-3.6	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1830977)									
EM1811891-021	BH18 3.5-3.6	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Page : 7 of 17
I ork Order : EM1811821
Client : GEO-EBVIROBMEBTAL SOL. TIOBS
Project : Bewtown Rd

Sub-Matric: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1830977) - continued									
EM1811821-041	WH18 3.5-3.6	EP0U5(SIM): Wenzo(k)fluoranthene	40U-08-2	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP0U5(SIM): Wenzo(a)pyrene	50-34-8	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP0U5(SIM): Ideno(1.4.3.cd)pyrene	123-32-5	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP0U5(SIM): Dibenz(a.h)anthracene	53-UD-3	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP0U5(SIM): Wenzo(g.h.i)perylene	121-47-4	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
EM1811821-007	WH15 0.55-0.65	EP0U5(SIM): Baphthalene	21-40-3	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP0U5(SIM): Acenaphthylene	408-26-8	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP0U5(SIM): Acenaphthene	83-34-2	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP0U5(SIM): Fluorene	86-U8-U	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP0U5(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP0U5(SIM): Anthracene	140-14-U	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP0U5(SIM): Fluoranthene	406-77-0	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP0U5(SIM): Pyrene	142-00-0	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP0U5(SIM): Wenz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP0U5(SIM): Chrysene	418-01-2	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP0U5(SIM): Wenzo(b+j)fluoranthene	405-22-4 405-84-3	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP0U5(SIM): Wenzo(k)fluoranthene	40U-08-2	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP0U5(SIM): Wenzo(a)pyrene	50-34-8	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP0U5(SIM): Ideno(1.4.3.cd)pyrene	123-32-5	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP0U5(SIM): Dibenz(a.h)anthracene	53-UD-3	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP0U5(SIM): Wenzo(g.h.i)perylene	121-47-4	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1830894)									
EM1811821-007	WH15 0.55-0.65	EP080: C6 - C2 Fraction	----	10	mg/kg	<10	<10	0.00	Bo Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1830976)									
EM1811821-041	WH18 3.5-3.6	EP0U1: C15 - C48 Fraction	----	100	mg/kg	<100	<100	0.00	Bo Limit
		EP0U1: C42 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	Bo Limit
		EP0U1: C10 - C17 Fraction	----	50	mg/kg	<50	<50	0.00	Bo Limit
		EP0U1: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	Bo Limit
EM1811821-007	WH15 0.55-0.65	EP0U1: C15 - C48 Fraction	----	100	mg/kg	<100	<100	0.00	Bo Limit
		EP0U1: C42 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	Bo Limit
		EP0U1: C10 - C17 Fraction	----	50	mg/kg	<50	<50	0.00	Bo Limit
		EP0U1: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	Bo Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1830985)									
EM18118U-004	Anonymous	EP080: C6 - C2 Fraction	----	10	mg/kg	<10	<10	0.00	Bo Limit
EM1811821-012	WH18 4.U-4.8	EP080: C6 - C2 Fraction	----	10	mg/kg	<10	<10	0.00	Bo Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1830894)									
EM1811821-007	WH15 0.55-0.65	EP080: C6 - C10 Fraction	C6ZC10	10	mg/kg	<10	<10	0.00	Bo Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1830976)									

Page : 5 of 17
I ork Order : EM1811821
Client : GEO-EBVIROBMEBTAL SOL. TIOBS
Project : Bewtown Rd

Sub-Matric: SOIL						Laboratory Duplicate (DUP) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1830976) - continued									
EM1811821-041	WH18 3.5-3.6	EP0U1: >C16 - C37 Fraction	----	100	mg/kg	<100	<100	0.00	Bo Limit
		EP0U1: >C37 - C70 Fraction	----	100	mg/kg	<100	<100	0.00	Bo Limit
		EP0U1: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	Bo Limit
		EP0U1: >C10 - C70 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	Bo Limit
EM1811821-007	WH15 0.55-0.65	EP0U1: >C16 - C37 Fraction	----	100	mg/kg	<100	<100	0.00	Bo Limit
		EP0U1: >C37 - C70 Fraction	----	100	mg/kg	<100	<100	0.00	Bo Limit
		EP0U1: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	Bo Limit
		EP0U1: >C10 - C70 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	Bo Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1830985)									
EM18118UU-004	Anonymous	EP080: C8 - C10 Fraction	C8ZC10	10	mg/kg	61	<10	177	Bo Limit
EM1811821-012	WH18 4.U-4.8	EP080: C8 - C10 Fraction	C8ZC10	10	mg/kg	<10	<10	0.00	Bo Limit
EP080: BTEXN (QC Lot: 1830894)									
EM1811821-007	WH15 0.55-0.65	EP080: Vénzene	U1-73-4	0.4	mg/kg	<0.4	<0.4	0.00	Bo Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP080: Ethylbenzene	100-71-7	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP080: meta- & para-Xylene	108-38-3 106-74-3	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP080: ortho-Xylene	25-7U-6	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP080: Baphthalene	21-40-3	1	mg/kg	<1	<1	0.00	Bo Limit
EP080: BTEXN (QC Lot: 1830985)									
EM18118UU-004	Anonymous	EP080: Vénzene	U1-73-4	0.4	mg/kg	<0.4	<0.4	0.00	Bo Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP080: Ethylbenzene	100-71-7	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP080: meta- & para-Xylene	108-38-3 106-74-3	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP080: ortho-Xylene	25-7U-6	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP080: Baphthalene	21-40-3	1	mg/kg	<1	<1	0.00	Bo Limit
EM1811821-012	WH18 4.U-4.8	EP080: Vénzene	U1-73-4	0.4	mg/kg	<0.4	<0.4	0.00	Bo Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP080: Ethylbenzene	100-71-7	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP080: meta- & para-Xylene	108-38-3 106-74-3	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP080: ortho-Xylene	25-7U-6	0.5	mg/kg	<0.5	<0.5	0.00	Bo Limit
		EP080: Baphthalene	21-40-3	1	mg/kg	<1	<1	0.00	Bo Limit

Sub-Matric: WATER						Laboratory Duplicate (DUP) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1832824)									
EM181185U-001	Anonymous	EG040A-F: Cadmium	U770-73-2	0.0001	mg/L	<0.0001	0.0001	0.00	Bo Limit
		EG040A-F: Arsenic	U770-38-4	0.001	mg/L	<0.001	<0.001	0.00	Bo Limit

Page : 6 of 14
Work Order : EM1811891
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report: LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
E- 5y56: @t t oæed Meu2t l b ICPWM0 ÐC Lou 18Gy8yH3 V4o[u[ned									
EM1811857-001	Anonymous	EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.014	0.013	0.00	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.018	0.017	0.00	0% - 50%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.087	0.084	3.70	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.035	0.034	5.06	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.28	0.28	0.00	No Limit
EM1811889-007	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.008	0.008	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.013	0.013	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
E- 5G 6: @t t oæed Mer4nrb l b 6IM0 ÐC Lou 18Gy8yi 3									
EM1811889-007	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP585r6v1: Tou2aPeroæn7 Bbdro42rl o(t ÐC Lou 18GyXv83									
EM1811898-001	Anonymous	EP080: C6 - C9 Fraction	—	20	µg/L	<20	<20	0.00	No Limit
EM1811898-005	Anonymous	EP080: C6 - C9 Fraction	—	20	µg/L	2020	1940	4.26	0% - 20%
EP585r6v1: Tou2aRe4ocer2l æ Bbdro42rl o(t VNEPM y51G6r24uo(t ÐC Lou 18GyXv83									
EM1811898-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EM1811898-005	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	1920	1840	4.12	0% - 20%
EP585: FTE/ N ÐC Lou 18GyXv83									
EM1811898-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit

Page : Uof 17
I ork Order : EM1811821
Client : GEO-EBVIROBMEBTAL SOL. TIOBS
Project : Bewtown Rd

Sub-Matric: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080: BTEXN (QC Lot: 1832678) - continued									
EM1811828-001	Anonymous	EP080: ortho-Xylene	25-7U-6	4	µg/L	<4	<4	0.00	Bo Limit
		EP080: Baphthalene	21-40-3	5	µg/L	<5	<5	0.00	Bo Limit
EM1811828-005	Anonymous	EP080: Vènzene	Ul-73-4	1	µg/L	88	83	5.60	0% - 40%
		EP080: Toluene	108-88-3	4	µg/L	3	4	0.00	Bo Limit
		EP080: Ethylbenzene	100-71-7	4	µg/L	6	6	0.00	Bo Limit
		EP080: meta- & para-Xylene	108-38-3 106-74-3	4	µg/L	2	2	0.00	Bo Limit
		EP080: ortho-Xylene	25-7U-6	4	µg/L	<4	<4	0.00	Bo Limit
		EP080: Baphthalene	21-40-3	5	µg/L	76	74	2.37	Bo Limit

Page	: 8 of 14
Work Order	: EM1811891
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **0 OIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
E- 55i T: Tou2aMeu2at I b ICPVAE0 EQCLou 18G59i H3								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	95.8	79	113
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	108	79	110
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	100	85	120
EG005T: Boron	7440-42-8	50	mg/kg	<50	33.2 mg/kg	110	82	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	89.1	85	109
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	98.6	83	109
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	91.9	78	112
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	92.8	78	108
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	90.2	78	106
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	95.6	82	107
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	97.0	82	111
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	99.8	93	109
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	95.7	80	109
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	97.1	82	111
E- 55i T: Tou2aMeu2at I b ICPVAE0 EQCLou 18G59i X3								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	95.6	79	113
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	108	79	110
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	100	85	120
EG005T: Boron	7440-42-8	50	mg/kg	<50	33.2 mg/kg	107	82	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	88.2	85	109
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	98.4	83	109
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	91.4	78	112
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	92.5	78	108
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	90.5	78	106
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	95.2	82	107
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	96.6	82	111
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	99.2	93	109
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	95.3	80	109
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	96.8	82	111
E- 5G T: Tou2aRe4ocer2l æ Mer4nrb I b 6IM0 EQCLou 18G59i G3								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	84.0	77	104
E- 5G T: Tou2aRe4ocer2l æ Mer4nrb I b 6IM0 EQCLou 18G59i i 3								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	85.2	77	104
EP5vi DIM3F: Poab(n4æ2r Aro7 2ua Bbdro42rl o(t EQCLou 18G59vv3								

Page : 9 of 14
Work Order : EM1811891
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: 0 OIL

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP5vi DIM3F : Poab(n4æ2r Aro7 2ust Bbdro42rl o(t DQCLou 18G59vv3 V4o(u(ned								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	100	75	131
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	112	70	132
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	102	80	128
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	105	70	128
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	108	80	128
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	1.6 mg/kg	108	72	126
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	108	70	128
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	110	80	125
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	101	70	130
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	101	80	126
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	99.1	71	124
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	102	75	125
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	95.4	70	125
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	92.9	71	128
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	93.6	72	126
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	91.5	68	127
EP585rfiv1: TouaPeuroæn7 Bbdro42rl o(t DQCLou 18G589H3								
EP080: C6 - C9 Fraction	---	10	mg/kg	<10	36 mg/kg	78.7	70	127
EP585rfiv1: TouaPeuroæn7 Bbdro42rl o(t DQCLou 18G59vX3								
EP071: C10 - C14 Fraction	---	50	mg/kg	<50	808 mg/kg	99.6	80	120
EP071: C15 - C28 Fraction	---	100	mg/kg	<100	3008 mg/kg	104	84	115
EP071: C29 - C36 Fraction	---	100	mg/kg	<100	1584 mg/kg	92.6	80	112
EP071: C10 - C36 Fraction (sum)	---	50	mg/kg	<50	---	---	---	---
EP585rfiv1: TouaPeuroæn7 Bbdro42rl o(t DQCLou 18G598i 3								
EP080: C6 - C9 Fraction	---	10	mg/kg	<10	36 mg/kg	108	70	127
EP585rfiv1: TouaRe4ocer2l æ Bbdro42rl o(t VNEPM y51G6r24uo(t DQCLou 18G589H3								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	79.2	68	125
EP585rfiv1: TouaRe4ocer2l æ Bbdro42rl o(t VNEPM y51G6r24uo(t DQCLou 18G59vX3								
EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	1160 mg/kg	99.2	83	117
EP071: >C16 - C34 Fraction	---	100	mg/kg	<100	3978 mg/kg	97.9	82	114
EP071: >C34 - C40 Fraction	---	100	mg/kg	<100	313 mg/kg	93.8	73	115
EP071: >C10 - C40 Fraction (sum)	---	50	mg/kg	<50	---	---	---	---
EP585rfiv1: TouaRe4ocer2l æ Bbdro42rl o(t VNEPM y51G6r24uo(t DQCLou 18G598i 3								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	104	68	125
EP585: FTE/ N DQCLou 18G589H3								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	78.8	74	124
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	80.4	77	125

Environmental Site Assessment (V9) 52 New Town Road, New Town. June 2025.

Page : 10 of 17
I ork Order : EM1811821
Client : GEO-EBVIROBMEBTAL SOL. TIOBS
Project : Bewtown Rd

Sub-Matrix: 0 OIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP585: FTE/ N DCLou 18G589H3 V4o(u(ned								
EP080: Ethylbenzene	100-71-7	0.5	mg/kg	<0.5	4 mg/kg	U8.5	U3	145
EP080: meta- & para-Xylene	108-38-3 106-74-3	0.5	mg/kg	<0.5	7 mg/kg	81.4	UU	148
EP080: ortho-Xylene	25-7U-6	0.5	mg/kg	<0.5	4 mg/kg	87.U	81	148
EP080: Baphthalene	21-40-3	1	mg/kg	<1	0.5 mg/kg	8U.4	66	130
EP585: F TE/ N DCLou 18G598i 3								
EP080: Vénzene	U1-73-4	0.4	mg/kg	<0.4	4 mg/kg	87.6	U7	147
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	4 mg/kg	105	UU	145
EP080: Ethylbenzene	100-71-7	0.5	mg/kg	<0.5	4 mg/kg	22.1	U3	145
EP080: meta- & para-Xylene	108-38-3 106-74-3	0.5	mg/kg	<0.5	7 mg/kg	103	UU	148
EP080: ortho-Xylene	25-7U-6	0.5	mg/kg	<0.5	4 mg/kg	10U	81	148
EP080: Baphthalene	21-40-3	1	mg/kg	<1	0.5 mg/kg	23.7	66	130

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
E- 5y56: @t t oaed Meu2.f I b ICPWI0 DCLou 18Gy8yH3								
EG040A-F: Arsenic	U770-38-4	0.001	mg/L	<0.001	0.1 mg/L	101	21	10U
EG040A-F: Véryllium	U770-71-U	0.001	mg/L	<0.001	0.1 mg/L	23.1	84	113
EG040A-F: Vérium	U770-32-3	0.001	mg/L	<0.001	0.1 mg/L	107	87	106
EG040A-F: Cadmium	U770-73-2	0.0001	mg/L	<0.0001	0.1 mg/L	22.0	87	107
EG040A-F: Chromium	U770-7U-3	0.001	mg/L	<0.001	0.1 mg/L	27.U	83	103
EG040A-F: Cobalt	U770-78-7	0.001	mg/L	<0.001	0.1 mg/L	25.3	83	106
EG040A-F: Copper	U770-50-8	0.001	mg/L	<0.001	0.1 mg/L	27.0	84	103
EG040A-F: Lead	U732-24-1	0.001	mg/L	<0.001	0.1 mg/L	28.4	83	105
EG040A-F: Manganese	U732-26-5	0.001	mg/L	<0.001	0.1 mg/L	2U.7	83	105
EG040A-F: Bickel	U770-04-0	0.001	mg/L	<0.001	0.1 mg/L	26.8	84	106
EG040A-F: Selenium	UU84-72-4	0.01	mg/L	<0.01	0.1 mg/L	2U.1	84	102
EG040A-F: Vanadium	U770-64-4	0.01	mg/L	<0.01	0.1 mg/L	2U.6	83	106
EG040A-F: _inc	U770-66-6	0.005	mg/L	<0.005	0.1 mg/L	101	85	102
EG040A-F: Véron	U770-74-8	0.05	mg/L	<0.05	0.5 mg/L	22.4	87	116
E- 5G 6: @t t oaed Mer4nrb I b 6IM0 DCLou 18Gy8yi 3								
EG035F: Mercury	U732-2U-8	0.0001	mg/L	<0.0001	0.01 mg/L	108	81	117
EP5vi DIM3F: Poab(n4ae2r Aro7 2ud Bbdro42rl o(t DCLou 18GI1893								
EP0U5(SIM): Baphthalene	21-40-3	1	µg/L	<1.0	5 µg/L	8U.U	78	110
EP0U5(SIM): Aoensphthylene	408-26-8	1	µg/L	<1.0	5 µg/L	82.4	72	147
EP0U5(SIM): Aoensphthene	83-34-2	1	µg/L	<1.0	5 µg/L	24.2	53	11U
EP0U5(SIM): Fluorene	86-U8-U	1	µg/L	<1.0	5 µg/L	28.2	57	118

Page : 11 of 14
Work Order : EM1811891
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Laboratory Control Spike (LCS) Report: Spike Recovery (%): LCS	Laboratory Control Spike (LCS) Report: Recovery Limits (%): Low	Laboratory Control Spike (LCS) Report: Recovery Limits (%): High
EP029r6IM*7 : Polyut 6lear AroB as5 mydro6arboui rQCLos 18) 118X* - 6ous5ut ed								
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	99.5	57	119
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	99.3	51	113
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	104	59	123
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	103	58	123
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	104	52	126
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	101	55	123
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	104	52	131
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	100	57	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	101	56	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	104	53	123
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	102	53	125
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	103	53	125
EP080I*21: Tosal Pesrolet B mydro6arboui rQCLos 18) 11X0*								
EP071: C10 - C14 Fraction	---	50	µg/L	<50	4331 µg/L	71.2	58	134
EP071: C15 - C28 Fraction	---	100	µg/L	<100	16952 µg/L	73.6	60	133
EP071: C29 - C36 Fraction	---	50	µg/L	<50	8895 µg/L	73.9	54	137
EP080I*21: Tosal Pesrolet B mydro6arboui rQCLos 18) 4328*								
EP080: C6 - C9 Fraction	---	20	µg/L	<20	360 µg/L	90.5	68	125
EP080I*21: Tosal Re6overable mydro6arboui - NEPM 401) Fra6s5oui rQCLos 18) 11X0*								
EP071: >C10 - C16 Fraction	---	100	µg/L	<100	6292 µg/L	71.8	58	122
EP071: >C16 - C34 Fraction	---	100	µg/L	<100	22143 µg/L	76.2	56	132
EP071: >C34 - C40 Fraction	---	100	µg/L	<100	1677 µg/L	75.6	58	137
EP080I*21: Tosal Re6overable mydro6arboui - NEPM 401) Fra6s5oui rQCLos 18) 4328*								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	89.2	66	123
EP080: 7 TE/ N rQCLos 18) 4328*								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	87.2	74	123
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	93.5	77	128
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	91.1	73	126
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	94.9	72	131
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	96.2	74	131
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	84.5	74	124

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Page : 12 of 14
Work Order : EM1811891
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG009T: Total Metals by ICP-AES (QCLot: 1810X9)							
EM1811855-003	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	82.6	78	124
		EG005T: Barium	7440-39-3	50 mg/kg	126	71	135
		EG005T: Beryllium	7440-41-7	50 mg/kg	102	85	125
		EG005T: Cadmium	7440-43-9	50 mg/kg	93.9	84	116
		EG005T: Chromium	7440-47-3	50 mg/kg	104	79	121
		EG005T: Copper	7440-50-8	50 mg/kg	98.6	82	124
		EG005T: Lead	7439-92-1	50 mg/kg	98.5	76	124
		EG005T: Manganese	7439-96-5	50 mg/kg	115	68	136
		EG005T: Nickel	7440-02-0	50 mg/kg	103	78	120
		EG005T: Selenium	7782-49-2	50 mg/kg	79.0	71	125
		EG005T: Vanadium	7440-62-2	50 mg/kg	112	76	124
		EG005T: Zinc	7440-66-6	50 mg/kg	100	74	128
EG009T: Total Metals by ICP-AES (QCLot: 1810X93)							
EM1811891-023	BH19 1.0-1.1	EG005T: Lead	7439-92-1	50 mg/kg	# 125	76	124
		EG005T: Manganese	7439-96-5	50 mg/kg	117	68	136
		EG005T: Zinc	7440-66-6	50 mg/kg	# 160	74	128
EM1811891-023	BH19 1.0-1.1	EG005T: Arsenic	7440-38-2	50 mg/kg	95.0	78	124
		EG005T: Barium	7440-39-3	50 mg/kg	89.8	71	135
		EG005T: Beryllium	7440-41-7	50 mg/kg	104	85	125
		EG005T: Cadmium	7440-43-9	50 mg/kg	96.0	84	116
		EG005T: Chromium	7440-47-3	50 mg/kg	95.3	79	121
		EG005T: Copper	7440-50-8	50 mg/kg	97.8	82	124
		EG005T: Nickel	7440-02-0	50 mg/kg	96.0	78	120
		EG005T: Selenium	7782-49-2	50 mg/kg	85.7	71	125
		EG005T: Vanadium	7440-62-2	50 mg/kg	106	76	124
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1810X9)							
EM1811855-003	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	89.0	76	116
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1810X99)							
EM1811891-023	BH19 1.0-1.1	EG035T: Mercury	7439-97-6	5 mg/kg	100	76	116
EP075(SIM): Polynuclear Aromatic Hydrocarbons (QCLot: 1810X22)							
EM1811816-002	Anonymous	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	83.4	67	117
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	# Not Determined	52	148
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1810X8)							
EM1811891-004	BH15 0.55-0.65	EP080: C6 - C9 Fraction	---	28 mg/kg	116	42	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1810X23)							
EM1811891-005	BH16 0.3-0.4	EP071: C10 - C14 Fraction	---	806 mg/kg	101	53	123

Page : 13 of 17
I ork Order : EM1811821
Client : GEO-EBVIROBMEBTAL SOL. TIOBS
Project : Bewtown Rd

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1830976) - continued							
EM1811821-005	WH16 0.3-0.7	EP0U1: C15 - C48 Fraction	----	3006 mg/kg	105	UD	147
		EP0U1: C42 - C36 Fraction	----	1587 mg/kg	23.8	67	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1830985)							
EM1811820-001	Anonymous	EP080: C6 - C2 Fraction	----	48 mg/kg	83.6	74	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1830894)							
EM1811821-007	WH15 0.55-0.65	EP080: C6 - C10 Fraction	C6ZC10	33 mg/kg	112	32	142
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1830976)							
EM1811821-005	WH16 0.3-0.7	EP0U1: >C10 - C16 Fraction	----	1160 mg/kg	22.8	65	143
		EP0U1: >C16 - C37 Fraction	----	32U8 mg/kg	28.8	6U	141
		EP0U1: >C37 - C70 Fraction	----	313 mg/kg	101	77	148
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1830985)							
EM1811820-001	Anonymous	EP080: C6 - C10 Fraction	C6ZC10	33 mg/kg	84.8	32	142
EP080: BTEXN (QCLot: 1830894)							
EM1811821-007	WH15 0.55-0.65	EP080: Wenzene	U1-73-4	4 mg/kg	23.8	50	136
		EP080: Toluene	108-88-3	4 mg/kg	23.7	56	132
EP080: BTEXN (QCLot: 1830985)							
EM1811820-001	Anonymous	EP080: Wenzene	U1-73-4	4 mg/kg	23.1	50	136
		EP080: Toluene	108-88-3	4 mg/kg	28.8	56	132

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1832824)							
EM181185U-001	Anonymous	EG040A-F: Arsenic	U770-38-4	0.4 mg/L	10U	85	131
		EG040A-F: Weryllium	U770-71-U	0.4 mg/L	21.1	U8	171
		EG040A-F: Warium	U770-32-3	0.4 mg/L	107	U5	14U
		EG040A-F: Cadmium	U770-73-2	0.05 mg/L	27.2	81	133
		EG040A-F: Chromium	U770-7U-3	0.4 mg/L	23.8	U1	135
		EG040A-F: Cobalt	U770-78-7	0.4 mg/L	22.0	U8	134
		EG040A-F: Copper	U770-50-8	0.4 mg/L	27.5	U8	130
		EG040A-F: Lead	U732-24-1	0.4 mg/L	24.4	U5	133
		EG040A-F: Manganese	U732-26-5	0.4 mg/L	23.1	67	137
		EG040A-F: Bickel	U770-04-0	0.4 mg/L	26.6	U8	131
		EG040A-F: Vanadium	U770-64-4	0.4 mg/L	27.5	U8	131
		EG040A-F: _inc	U770-66-6	0.4 mg/L	2U5	U5	131
EG035F: Dissolved Mercury by FIMS (QCLot: 1832825)							
EM1811821-046	Field Wank 3	EG035F: Mercury	U732-2U-8	0.01 mg/L	10U	UD	140

Page	: 14 of 14
Work Order	: EM1811891
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP585rfiv1: Tou2aPeuroæn7 Bbdro42rl o(t BQCLou 18GyXv83							
EM1811890-007	Anonymous	EP080: C6 - C9 Fraction	---	280 µg/L	84.1	43	125
EP585rfiv1: Tou2aRe4ocer2l æ Bbdro42rl o(t VNEPM y51G6r24um(t BQCLou 18GyXv83							
EM1811890-007	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	81.2	44	122
EP585: FTE/ N BQCLou 18GyXv83							
EM1811890-007	Anonymous	EP080: Benzene	71-43-2	20 µg/L	102	68	130
		EP080: Toluene	108-88-3	20 µg/L	107	72	132

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM1811891	Page	: 1 of 9
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Telephone	: +61-3-8549 9630
Project	: Newtown Rd	Date Samples Received	: 26-Jul-2018
Site	: ----	Issue Date	: 31-Jul-2018
Sampler	: SARAH JOYCE	No. of samples received	: 27
Order number	:	No. of samples analysed	: 14

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- NO Method Blank value outliers occur.
- NO Duplicate outliers occur.
- NO Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, NO surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- NO Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.

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Page : 2 of 9
Work Order : EM1811891
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EG005T: Total Metals by ICP-AES	EM1811891--023	BH19 1.0-1.1	**Lead**	7439-92-1	125 %	76-124%	**Recovery greater than upper data quality objective**
EG005T: Total Metals by ICP-AES	EM1811891--023	BH19 1.0-1.1	**Zinc**	7440-66-6	160 %	74-128%	**Recovery greater than upper data quality objective**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1811816--002	Anonymous	**Pyrene**	129-00-0	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	3	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	3	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	3	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	3	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
BH14 0.4-0.5,	BH15 0.55-0.65,	25-Jul-2018	----	----	----	26-Jul-2018	08-Aug-2018	✓
BH16 0.3-0.4,	BH13 1.0-1.1,							
BH13 1.5-1.6,	BH17 0.5-0.6,							
BH17 1.1-1.2,	BH18 1.5-1.6,							
BH18 2.7-2.8,	BH18 3.5-3.6,							
BH19 1.0-1.1,	BH19 2.1-2.2							

Page	: 3 of 9
Work Order	: EM1811891
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Matrix: **SOIL** Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
BH14 0.4-0.5,	BH15 0.55-0.65,	25-Jul-2018	27-Jul-2018	21-Jan-2019	✓	27-Jul-2018	21-Jan-2019	✓
BH16 0.3-0.4,	BH13 1.0-1.1,							
BH13 1.5-1.6,	BH17 0.5-0.6,							
BH17 1.1-1.2,	BH18 1.5-1.6,							
BH18 2.7-2.8,	BH18 3.5-3.6,							
BH19 1.0-1.1,	BH19 2.1-2.2							
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
BH14 0.4-0.5,	BH15 0.55-0.65,	25-Jul-2018	27-Jul-2018	22-Aug-2018	✓	30-Jul-2018	22-Aug-2018	✓
BH16 0.3-0.4,	BH13 1.0-1.1,							
BH13 1.5-1.6,	BH17 0.5-0.6,							
BH17 1.1-1.2,	BH18 1.5-1.6,							
BH18 2.7-2.8,	BH18 3.5-3.6,							
BH19 1.0-1.1,	BH19 2.1-2.2							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
BH14 0.4-0.5,	BH15 0.55-0.65,	25-Jul-2018	27-Jul-2018	08-Aug-2018	✓	27-Jul-2018	05-Sep-2018	✓
BH16 0.3-0.4,	BH13 1.0-1.1,							
BH13 1.5-1.6,	BH17 0.5-0.6,							
BH17 1.1-1.2,	BH18 1.5-1.6,							
BH18 2.7-2.8,	BH18 3.5-3.6,							
BH19 1.0-1.1,	BH19 2.1-2.2							
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080)								
BH14 0.4-0.5,	BH15 0.55-0.65,	25-Jul-2018	26-Jul-2018	08-Aug-2018	✓	26-Jul-2018	08-Aug-2018	✓
BH16 0.3-0.4,	BH13 1.0-1.1,							
BH17 0.5-0.6,	BH18 1.5-1.6,							
BH18 3.5-3.6,	BH19 2.1-2.2							
Soil Glass Jar - Unpreserved (EP080)								
BH13 1.5-1.6,	BH17 1.1-1.2,	25-Jul-2018	26-Jul-2018	08-Aug-2018	✓	27-Jul-2018	08-Aug-2018	✓
BH18 2.7-2.8,	BH19 1.0-1.1							
Soil Glass Jar - Unpreserved (EP071)								
BH14 0.4-0.5,	BH15 0.55-0.65,	25-Jul-2018	27-Jul-2018	08-Aug-2018	✓	27-Jul-2018	05-Sep-2018	✓
BH16 0.3-0.4,	BH13 1.0-1.1,							
BH13 1.5-1.6,	BH17 0.5-0.6,							
BH17 1.1-1.2,	BH18 1.5-1.6,							
BH18 2.7-2.8,	BH18 3.5-3.6,							
BH19 1.0-1.1,	BH19 2.1-2.2							

Page : 4 of 9
Work Order : EM1811891
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Matrix: **SOIL** Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP080)								
BH14 0.4-0.5,	BH15 0.55-0.65,	25-Jul-2018	26-Jul-2018	08-Aug-2018	✓	26-Jul-2018	08-Aug-2018	✓
BH16 0.3-0.4,	BH13 1.0-1.1,							
BH17 0.5-0.6,	BH18 1.5-1.6,							
BH18 3.5-3.6,	BH19 2.1-2.2							
Soil Glass Jar - Unpreserved (EP080)								
BH13 1.5-1.6,	BH17 1.1-1.2,	25-Jul-2018	26-Jul-2018	08-Aug-2018	✓	27-Jul-2018	08-Aug-2018	✓
BH18 2.7-2.8,	BH19 1.0-1.1							
Soil Glass Jar - Unpreserved (EP071)								
BH14 0.4-0.5,	BH15 0.55-0.65,	25-Jul-2018	27-Jul-2018	08-Aug-2018	✓	27-Jul-2018	05-Sep-2018	✓
BH16 0.3-0.4,	BH13 1.0-1.1,							
BH13 1.5-1.6,	BH17 0.5-0.6,							
BH17 1.1-1.2,	BH18 1.5-1.6,							
BH18 2.7-2.8,	BH18 3.5-3.6,							
BH19 1.0-1.1,	BH19 2.1-2.2							
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080)								
BH14 0.4-0.5,	BH15 0.55-0.65,	25-Jul-2018	26-Jul-2018	08-Aug-2018	✓	26-Jul-2018	08-Aug-2018	✓
BH16 0.3-0.4,	BH13 1.0-1.1,							
BH17 0.5-0.6,	BH18 1.5-1.6,							
BH18 3.5-3.6,	BH19 2.1-2.2							
Soil Glass Jar - Unpreserved (EP080)								
BH13 1.5-1.6,	BH17 1.1-1.2,	25-Jul-2018	26-Jul-2018	08-Aug-2018	✓	27-Jul-2018	08-Aug-2018	✓
BH18 2.7-2.8,	BH19 1.0-1.1							

Matrix: **WATER** Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-F)								
Field Blank 3,	Rinsate 3	25-Jul-2018	---	---	---	27-Jul-2018	21-Jan-2019	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG035F)								
Field Blank 3,	Rinsate 3	25-Jul-2018	---	---	---	27-Jul-2018	08-Aug-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP075(SIM))								
Field Blank 3,	Rinsate 3	25-Jul-2018	26-Jul-2018	01-Aug-2018	✓	30-Jul-2018	04-Sep-2018	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071)								
Field Blank 3,	Rinsate 3	25-Jul-2018	26-Jul-2018	01-Aug-2018	✓	30-Jul-2018	04-Sep-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)								
Field Blank 3,	Rinsate 3	25-Jul-2018	27-Jul-2018	08-Aug-2018	✓	27-Jul-2018	08-Aug-2018	✓

Page	: 5 of 9
Work Order	: EM1811891
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Matrix: **WATER** Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber Glass Bottle - Unpreserved (EP071)								
Field Blank 3,	Rinsate 3	25-Jul-2018	26-Jul-2018	01-Aug-2018	✓	30-Jul-2018	04-Sep-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)								
Field Blank 3,	Rinsate 3	25-Jul-2018	27-Jul-2018	08-Aug-2018	✓	27-Jul-2018	08-Aug-2018	✓
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)								
Field Blank 3,	Rinsate 3	25-Jul-2018	27-Jul-2018	08-Aug-2018	✓	27-Jul-2018	08-Aug-2018	✓

Page	: 6 of 9
Work Order	: EM1811891
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: x = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	3	23	13.04	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	4	23	17.39	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	20	15.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	23	8.70	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	23	8.70	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	23	8.70	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	23	8.70	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	23	8.70	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	3	23	13.04	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: x = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*	
Laboratory Duplicates (DUP)							
Dissolved Mercury by FIMS	EG035F	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	3	0.00	10.00	x	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	3	0.00	10.00	x	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Dissolved Mercury by FIMS	EG035F	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Page	: 7 of 9
Work Order	: EM1811891
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Dissolved Mercury by FIMS	EG035F	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Dissolved Mercury by FIMS	EG035F	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	3	0.00	5.00	×	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	3	0.00	5.00	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Page : 8 of 9
Work Order : EM1811891
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house. A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A. Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A. The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270D. Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)

Page	9 of 9
Work Order	EM1811891
Client	GEO-ENVIRONMENTAL SOLUTIONS
Project	Newtown Rd

Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B. Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion. 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS
Tumbler Extraction of Solids	ORG17	SOIL	In house. Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B. 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: EM1812175	Page	: 1 of 8
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Project	: Newtown Rd	Date Samples Received	: 26-Jul-2018
Order number	:	Date Analysis Commenced	: 01-Aug-2018
C-O-C number	: ----	Issue Date	: 06-Aug-2018
Sampler	: ----		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 4		
No. of samples analysed	: 4		

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Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

RIGHT SOLUTIONS | RIGHT PARTNER

Page : 2 of 8
Work Order : EM1812175
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1843763)									
EM1812173-005	Anonymous	EA055: Moisture Content	----	0.1	%	22.1	22.8	3.43	0% - 20%
EM1812175-001	BH13 2.0-2.1	EA055: Moisture Content	----	0.1	%	11.8	11.9	1.18	0% - 50%
EG005T: Total Metals by ICP-AES (QC Lot: 1843751)									
EM1812173-006	Anonymous	EG005T: Lead	7439-92-1	5	mg/kg	218	# 105	69.9	0% - 20%
		EG005T: Zinc	7440-66-6	5	mg/kg	573	# 216	90.6	0% - 20%
EM1812173-006	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	80	50	50.5	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	5	5	0.00	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	10	9	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	9	10	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	52	38	30.8	0% - 50%
		EG005T: Manganese	7439-96-5	5	mg/kg	263	316	18.4	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	59	36	48.7	0% - 50%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EM1812175-001	BH13 2.0-2.1	EG005T: Beryllium	7440-41-7	1	mg/kg	1	1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	100	90	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	22	22	0.00	0% - 50%
		EG005T: Cobalt	7440-48-4	2	mg/kg	16	14	17.6	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	13	13	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	11	10	11.9	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	9	9	0.00	No Limit

Page : 3 of 8
Work Order : EM1812175
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005T: Total Metals by ICP-AES (QC Lot: 1843751) - continued									
EM1812175-001	BH13 2.0-2.1	EG005T: Lead	7439-92-1	5	mg/kg	30	30	0.00	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	552	496	10.8	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	28	26	8.18	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	33	32	3.18	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1843750)									
EM1812173-006	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EM1812175-001	BH13 2.0-2.1	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1843424)									
EM1812173-001	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EM1812173-011	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	0.6	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	1.3	1.2	10.8	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	4.9	3.4	35.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	1.4	1.0	32.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	9.4	7.2	26.4	0% - 50%
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	9.7	7.7	22.6	0% - 50%
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	4.7	3.7	23.4	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	4.1	2.9	32.5	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	6.1	5.0	20.0	0% - 50%
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	1.9	1.6	16.5	No Limit

Page : 4 of 8
Work Order : EM1812175
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1843424) - continued									
EM1812173-011	Anonymous	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	4.9	4.1	18.8	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	2.5	2.1	16.1	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	0.6	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	3.2	2.7	16.1	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1843360)									
EM1812173-001	Anonymous	EP080: C6 - C9 Fraction	---	10	mg/kg	<10	<10	0.00	No Limit
EM1812173-011	Anonymous	EP080: C6 - C9 Fraction	---	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1843425)									
EM1812173-001	Anonymous	EP071: C15 - C28 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	---	50	mg/kg	<50	<50	0.00	No Limit
EM1812173-011	Anonymous	EP071: C15 - C28 Fraction	---	100	mg/kg	280	230	18.7	No Limit
		EP071: C29 - C36 Fraction	---	100	mg/kg	210	200	8.88	No Limit
		EP071: C10 - C14 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	---	50	mg/kg	490	430	13.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1843360)									
EM1812173-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EM1812173-011	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1843425)									
EM1812173-001	Anonymous	EP071: >C16 - C34 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	---	50	mg/kg	<50	<50	0.00	No Limit
EM1812173-011	Anonymous	EP071: >C16 - C34 Fraction	---	100	mg/kg	440	380	15.0	No Limit
		EP071: >C34 - C40 Fraction	---	100	mg/kg	100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	---	50	mg/kg	540	380	34.8	0% - 50%
EP080: BTEXN (QC Lot: 1843360)									
EM1812173-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EM1812173-011	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Page : 5 of 8
Work Order : EM1812175
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080: BTEXN (QC Lot: 1843360) - continued									
EM1812173-011	Anonymous	EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Page : 6 of 8
Work Order : EM1812175
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 1843751)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	87.5	79	113
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	94.7	79	110
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	97.3	85	120
EG005T: Boron	7440-42-8	50	mg/kg	<50	33.2 mg/kg	99.7	82	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	100.0	85	109
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	86.7	83	109
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	84.3	78	112
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	85.5	78	108
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	84.1	78	106
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	87.8	82	107
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	90.2	82	111
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	99.0	93	109
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	86.1	80	109
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	93.4	82	111
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1843750)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	94.2	77	104
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1843424)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	95.6	75	131
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	92.2	70	132
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	93.9	80	128
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	92.7	70	128
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	97.5	80	128
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	1.6 mg/kg	96.5	72	126
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	92.1	70	128
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	96.9	80	125
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	87.6	70	130
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	91.9	80	126
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	86.2	71	124
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	91.9	75	125
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	81.5	70	125
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	85.8	71	128
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	84.6	72	126
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	88.0	68	127

Page : 7 of 8
Work Order : EM1812175
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1843360)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	36 mg/kg	99.2	70	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1843425)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	806 mg/kg	97.2	80	120
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3006 mg/kg	104	84	115
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	1584 mg/kg	97.6	80	112
EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1843360)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	96.3	68	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1843425)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	1160 mg/kg	99.3	83	117
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	3978 mg/kg	102	82	114
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	313 mg/kg	84.0	73	115
EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080: BTEXN (QCLot: 1843360)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	101	74	124
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	103	77	125
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	108	73	125
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	108	77	128
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	106	81	128
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	96.3	66	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005T: Total Metals by ICP-AES (QCLot: 1843751)							
EM1812173-007	Anonymous	EG005T: Barium	7440-39-3	50 mg/kg	112	71	135
		EG005T: Lead	7439-92-1	50 mg/kg	109	76	124
		EG005T: Manganese	7439-96-5	50 mg/kg	# Not Determined	68	136
		EG005T: Vanadium	7440-62-2	50 mg/kg	98.1	76	124
		EG005T: Zinc	7440-66-6	50 mg/kg	# 12.1	74	128
EM1812173-007	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	88.8	78	124
		EG005T: Beryllium	7440-41-7	50 mg/kg	94.6	85	125

Page : 8 of 8
Work Order : EM1812175
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 1843751) - continued							
EM1812173-007	Anonymous	EG005T: Cadmium	7440-43-9	50 mg/kg	84.6	84	116
		EG005T: Chromium	7440-47-3	50 mg/kg	85.5	79	121
		EG005T: Copper	7440-50-8	50 mg/kg	103	82	124
		EG005T: Nickel	7440-02-0	50 mg/kg	81.9	78	120
		EG005T: Selenium	7782-49-2	50 mg/kg	81.0	71	125
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1843750)							
EM1812173-007	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	90.2	76	116
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1843424)							
EM1812173-003	Anonymous	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	94.4	67	117
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	105	52	148
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1843360)							
EM1812173-002	Anonymous	EP080: C6 - C9 Fraction	---	28 mg/kg	71.3	42	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1843425)							
EM1812173-002	Anonymous	EP071: C10 - C14 Fraction	---	806 mg/kg	94.8	53	123
		EP071: C15 - C28 Fraction	---	3006 mg/kg	100	70	124
		EP071: C29 - C36 Fraction	---	1584 mg/kg	97.6	64	118
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1843360)							
EM1812173-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	71.6	39	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1843425)							
EM1812173-002	Anonymous	EP071: >C10 - C16 Fraction	---	1160 mg/kg	96.5	65	123
		EP071: >C16 - C34 Fraction	---	3978 mg/kg	99.3	67	121
		EP071: >C34 - C40 Fraction	---	313 mg/kg	93.8	44	126
EP080: BTEXN (QCLot: 1843360)							
EM1812173-002	Anonymous	EP080: Benzene	71-43-2	2 mg/kg	79.1	50	136
		EP080: Toluene	108-88-3	2 mg/kg	86.2	56	139

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM1812175	Page	: 1 of 5
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Telephone	: +61-3-8549 9630
Project	: Newtown Rd	Date Samples Received	: 26-Jul-2018
Site	: ----	Issue Date	: 06-Aug-2018
Sampler	: ----	No. of samples received	: 4
Order number	:	No. of samples analysed	: 4

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- NO Method Blank value outliers occur.
- NO Laboratory Control outliers occur.
- Duplicate outliers exist - please see following pages for full details.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, NO surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- NO Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- NO Quality Control Sample Frequency Outliers exist.

Page : 2 of 5
Work Order : EM1812175
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EG005T: Total Metals by ICP-AES	EM1812173--006	Anonymous	**Lead**	7439-92-1	69.9 %	0% - 20%	**RPD exceeds LOR based limits**
EG005T: Total Metals by ICP-AES	EM1812173--006	Anonymous	**Zinc**	7440-66-6	90.6 %	0% - 20%	**RPD exceeds LOR based limits**
Matrix Spike (MS) Recoveries							
EG005T: Total Metals by ICP-AES	EM1812173--007	Anonymous	**Manganese**	7439-96-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG005T: Total Metals by ICP-AES	EM1812173--007	Anonymous	**Zinc**	7440-66-6	12.1 %	74-128%	**Recovery less than lower data quality objective**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days, others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
BH13 2.0-2.1,	BH18 0.5-0.6,	**25-Jul-2018**	----	----	----	**01-Aug-2018**	08-Aug-2018	✓
BH18 2.5-2.6,	BH18 3.1-3.2							
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
BH13 2.0-2.1,	BH18 0.5-0.6,	**25-Jul-2018**	**02-Aug-2018**	21-Jan-2019	✓	**02-Aug-2018**	21-Jan-2019	✓
BH18 2.5-2.6,	BH18 3.1-3.2							
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
BH13 2.0-2.1,	BH18 0.5-0.6,	**25-Jul-2018**	**02-Aug-2018**	22-Aug-2018	✓	**02-Aug-2018**	22-Aug-2018	✓
BH18 2.5-2.6,	BH18 3.1-3.2							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
BH13 2.0-2.1,	BH18 0.5-0.6,	**25-Jul-2018**	**01-Aug-2018**	08-Aug-2018	✓	**01-Aug-2018**	10-Sep-2018	✓
BH18 2.5-2.6,	BH18 3.1-3.2							

Page	: 3 of 5
Work Order	: EM1812175
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Matrix: **SOIL**

Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP071)								
BH13 2.0-2.1,	BH18 0.5-0.6,	25-Jul-2018	01-Aug-2018	08-Aug-2018	✓	01-Aug-2018	10-Sep-2018	✓
BH18 2.5-2.6,	BH18 3.1-3.2							
Soil Glass Jar - Unpreserved (EP080)								
BH13 2.0-2.1,	BH18 0.5-0.6,	25-Jul-2018	01-Aug-2018	08-Aug-2018	✓	03-Aug-2018	08-Aug-2018	✓
BH18 2.5-2.6,	BH18 3.1-3.2							
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP071)								
BH13 2.0-2.1,	BH18 0.5-0.6,	25-Jul-2018	01-Aug-2018	08-Aug-2018	✓	01-Aug-2018	10-Sep-2018	✓
BH18 2.5-2.6,	BH18 3.1-3.2							
Soil Glass Jar - Unpreserved (EP080)								
BH13 2.0-2.1,	BH18 0.5-0.6,	25-Jul-2018	01-Aug-2018	08-Aug-2018	✓	03-Aug-2018	08-Aug-2018	✓
BH18 2.5-2.6,	BH18 3.1-3.2							
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080)								
BH13 2.0-2.1,	BH18 0.5-0.6,	25-Jul-2018	01-Aug-2018	08-Aug-2018	✓	03-Aug-2018	08-Aug-2018	✓
BH18 2.5-2.6,	BH18 3.1-3.2							

Page	: 4 of 5
Work Order	: EM1812175
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	3	19	15.79	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	19	10.53	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Page	5 of 5
Work Order	EM1812175
Client	GEO-ENVIRONMENTAL SOLUTIONS
Project	Newtown Rd

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house. A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A. Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM1812116**	Page	: 1 of 11
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Project	: New Town Road	Date Samples Received	: 31-Jul-2018
Order number	: 30 July 2018	Date Analysis Commenced	: 31-Jul-2018
C-O-C number	: ----	Issue Date	: 03-Aug-2018
Sampler	: SJ		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 5		
No. of samples analysed	: 4		

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Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

Page	: 2 of 11
Work Order	: EM1812116
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: New Town Road

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

						Laboratory Duplicate (DUP) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1840106)									
EM1812116-003	BH20 0.5-0.6	EA055: Moisture Content	----	0.1	%	14.4	14.1	2.59	0% - 50%
EG005T: Total Metals by ICP-AES (QC Lot: 1840334)									
EM1812066-028	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	50	50	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	20	19	0.00	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	2	2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	12	12	0.00	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	6	7	0.00	No Limit
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	38	27	32.5	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EM1812109-001	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	50	60	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	10	8	18.8	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	6	5	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	8	7	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	10	9	11.1	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	8	9	0.00	No Limit

Environmental Site Assessment (V9) 52 New Town Road, New Town. June 2025.

Page : 2 of 11
Work Order : VM181L116
Client : GVO-V' 3HRO' MV' TAb AOb. TIO' A
Project : ' ew Town Road

Aut-Matrix: SOIL

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005T: Total Metals by ICP-AES (QC Lot: 1840334) - continued									
VM181L10K-001	Anonymous	VG005T: Manganese	U73K-KB-5	5	ng/kg	1K6	183	6.UL	0% - L0%
		VG005T: Aelenfun	UU8L-7K-L	5	ng/kg	<5	<5	0.00	' o b'n'lt
		VG005T: 3anadfun	U770-6L-L	5	ng/kg	10	K	1L.7	' o b'n'lt
		VG005T: _'nic	U770-66-6	5	ng/kg	L5	L5	0.00	' o b'n'lt
		VG005T: Voron	U770-7L-S	50	ng/kg	<50	<50	0.00	' o b'n'lt
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1840335)									
VM181L066-0L8	Anonymous	VG035T: Mercury	U73K-KU-6	0.1	ng/kg	<0.1	<0.1	0.00	' o b'n'lt
VM181L10K-001	Anonymous	VG035T: Mercury	U73K-KU-6	0.1	ng/kg	<0.1	<0.1	0.00	' o b'n'lt
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1840323)									
VM181L10K-001	Anonymous	VP0U5(AiM): ' a\ydtdalene	K1-L0-3	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Acena\ydtdylene	L08-KB-8	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Acena\ydtdene	83-3L-K	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Fluorene	86-U8-U	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Pdenantdrene	85-01-8	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Antdracene	1L0-1L-U	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Fluorantdene	L06-77-0	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Pyrene	1LK-00-0	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Vènz(a)antdracene	56-55-3	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Cdrysene	L18-01-K	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Vènzo(t+j)fluorantdene	L05-KK-L L05-8L-3	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Vènzo(k)fluorantdene	L0U08-K	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Vènzo(a)\yrene	50-3L-8	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Iddeno(1.L.3.cd)\yrene	1K3-3K-5	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Mt enz(a.d)antdracene	53-L0-3	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Vènzo(g.d.f)\erylene	1K1-L7-L	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
VM181L105-011	Anonymous	VP0U5(AiM): ' a\ydtdalene	K1-L0-3	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Acena\ydtdylene	L08-KB-8	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Acena\ydtdene	83-3L-K	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Fluorene	86-U8-U	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Pdenantdrene	85-01-8	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Antdracene	1L0-1L-U	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Fluorantdene	L06-77-0	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Pyrene	1LK-00-0	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Vènz(a)antdracene	56-55-3	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Cdrysene	L18-01-K	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Vènzo(t+j)fluorantdene	L05-KK-L L05-8L-3	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Vènzo(k)fluorantdene	L0U08-K	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt
		VP0U5(AiM): Vènzo(a)\yrene	50-3L-8	0.5	ng/kg	<0.5	<0.5	0.00	' o b'n'lt

Page : 4 of 11
Work Order : EM1812116
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Road

Sub-Matrix: SOIL

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1840323) - continued									
EM1812105-011	Anonymous	EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1840010)									
EM1812105-002	Anonymous	EP080: C6 - C9 Fraction	---	10	mg/kg	<10	<10	0.00	No Limit
EM1812118-001	Anonymous	EP080: C6 - C9 Fraction	---	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1840322)									
EM1812109-001	Anonymous	EP071: C15 - C28 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	---	50	mg/kg	<50	<50	0.00	No Limit
EM1812105-011	Anonymous	EP071: C15 - C28 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	---	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1840010)									
EM1812105-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EM1812118-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1840322)									
EM1812109-001	Anonymous	EP071: >C16 - C34 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	---	50	mg/kg	<50	<50	0.00	No Limit
EM1812105-011	Anonymous	EP071: >C16 - C34 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	---	50	mg/kg	<50	<50	0.00	No Limit
EP080: BTEXN (QC Lot: 1840010)									
EM1812105-002	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EM1812118-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Page : 5 of 11
Work Order : VM181L116
Client : GVO-V' 3HRO' MV' TAb AOb. TIO' A
Project : ' ew Town Road

Aut-Matrix: SOIL

						Laboratory Duplicate (DUP) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080: BTEXN (QC Lot: 1840010) - continued									
VM181L118-001	Anonymous	VP080: meta- & para-Xylene	108-38-3 106-7L-3	0.5	mg/kg	<0.5	<0.5	0.00	' o b/n/t
		VP080: ortho-Xylene	K5-7U6	0.5	mg/kg	<0.5	<0.5	0.00	' o b/n/t
		VP080: ' aphthalene	K1-L0-3	1	mg/kg	<1	<1	0.00	' o b/n/t

Aut-Matrix: WATER

						Laboratory Duplicate (DUP) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 1842761)									
VM1811U83-001	Anonymous	VG0L0A-T: Cadmium	U770-73-K	0.0001	mg/L	<0.0001	<0.0001	0.00	' o b/n/t
		VG0L0A-T: Arsenic	U770-38-L	0.001	mg/L	<0.001	<0.001	0.00	' o b/n/t
		VG0L0A-T: Beryllium	U770-71-U	0.001	mg/L	<0.001	<0.001	0.00	' o b/n/t
		VG0L0A-T: Barium	U770-3K-3	0.001	mg/L	0.017	0.013	UK1	0% - 50%
		VG0L0A-T: Chromium	U770-7U-3	0.001	mg/L	<0.001	<0.001	0.00	' o b/n/t
		VG0L0A-T: Cobalt	U770-78-7	0.001	mg/L	<0.001	<0.001	0.00	' o b/n/t
		VG0L0A-T: Copper	U770-50-8	0.001	mg/L	0.00L	0.00L	0.00	' o b/n/t
		VG0L0A-T: Lead	U73K-KL-1	0.001	mg/L	<0.001	<0.001	0.00	' o b/n/t
		VG0L0A-T: Manganese	U73K-KB-5	0.001	mg/L	0.003	0.003	0.00	' o b/n/t
		VG0L0A-T: Nickel	U770-0L-0	0.001	mg/L	<0.001	<0.001	0.00	' o b/n/t
		VG0L0A-T: Zinc	U770-66-6	0.005	mg/L	0.00U	0.006	0.00	' o b/n/t
		VG0L0A-T: Selenium	UL8L-7K-L	0.01	mg/L	<0.01	<0.01	0.00	' o b/n/t
		VG0L0A-T: Vanadium	U770-6L-L	0.01	mg/L	<0.01	<0.01	0.00	' o b/n/t
		VG0L0A-T: Boron	U770-7L-8	0.05	mg/L	<0.05	<0.05	0.00	' o b/n/t
VM1811U83-011	Anonymous	VG0L0A-T: Cadmium	U770-73-K	0.0001	mg/L	<0.0001	<0.0001	0.00	' o b/n/t
		VG0L0A-T: Arsenic	U770-38-L	0.001	mg/L	<0.001	<0.001	0.00	' o b/n/t
		VG0L0A-T: Beryllium	U770-71-U	0.001	mg/L	<0.001	<0.001	0.00	' o b/n/t
		VG0L0A-T: Barium	U770-3K-3	0.001	mg/L	0.016	0.015	0.00	0% - 50%
		VG0L0A-T: Chromium	U770-7U-3	0.001	mg/L	<0.001	<0.001	0.00	' o b/n/t
		VG0L0A-T: Cobalt	U770-78-7	0.001	mg/L	<0.001	<0.001	0.00	' o b/n/t
		VG0L0A-T: Copper	U770-50-8	0.001	mg/L	<0.001	<0.001	0.00	' o b/n/t
		VG0L0A-T: Lead	U73K-KL-1	0.001	mg/L	<0.001	<0.001	0.00	' o b/n/t
		VG0L0A-T: Manganese	U73K-KB-5	0.001	mg/L	<0.001	<0.001	0.00	' o b/n/t
		VG0L0A-T: Nickel	U770-0L-0	0.001	mg/L	<0.001	<0.001	0.00	' o b/n/t
		VG0L0A-T: Zinc	U770-66-6	0.005	mg/L	<0.005	<0.005	0.00	' o b/n/t
		VG0L0A-T: Selenium	UL8L-7K-L	0.01	mg/L	<0.01	<0.01	0.00	' o b/n/t
		VG0L0A-T: Vanadium	U770-6L-L	0.01	mg/L	<0.01	<0.01	0.00	' o b/n/t
		VG0L0A-T: Boron	U770-7L-8	0.05	mg/L	<0.05	<0.05	0.00	' o b/n/t
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1843471)									
VM181L00L-0U8	Anonymous	VG035T: Mercury	U73K-KU6	0.0001	mg/L	<0.0001	<0.0001	0.00	' o b/n/t
VM181L153-001	Anonymous	VG035T: Mercury	U73K-KU6	0.0001	mg/L	<0.0001	<0.0001	0.00	' o b/n/t
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1842749)									
VM1811KL3-0L8	Anonymous	VP080: C8 - C14 Fraction	---	L0	µg/L	<L0	<L0	0.00	' o b/n/t

Page : 6 of 11
Work Order : EM1812116
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Road

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1842749) - continued									
EM1812132-006	Anonymous	EP080: C6 - C9 Fraction	---	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1842749)									
EM1811923-028	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EM1812132-006	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1842749)									
EM1811923-028	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EM1812132-006	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Page : 4 of 11
[ork Order : VM181L116
Clfent : GVO-V' 3HRO' MV' TAb AOb. TIO' A
Project : ' ew Town Road

Method Blank (MB) and Laboratory Control Spike (LCS) Report

Tde quality control tern Metdod / bat oratory Vlank refers to an analyte free natrfx to wdfod all reagents are added 'n tde sane nolunes or \ro\ortfons as used 'n standard san\le \re\arst'on. Tde \urnose of tdfs QC \aran'eter 's to non'tor \otent'al lat oratory contan'nat'on. Tde quality control tern bat oratory Control A\ke (bCA) refers to a certified reference natenalU or a known 'nterference free natrfx s\fked wtfd target analytes. Tde \urnose of tdfs QC \aran'eter 's to non'tor netdod \rec'sfon and accuracy 'nde\endent of san\le natrfx. Mynan'c Recovery b'n'ts are t ased on stat'st'cal emlsulfon of \rocessed bCA.

Aut-Matrfx: SOIL

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 1840334)								
VG005T: Arsen'c	U770-38-L	5	ng/kg	<5	L1.Ung/kg	K3.8	UK	113
VG005T: Vár'un	U770-3K-3	10	ng/kg	<10	173 ng/kg	K6.8	UK	110
VG005T: Véryll'un	U770-71-U	1	ng/kg	<1	5.63 ng/kg	K5.U	85	1L0
VG005T: Véron	U770-7L-8	50	ng/kg	<50	33.L ng/kg	101	8L	1L6
VG005T: Cadn'un	U770-73-K	1	ng/kg	<1	7.67 ng/kg	85.8	85	10K
VG005T: Cdron'un	U770-7U-3	L	ng/kg	<L	73.Kng/kg	K6.U	83	10K
VG005T: Cot alt	U770-78-7	L	ng/kg	<L	16 ng/kg	K0.1	U8	11L
VG005T: Co\\er	U770-50-8	5	ng/kg	<5	3L ng/kg	K7.6	U8	108
VG005T: bead	U73K-KL-1	5	ng/kg	<5	70 ng/kg	K1.K	U8	106
VG005T: Manganese	U73K-K6-5	5	ng/kg	<5	130 ng/kg	K5.0	8L	10U
VG005T: ' 'okel	U770-0L-0	L	ng/kg	<L	55 ng/kg	K6.K	8L	111
VG005T: Aelen'un	UU8L-7K-L	5	ng/kg	<5	5.3Ung/kg	101	K3	10K
VG005T: 3anad'un	U770-6L-L	5	ng/kg	<5	LK.6 ng/kg	K5.0	80	10K
VG005T: _'nc	U770-66-6	5	ng/kg	<5	60.8 ng/kg	K6.L	8L	111
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1840335)								
VG035T: Mercury	U73K-KU-6	0.1	ng/kg	<0.1	L.5Ung/kg	K5.6	UU	107
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1840323)								
VP0U5(AM): ' a\dtdalene	K1-L0-3	0.5	ng/kg	<0.5	3 ng/kg	KU8	U5	131
VP0U5(AM): Acena\dtdylene	L08-K8-8	0.5	ng/kg	<0.5	3 ng/kg	K3.0	U0	13L
VP0U5(AM): Acena\dtdene	83-3L-K	0.5	ng/kg	<0.5	3 ng/kg	K8.U	80	1L8
VP0U5(AM): Fluorene	86-U6-U	0.5	ng/kg	<0.5	3 ng/kg	K8.K	U0	1L8
VP0U5(AM): Pdenantdrene	85-01-8	0.5	ng/kg	<0.5	3 ng/kg	10L	80	1L8
VP0U5(AM): Antdracene	1L0-1L-U	0.5	ng/kg	<0.5	1.6 ng/kg	KK.L	UL	1L6
VP0U5(AM): Fluorantdene	L08-77-0	0.5	ng/kg	<0.5	3 ng/kg	K7.7	U0	1L8
VP0U5(AM): Pyrene	1LK-00-0	0.5	ng/kg	<0.5	3 ng/kg	K8.K	80	1L5
VP0U5(AM): Wenz(a)antdracene	56-55-3	0.5	ng/kg	<0.5	3 ng/kg	K0.L	U0	130
VP0U5(AM): Cdrysene	L18-01-K	0.5	ng/kg	<0.5	3 ng/kg	K7.U	80	1L6
VP0U5(AM): Wenzo(t +j)fluorantdene	L05-KK-L L05-8L-3	0.5	ng/kg	<0.5	3 ng/kg	K3.L	U1	1L7
VP0U5(AM): Wenzo(k)fluorantdene	L0U-08-K	0.5	ng/kg	<0.5	3 ng/kg	101	U5	1L5
VP0U5(AM): Wenzo(a)\yrene	50-3L-8	0.5	ng/kg	<0.5	3 ng/kg	88.8	U0	1L5
VP0U5(AM): Ikdeno(1.L.3.cd)\yrene	1K3-3K-5	0.5	ng/kg	<0.5	3 ng/kg	K7.6	U1	1L8
VP0U5(AM): M't enz(a.d)antdracene	53-L0-3	0.5	ng/kg	<0.5	3 ng/kg	KU0	UL	1L6
VP0U5(AM): Wenzo(g.d.')\yerylene	1K1-L7-L	0.5	ng/kg	<0.5	3 ng/kg	K6.6	68	1LU

Page : 8 of 11
Work Order : EM1812116
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Road

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Laboratory Control Spike (LCS) Report: Spike Recovery (%): LCS	Laboratory Control Spike (LCS) Report: Recovery Limits (%): Low	Laboratory Control Spike (LCS) Report: Recovery Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1840010)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	36 mg/kg	82.5	70	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1840322)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	806 mg/kg	92.8	80	120
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3006 mg/kg	99.0	84	115
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	1584 mg/kg	93.0	80	112
EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1840010)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	79.2	68	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1840322)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	1160 mg/kg	95.2	83	117
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	3978 mg/kg	96.9	82	114
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	313 mg/kg	79.7	73	115
EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080: BTEXN (QCLot: 1840010)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	76.2	74	124
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	85.6	77	125
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	83.4	73	125
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	93.2	77	128
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	97.2	81	128
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	85.8	66	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Laboratory Control Spike (LCS) Report: Spike Recovery (%): LCS	Laboratory Control Spike (LCS) Report: Recovery Limits (%): Low	Laboratory Control Spike (LCS) Report: Recovery Limits (%): High
EG020T: Total Metals by ICP-MS (QCLot: 1842761)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.9	90	110
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	96.4	88	113
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	98.1	88	112
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.0	86	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	93.1	87	109
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	94.0	88	113
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	92.6	87	108
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	94.8	88	109
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	95.1	88	111
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	95.2	87	111
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	92.6	85	113
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	94.0	88	112
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	96.0	87	113

Page : 9 of 11
Work Order : EM1812116
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Road

Sub-Matrix: WATER

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 1842761) - continued								
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	99.9	88	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1843471)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	105	81	114
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1840424)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	61.3	48	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	63.5	49	124
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	65.5	53	117
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	69.4	54	118
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	70.8	57	119
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	72.3	51	113
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	73.9	59	123
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	73.6	58	123
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	70.9	52	126
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	76.0	55	123
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	76.8	52	131
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	82.8	57	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	79.6	56	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	75.1	53	123
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	74.5	53	125
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	75.7	53	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1840423)								
EP071: C10 - C14 Fraction	---	50	µg/L	<50	4331 µg/L	79.8	58	134
EP071: C15 - C28 Fraction	---	100	µg/L	<100	16952 µg/L	86.8	60	133
EP071: C29 - C36 Fraction	---	50	µg/L	<50	8695 µg/L	84.8	54	137
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1842749)								
EP080: C6 - C9 Fraction	---	20	µg/L	<20	360 µg/L	108	68	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1840423)								
EP071: >C10 - C16 Fraction	---	100	µg/L	<100	6292 µg/L	89.3	58	122
EP071: >C16 - C34 Fraction	---	100	µg/L	<100	22143 µg/L	85.1	56	132
EP071: >C34 - C40 Fraction	---	100	µg/L	<100	1677 µg/L	77.5	58	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1842749)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	106	66	123
EP080: BTEXN (QCLot: 1842749)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	106	74	123
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	109	77	128
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	107	73	126

Page : 10 of 11
Work Order : EM1812116
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Road

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Laboratory Control Spike (LCS) Report: Spike Recovery (%): LCS	Laboratory Control Spike (LCS) Report: Recovery Limits (%): Low	Laboratory Control Spike (LCS) Report: Recovery Limits (%): High
EP080: BTEXN (QCLot: 1842749) - continued								
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	110	72	131
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	108	74	131
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	98.6	74	124

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	Matrix Spike (MS) Report: SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005T: Total Metals by ICP-AES (QCLot: 1840334)							
EM1812066-030	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	91.6	78	124
		EG005T: Barium	7440-39-3	50 mg/kg	106	71	135
		EG005T: Beryllium	7440-41-7	50 mg/kg	101	85	125
		EG005T: Cadmium	7440-43-9	50 mg/kg	92.7	84	116
		EG005T: Chromium	7440-47-3	50 mg/kg	98.0	79	121
		EG005T: Copper	7440-50-8	50 mg/kg	94.7	82	124
		EG005T: Lead	7439-92-1	50 mg/kg	90.6	76	124
		EG005T: Manganese	7439-96-5	50 mg/kg	108	68	136
		EG005T: Nickel	7440-02-0	50 mg/kg	93.8	78	120
		EG005T: Selenium	7782-49-2	50 mg/kg	84.0	71	125
		EG005T: Vanadium	7440-62-2	50 mg/kg	98.3	76	124
		EG005T: Zinc	7440-66-6	50 mg/kg	102	74	128
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1840335)							
EM1812066-030	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	110	76	116
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1840323)							
EM1811915-049	Anonymous	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	91.7	67	117
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	95.9	52	148
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1840010)							
EM1812105-007	Anonymous	EP080: C6 - C9 Fraction	---	28 mg/kg	60.8	42	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1840322)							
EM1811915-049	Anonymous	EP071: C10 - C14 Fraction	---	806 mg/kg	92.6	53	123
		EP071: C15 - C28 Fraction	---	3006 mg/kg	98.1	70	124
		EP071: C29 - C36 Fraction	---	1584 mg/kg	92.6	64	118
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1840010)							

Page : 11 of 11
Work Order : VM181L116
Client : GVO-V' 3HRO' MV' TAb AOb. TKO' A
Project : ' ew Town Road

ALS

Aut-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1840010) - continued							
VM181L105-00U	Anonymous	VP080: C6 - C10 Fraction	C6ZC10	33 ng/kg	5K.U	3K	1LK
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1840322)							
VM1811K15-07K	Anonymous	VP0U1: >C10 - C16 Fraction	----	1160 ng/kg	K7.5	65	1L3
		VP0U1: >C16 - C37 Fraction	----	3KU8 ng/kg	K8.1	6U	1L1
		VP0U1: >C37 - C70 Fraction	----	313 ng/kg	83.7	77	1L8
EP080: BTEXN (QCLot: 1840010)							
VM181L105-00U	Anonymous	VP080: Wenzene	Ul-73-L	L ng/kg	6UK	50	136
		VP080: Toluene	108-88-3	L ng/kg	U5.6	56	13K

Aut-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 1842761)							
VM1811U83-001	Anonymous	VG0L0A-T: Arsenic	U770-38-L	1 ng/b	K3.3	8L	118
		VG0L0A-T: Weryll'un	U770-71-U	1 ng/b	K8.6	UK	1L1
		VG0L0A-T: Wer'un	U770-3K-3	1 ng/b	K7.5	80	117
		VG0L0A-T: Cadn'un	U770-73-K	0.L5 ng/b	KL.6	U5	1LK
		VG0L0A-T: Cdron'un	U770-7U-3	1 ng/b	K3.L	80	118
		VG0L0A-T: Cot alt	U770-78-7	1 ng/b	86.U	8L	1L0
		VG0L0A-T: Co\/\/er	U770-50-8	1 ng/b	K1.1	81	115
		VG0L0A-T: bead	U73K-KL-1	1 ng/b	88.8	83	1L1
		VG0L0A-T: Manganese	U73K-K8-5	1 ng/b	K3.K	U8	1L3
		VG0L0A-T: ' 'ckel	U770-0L-0	1 ng/b	K1.6	80	118
		VG0L0A-T: 3 anad'un	U770-6L-L	1 ng/b	KL.8	81	11K
		VG0L0A-T: _'nc	U770-66-6	1 ng/b	K1.8	U7	116
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1843471)							
VM181L105-03K	Anonymous	VG035T: Mercury	U73K-KU-6	0.01 ng/b	101	UD	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1842749)							
VM1811KKL-011	Anonymous	VP080: C6 - CK Fraction	----	L80 µg/b	87.5	73	1L5
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1842749)							
VM1811KKL-011	Anonymous	VP080: C6 - C10 Fraction	C6ZC10	330 µg/b	80.8	77	1LL
EP080: BTEXN (QCLot: 1842749)							
VM1811KKL-011	Anonymous	VP080: Wenzene	Ul-73-L	L0 µg/b	100	68	130
		VP080: Toluene	108-88-3	L0 µg/b	105	UL	13L

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM1812116**	Page	: 1 of 7
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Telephone	: +61-3-8549 9630
Project	: New Town Road	Date Samples Received	: 31-Jul-2018
Site	: ----	Issue Date	: 03-Aug-2018
Sampler	: SJ	No. of samples received	: 5
Order number	: 30 July 2018	No. of samples analysed	: 4

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

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Page : 2 of 7
Work Order : EM1812116
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Road

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	2	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	3	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	2	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	3	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
BH20 0.5-0.6, BH20 1.0-1.1	30-Jul-2018	---	---	---	31-Jul-2018	13-Aug-2018	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
BH20 0.5-0.6, BH20 1.0-1.1	30-Jul-2018	01-Aug-2018	26-Jan-2019	✓	01-Aug-2018	26-Jan-2019	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
BH20 0.5-0.6, BH20 1.0-1.1	30-Jul-2018	01-Aug-2018	27-Aug-2018	✓	02-Aug-2018	27-Aug-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM))							
BH20 0.5-0.6, BH20 1.0-1.1	30-Jul-2018	31-Jul-2018	13-Aug-2018	✓	31-Jul-2018	09-Sep-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080)							
BH20 0.5-0.6, BH20 1.0-1.1	30-Jul-2018	31-Jul-2018	13-Aug-2018	✓	02-Aug-2018	13-Aug-2018	✓
Soil Glass Jar - Unpreserved (EP071)							
BH20 0.5-0.6, BH20 1.0-1.1	30-Jul-2018	31-Jul-2018	13-Aug-2018	✓	31-Jul-2018	09-Sep-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080)							
BH20 0.5-0.6, BH20 1.0-1.1	30-Jul-2018	31-Jul-2018	13-Aug-2018	✓	02-Aug-2018	13-Aug-2018	✓
Soil Glass Jar - Unpreserved (EP071)							
BH20 0.5-0.6, BH20 1.0-1.1	30-Jul-2018	31-Jul-2018	13-Aug-2018	✓	31-Jul-2018	09-Sep-2018	✓

Page : 3 of 7
Work Order : EM1812116
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Road

Matrix: **SOIL** — Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080)								
BH20 0.5-0.6,	BH20 1.0-1.1	30-Jul-2018	31-Jul-2018	13-Aug-2018	✓	02-Aug-2018	13-Aug-2018	✓

Matrix: **WATER** — Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T)								
Field Blank 4,	Rinsate 4	30-Jul-2018	01-Aug-2018	26-Jan-2019	✓	01-Aug-2018	26-Jan-2019	✓
EG035T: Total Recoverable Mercury by FIMS								
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG035T)								
Field Blank 4,	Rinsate 4	30-Jul-2018	---	---	---	01-Aug-2018	27-Aug-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP075(SIM))								
Field Blank 4,	Rinsate 4	30-Jul-2018	31-Jul-2018	06-Aug-2018	✓	01-Aug-2018	09-Sep-2018	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071)								
Field Blank 4,	Rinsate 4	30-Jul-2018	31-Jul-2018	06-Aug-2018	✓	01-Aug-2018	09-Sep-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)								
Field Blank 4,	Rinsate 4	30-Jul-2018	01-Aug-2018	13-Aug-2018	✓	01-Aug-2018	13-Aug-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber Glass Bottle - Unpreserved (EP071)								
Field Blank 4,	Rinsate 4	30-Jul-2018	31-Jul-2018	06-Aug-2018	✓	01-Aug-2018	09-Sep-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)								
Field Blank 4,	Rinsate 4	30-Jul-2018	01-Aug-2018	13-Aug-2018	✓	01-Aug-2018	13-Aug-2018	✓
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)								
Field Blank 4,	Rinsate 4	30-Jul-2018	01-Aug-2018	13-Aug-2018	✓	01-Aug-2018	13-Aug-2018	✓

Page : 4 of 7
Work Order : EM1812116
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Road

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	1	4	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*	
Laboratory Duplicates (DUP)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	2	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	3	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Page : 5 of 7
Work Order : EM1812116
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Road

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS) - Continued							
Total Mercury by FIMS	EG035T	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	2	0.00	5.00	×	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	3	0.00	5.00	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Page	: 6 of 7
Work Order	: EM1812116
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: New Town Road

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house. A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A. Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A. The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)

Page	: 7 of 7
Work Order	: EM1812116
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: New Town Road

Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B. Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion. 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B. 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM1814666**	Page	: 1 of 6
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Project	: New Town Rd	Date Samples Received	: 13-Sep-2018
Order number	:	Date Analysis Commenced	: 13-Sep-2018
C-O-C number	: ----	Issue Date	: 17-Sep-2018
Sampler	: AARON PLUMMER		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 3		
No. of samples analysed	: 3		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

RIGHT SOLUTIONS | RIGHT PARTNER

Page : 2 of 6
Work Order : EM1814666
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Rd

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1929583)									
EM1814560-006	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0026	0.0019	29.1	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.100	0.090	11.0	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.039	0.036	6.94	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.007	0.007	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.025	<0.025	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.25	<0.25	0.00	No Limit
EM1814553-011	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0004	0.0005	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.010	0.010	0.00	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.134	0.132	1.74	0% - 20%
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	6.72	6.55	2.52	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.143	0.143	0.00	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	1.67	1.65	1.04	0% - 20%

Page : 3 of 6
Work Order : EM1814666
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Rd

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1929583) - continued									
EM1814553-011	Anonymous	EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.53	0.51	4.05	0% - 50%
EG035F: Dissolved Mercury by FIMS (QC Lot: 1929585)									
EM1814666-001	MW1	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1929689)									
EM1814586-001	Anonymous	EP080: C6 - C9 Fraction	---	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1929689)									
EM1814586-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1929689)									
EM1814586-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Page : 4 of 6
Work Order : EM1814666
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Rd

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1929583)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	91.5	91	107
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	99.2	82	113
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	92.4	84	106
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	93.4	84	104
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	96.2	83	103
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	92.0	83	106
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	90.4	82	103
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	94.0	83	105
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	101	83	105
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	93.2	82	106
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	93.5	82	109
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	99.1	83	106
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	102	85	109
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	102	84	116
EG035F: Dissolved Mercury by FIMS (QCLot: 1929585)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	88.2	81	114
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1930069)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	87.6	48	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	89.9	49	124
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	92.9	53	117
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	93.8	54	118
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	96.2	57	119
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	96.7	51	113
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	94.4	59	123
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	93.1	58	123
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	92.5	52	126
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	96.3	55	123
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	99.8	52	131
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	101	57	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	101	56	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	97.2	53	123
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	96.5	53	125
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	97.4	53	125

Page : 5 of 6
Work Order : EM1814666
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Rd

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1929689)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	73.8	68	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1930070)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	4331 µg/L	79.1	58	134
EP071: C15 - C28 Fraction	----	100	µg/L	<100	16952 µg/L	78.9	60	133
EP071: C29 - C36 Fraction	----	50	µg/L	<50	8695 µg/L	79.2	54	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1929689)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	72.6	66	123
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1930070)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	6292 µg/L	77.5	58	122
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	22143 µg/L	81.0	56	132
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1677 µg/L	82.1	58	137
EP080: BTEXN (QCLot: 1929689)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	78.9	74	123
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	81.4	77	128
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	84.3	73	126
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	86.5	72	131
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	93.7	74	131
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	99.0	74	124

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1929583)							
EM1814553-011	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	90.8	85	131
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	102	73	141
		EG020A-F: Barium	7440-39-3	0.2 mg/L	92.9	75	127
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	91.4	81	133
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	95.0	71	135
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	87.1	78	132
		EG020A-F: Copper	7440-50-8	0.2 mg/L	89.4	76	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	92.8	75	133
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	# Not Determined	64	134

Page : 6 of 6
Work Order : EM1814666
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Rd

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1929583) - continued							
EM1814553-011	Anonymous	EG020A-F: Nickel	7440-02-0	0.2 mg/L	91.4	73	131
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	99.0	73	131
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	# Not Determined	75	131
EG035F: Dissolved Mercury by FIMS (QCLot: 1929585)							
EM1814666-002	DUPLICATE	EG035F: Mercury	7439-97-6	0.01 mg/L	83.5	70	120
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1929689)							
EM1814586-002	Anonymous	EP080: C6 - C9 Fraction	---	280 µg/L	68.6	43	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1929689)							
EM1814586-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	66.2	44	122
EP080: BTEXN (QCLot: 1929689)							
EM1814586-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	77.9	68	130
		EP080: Toluene	108-88-3	20 µg/L	83.5	72	132

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM1814666	Page	: 1 of 5
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Telephone	: +61-3-8549 9630
Project	: New Town Rd	Date Samples Received	: 13-Sep-2018
Site	: ----	Issue Date	: 17-Sep-2018
Sampler	: AARON PLUMMER	No. of samples received	: 3
Order number	:	No. of samples analysed	: 3

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

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Page : 2 of 5
Work Order : EM1814666
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Rd

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EG020F: Dissolved Metals by ICP-MS	EM1814553--011	Anonymous	**Manganese**	7439-96-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG020F: Dissolved Metals by ICP-MS	EM1814553--011	Anonymous	**Zinc**	7440-66-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	5	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	3	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	5	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	3	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER** Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)								
MW1.	DUPLICATE	**11-Sep-2018**	----	----	----	**13-Sep-2018**	10-Mar-2019	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Filtered; Lab-acidified (EG035F)								
MW1.	DUPLICATE	**11-Sep-2018**	----	----	----	**14-Sep-2018**	09-Oct-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP075(SIM))								
MW1, FIELD BLANK	DUPLICATE,	**11-Sep-2018**	**13-Sep-2018**	18-Sep-2018	✓	**14-Sep-2018**	23-Oct-2018	✓

Page	: 3 of 5
Work Order	: EM1814666
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: New Town Rd

Matrix: **WATER**

Evaluation: x = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071)								
MW1,	DUPLICATE,	11-Sep-2018	13-Sep-2018	18-Sep-2018	✓	14-Sep-2018	23-Oct-2018	✓
FIELD BLANK								
Amber VOC Vial - Sulfuric Acid (EP080)								
MW1,	DUPLICATE,	11-Sep-2018	13-Sep-2018	25-Sep-2018	✓	14-Sep-2018	25-Sep-2018	✓
FIELD BLANK								
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber Glass Bottle - Unpreserved (EP071)								
MW1,	DUPLICATE,	11-Sep-2018	13-Sep-2018	18-Sep-2018	✓	14-Sep-2018	23-Oct-2018	✓
FIELD BLANK								
Amber VOC Vial - Sulfuric Acid (EP080)								
MW1,	DUPLICATE,	11-Sep-2018	13-Sep-2018	25-Sep-2018	✓	14-Sep-2018	25-Sep-2018	✓
FIELD BLANK								
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)								
MW1,	DUPLICATE,	11-Sep-2018	13-Sep-2018	25-Sep-2018	✓	14-Sep-2018	25-Sep-2018	✓
FIELD BLANK								

Page	: 4 of 5
Work Order	: EM1814666
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: New Town Rd

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*	
Laboratory Duplicates (DUP)							
Dissolved Mercury by FIMS	EG035F	1	2	50.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	5	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	3	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	9	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Dissolved Mercury by FIMS	EG035F	1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Dissolved Mercury by FIMS	EG035F	1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Dissolved Mercury by FIMS	EG035F	1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	5	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	3	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Page	5 of 5
Work Order	EM1814666
Client	GEO-ENVIRONMENTAL SOLUTIONS
Project	New Town Rd

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A. The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Preparation Methods	**Method**	**Matrix**	**Method Descriptions**
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: ES1827248	Page	: 1 of 6
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Sydney
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Project	: New Town Rd	Date Samples Received	: 14-Sep-2018
Order number	:	Date Analysis Commenced	: 14-Sep-2018
C-O-C number	: ----	Issue Date	: 18-Sep-2018
Sampler	: A. Plummer		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 1		
No. of samples analysed	: 1		

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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW

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Page : 2 of 6
Work Order : ES1827248
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Rd

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1933929)									
ES1827107-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.012	0.011	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES1827080-014	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.019	0.019	0.00	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.011	0.013	17.4	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit

Page : 3 of 6
Work Order : ES1827248
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Rd

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1933929) - continued									
ES1827080-014	Anonymous	EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.16	0.16	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 1933926)									
ES1826970-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1827080-004	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1934107)									
ES1827115-001	Anonymous	EP080: C8 - C9 Fraction	---	20	µg/L	<20	<20	0.00	No Limit
ES1827115-015	Anonymous	EP080: C8 - C9 Fraction	---	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1934107)									
ES1827115-001	Anonymous	EP080: C8 - C10 Fraction	C8_C10	20	µg/L	<20	<20	0.00	No Limit
ES1827115-015	Anonymous	EP080: C8 - C10 Fraction	C8_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1934107)									
ES1827115-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1827115-015	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Page : 4 of 6
Work Order : ES1827248
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Rd

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1933929)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	89.3	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	88.1	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	88.9	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	89.0	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	89.2	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	91.2	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	91.1	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	95.9	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	91.1	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	89.1	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	85.5	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	90.5	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	86.5	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	86.8	85	115
EG035F: Dissolved Mercury by FIMS (QCLot: 1933926)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	90.5	83	105
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1932010)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	73.0	50	94
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	89.1	64	114
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	84.2	62	113
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	96.5	64	115
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	98.1	63	116
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	94.8	64	116
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	101	64	118
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	104	63	118
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	86.2	64	117
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	85.4	63	116
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	89.3	62	119
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	86.6	63	115
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	95.8	63	117
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	93.1	60	118
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	98.5	61	117
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	90.1	59	118

Page : 5 of 6
Work Order : ES1827248
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Rd

Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1932009)								
EP071: C10 - C14 Fraction	---	50	µg/L	<50	2000 µg/L	83.6	76	116
EP071: C15 - C28 Fraction	---	100	µg/L	<100	3000 µg/L	93.5	83	109
EP071: C29 - C36 Fraction	---	50	µg/L	<50	2000 µg/L	83.7	75	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1934107)								
EP080: C6 - C9 Fraction	---	20	µg/L	<20	260 µg/L	113	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1932009)								
EP071: >C10 - C16 Fraction	---	100	µg/L	<100	2500 µg/L	93.8	76	114
EP071: >C16 - C34 Fraction	---	100	µg/L	<100	3500 µg/L	96.9	81	111
EP071: >C34 - C40 Fraction	---	100	µg/L	<100	1500 µg/L	95.8	77	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1934107)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	116	75	127
EP080: BTEXN (QCLot: 1934107)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	106	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	105	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	103	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	99.0	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	103	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	103	70	120

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1933929)							
ES1827080-012	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	96.0	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	93.3	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	93.0	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	92.1	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	92.8	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	94.1	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	90.7	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	91.9	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	91.0	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	92.0	70	130

Page : 6 of 6
Work Order : ES1827248
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Rd

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1933929) - continued							
ES1827080-012	Anonymous	EG020A-F: Vanadium	7440-62-2	1 mg/L	93.9	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	92.2	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 1933926)							
ES1826926-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	74.8	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1934107)							
ES1827115-001	Anonymous	EP080: C6 - C9 Fraction	---	325 µg/L	105	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1934107)							
ES1827115-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	106	70	130
EP080: BTEXN (QCLot: 1934107)							
ES1827115-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	100	70	130
		EP080: Toluene	108-88-3	25 µg/L	106	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	106	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	105	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	107	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	105	70	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1827248	Page	: 1 of 4
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Sydney
Contact	: SARAH JOYCE	Telephone	: +61-3-8549 9630
Project	: New Town Rd	Date Samples Received	: 14-Sep-2018
Site	: ----	Issue Date	: 18-Sep-2018
Sampler	: A. Plummer	No. of samples received	: 1
Order number	:	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

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Page : 2 of 4
Work Order : ES1827248
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Rd

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	5	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	5	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	5	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	5	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-F)							
TRIPLICATE	11-Sep-2018	----	----	----	17-Sep-2018	10-Mar-2019	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG035F)							
TRIPLICATE	11-Sep-2018	----	----	----	17-Sep-2018	25-Sep-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
TRIPLICATE	11-Sep-2018	14-Sep-2018	18-Sep-2018	✓	15-Sep-2018	24-Oct-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
TRIPLICATE	11-Sep-2018	14-Sep-2018	18-Sep-2018	✓	14-Sep-2018	24-Oct-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
TRIPLICATE	11-Sep-2018	17-Sep-2018	25-Sep-2018	✓	17-Sep-2018	25-Sep-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
TRIPLICATE	11-Sep-2018	14-Sep-2018	18-Sep-2018	✓	14-Sep-2018	24-Oct-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
TRIPLICATE	11-Sep-2018	17-Sep-2018	25-Sep-2018	✓	17-Sep-2018	25-Sep-2018	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
TRIPLICATE	11-Sep-2018	17-Sep-2018	25-Sep-2018	✓	17-Sep-2018	25-Sep-2018	✓

Page	: 3 of 4
Work Order	: ES1827248
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: New Town Rd

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*	
Laboratory Duplicates (DUP)							
Dissolved Mercury by FIMS	EG035F	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	5	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	5	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Dissolved Mercury by FIMS	EG035F	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Dissolved Mercury by FIMS	EG035F	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Dissolved Mercury by FIMS	EG035F	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	5	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	5	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Page	4 of 4
Work Order	ES1827248
Client	GEO-ENVIRONMENTAL SOLUTIONS
Project	New Town Rd

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A. The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Preparation Methods	**Method**	**Matrix**	**Method Descriptions**
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM1816786**	Page	: 1 of 5
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Project	: New Town Road	Date Samples Received	: 18-Oct-2018
Order number	:	Date Analysis Commenced	: 19-Oct-2018
C-O-C number	: ----	Issue Date	: 24-Oct-2018
Sampler	: SJ		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 3		
No. of samples analysed	: 3		

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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC

Page : 2 of 5
Work Order : EM1816786
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Road

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1990701)									
EM1816784-003	Anonymous	EA055: Moisture Content	----	0.1	%	12.2	12.3	0.00	0% - 50%
EM1816785-005	Anonymous	EA055: Moisture Content	----	0.1	%	4.2	5.1	19.9	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1990935)									
EM1816790-041	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EM1816790-005	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Page : 3 of 5
Work Order : EM1816786
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Road

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1990935) - continued									
EM1816790-005	Anonymous	EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Page	: 4 of 5
Work Order	: EM1816786
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: New Town Road

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1990935)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	100	75	131
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	94.8	70	132
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	99.9	80	128
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	98.9	70	128
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	102	80	128
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	104	72	126
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	101	70	128
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	103	80	125
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	97.5	70	130
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	104	80	126
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	86.0	71	124
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	104	75	125
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	85.8	70	125
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	90.0	71	128
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	92.5	72	126
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	92.6	68	127

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1996114)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	63.6	48	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	67.7	49	124
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	66.9	53	117
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	68.7	54	118
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	70.2	57	119
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	70.1	51	113
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	70.8	59	123
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	69.3	58	123
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	71.3	52	126
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	70.9	55	123
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	69.4	52	131
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	71.4	57	126

Page : 5 of 5
Work Order : EM1816786
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Road

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1996114) - continued								
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	71.6	56	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	68.2	53	123
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	67.2	53	125
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	68.5	53	125

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1990935)							
EM1816786-002	GT01	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	91.8	67	117
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	# Not Determined	52	148

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM1816786	Page	: 1 of 5
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Telephone	: +6138549 9630
Project	: New Town Road	Date Samples Received	: 18-Oct-2018
Site	: ----	Issue Date	: 24-Oct-2018
Sampler	: SJ	No. of samples received	: 3
Order number	:	No. of samples analysed	: 3

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Page : 2 of 5
Work Order : EM1816786
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Road

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1816786--002	GT01	**Pyrene**	129-00-0	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	4	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	4	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
GT02, GT03	GT01,	**17-Oct-2018**	----	----	----	**19-Oct-2018**	31-Oct-2018	✓
EN33: TCLP Leach								
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN33a)								
GT02, GT03	GT01,	**17-Oct-2018**	**22-Oct-2018**	31-Oct-2018	✓	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
GT02, GT03	GT01,	**17-Oct-2018**	**19-Oct-2018**	31-Oct-2018	✓	**19-Oct-2018**	28-Nov-2018	✓

Matrix: **WATER** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation

Page : 3 of 5
Work Order : EM1816786
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Road

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
GT02, GT01, GT03	**22-Oct-2018**	**23-Oct-2018**	29-Oct-2018	✓	**23-Oct-2018**	02-Dec-2018	✓

Page : 4 of 5
Work Order : EM1816786
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Road

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	4	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	4	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard

Page	: 5 of 5
Work Order	: EM1816786
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: New Town Road

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)

Preparation Methods	Method	Matrix	Method Descriptions
TCLP for Non & Semivolatile Analytes	EN33a	SOIL	In house QWI-EN/33 referenced to USEPA SW846-1311: The TCLP procedure is designed to determine the mobility of both organic and inorganic analytes present in wastes. The standard TCLP leach is for non-volatile and Semivolatile test parameters.
Separatory Funnel Extraction of Liquids	ORG14	SOIL	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM1817421**	Page	: 1 of 16
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Project	: 48-52	Date Samples Received	: 30-Oct-2018
Order number	:	Date Analysis Commenced	: 30-Oct-2018
C-O-C number	: ----	Issue Date	: 05-Nov-2018
Sampler	: GM		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 28		
No. of samples analysed	: 28		

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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Andrew Lu	VOC Section Supervisor	Melbourne Organics, Springvale, VIC
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC
Steven McGrath	Technical Manager	Melbourne Organics, Springvale, VIC

Page : 2 of 16
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2010996)									
EM1817397-012	Anonymous	EA055: Moisture Content	----	0.1	%	5.6	3.8	38.3	No Limit
EM1817415-017	Anonymous	EA055: Moisture Content	----	0.1	%	29.9	29.1	2.80	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2010997)									
EM1817421-009	BH22 2.5-2.6	EA055: Moisture Content	----	0.1	%	17.4	17.7	1.69	0% - 50%
EM1817421-019	BH24 2.5-2.6	EA055: Moisture Content	----	0.1	%	12.6	10.6	17.2	0% - 50%
EG005T: Total Metals by ICP-AES (QC Lot: 2011178)									
EM1817359-001	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	1	1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	60	60	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	7	7	0.00	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	4	5	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	11	12	11.5	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	12	10	17.3	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	16	18	13.3	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	15	18	16.8	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	63	98	43.0	0% - 50%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	14	14	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	59	66	11.9	0% - 50%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EM1817415-015	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	1	1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	50	60	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	44	46	3.27	0% - 20%

Page : 3 of 16
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005T: Total Metals by ICP-AES (QC Lot: 2011178) - continued									
EM1817415-015	Anonymous	EG005T: Cobalt	7440-48-4	2	mg/kg	11	11	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	30	30	0.00	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	10	8	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	14	15	7.73	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	11	12	13.9	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	80	87	8.52	0% - 50%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	52	53	3.37	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	38	44	14.1	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 2011180)									
EM1817421-009	BH22 2.5-2.6	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	90	80	12.7	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	25	20	23.1	0% - 50%
		EG005T: Cobalt	7440-48-4	2	mg/kg	23	15	38.8	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	24	18	27.0	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	58	50	14.0	0% - 50%
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	358	354	1.28	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	119	102	15.4	0% - 20%
		EG005T: Zinc	7440-66-6	5	mg/kg	37	34	9.48	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EM1817421-018	BH24 1.5-1.6	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	160	180	11.1	0% - 50%
		EG005T: Chromium	7440-47-3	2	mg/kg	19	18	0.00	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	9	12	24.8	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	13	12	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	15	16	7.30	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	31	45	35.5	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	222	206	7.28	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	47	55	15.4	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	51	56	8.78	0% - 50%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2011179)									

Page : 4 of 16
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2011179) - continued									
EM1817359-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EM1817415-015	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2011181)									
EM1817421-009	BH22 2.5-2.6	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EM1817421-018	BH24 1.5-1.6	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.1	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2011381)									
EM1817421-001	BH21 0.5-0.6	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	1.5	1.6	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	0.7	0.6	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	0.9	1.1	15.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	12.8	12.9	0.00	0% - 20%
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	3.6	3.0	18.8	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	26.9	# 20.1	28.9	0% - 20%
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	25.2	# 19.2	27.0	0% - 20%
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	10.6	# 7.2	38.4	0% - 20%
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	10.1	# 6.9	37.6	0% - 20%
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	16.3	# 10.8	40.7	0% - 20%
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	5.8	4.2	32.0	0% - 50%
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	14.3	# 9.4	41.8	0% - 20%
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	8.6	6.2	31.4	0% - 50%
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	1.7	1.1	39.2	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	11.5	# 8.2	33.7	0% - 20%
EM1817421-011	BH23 0.5-0.6	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	1.2	<0.5	84.4	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	0.6	<0.5	22.4	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	0.9	<0.5	57.1	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	8.7	# 4.0	74.2	0% - 50%
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	2.2	0.9	81.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	13.0	# 6.4	69.0	0% - 20%
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	12.9	# 6.4	66.9	0% - 20%
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	5.1	# 2.3	75.9	0% - 50%
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	5.0	2.2	75.9	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	8.0	# 3.5	77.3	0% - 50%
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	2.9	1.2	85.8	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	6.7	# 2.9	78.9	0% - 50%
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	4.1	1.7	81.8	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	1.0	<0.5	64.8	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	5.4	# 2.3	81.0	0% - 50%

Page : 5 of 16
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2013363)									
EM1817421-021	BH25 0.5-0.6	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	3.4	0.7	128	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	0.8	<0.5	42.7	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	3.1	1.3	85.4	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	3.0	1.4	74.5	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	0.9	<0.5	57.1	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	1.0	<0.5	64.8	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	1.1	0.5	71.2	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	0.9	<0.5	53.2	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	0.6	<0.5	21.9	No Limit
EM1817535-004	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2009686)									
EM1817421-001	BH21 0.5-0.6	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EM1817421-011	BH23 0.5-0.6	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2011114)									
EM1817421-021	BH25 0.5-0.6	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2011382)									

Page : 6 of 16
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2011382) - continued									
EM1817421-001	BH21 0.5-0.6	EP071: C15 - C28 Fraction	----	100	mg/kg	480	370	26.2	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	400	310	24.7	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	880	680	25.6	0% - 50%
EM1817421-011	BH23 0.5-0.6	EP071: C15 - C28 Fraction	----	100	mg/kg	330	130	87.4	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	300	120	83.5	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	630	# 250	86.4	0% - 50%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2013364)									
EM1817421-021	BH25 0.5-0.6	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EM1817535-004	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2009686)									
EM1817421-001	BH21 0.5-0.6	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EM1817421-011	BH23 0.5-0.6	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2011114)									
EM1817421-021	BH25 0.5-0.6	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2011382)									
EM1817421-001	BH21 0.5-0.6	EP071: >C16 - C34 Fraction	----	100	mg/kg	760	580	26.2	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	230	190	20.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	990	770	25.0	0% - 50%
EM1817421-011	BH23 0.5-0.6	EP071: >C16 - C34 Fraction	----	100	mg/kg	540	220	85.5	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	180	<100	55.4	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	720	# 220	106	0% - 50%
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2013364)									
EM1817421-021	BH25 0.5-0.6	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EM1817535-004	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit

Page : 7 of 16
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2013364) - continued									
EM1817535-004	Anonymous	EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EP080: BTEXN (QC Lot: 2009686)									
EM1817421-001	BH21 0.5-0.6	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EM1817421-011	BH23 0.5-0.6	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP080: BTEXN (QC Lot: 2011114)									
EM1817421-021	BH25 0.5-0.6	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2009520)									
EM1817404-009	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0002	0.0002	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.007	0.006	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.203	0.179	12.7	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.022	0.020	10.2	0% - 20%
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.003	0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.058	0.052	11.8	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.159	0.136	15.5	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.175	0.153	13.5	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	0.03	0.02	0.00	No Limit

Page : 8 of 16
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2009520) - continued									
EM1817404-009	Anonymous	EG020A-F: Boron	7440-42-8	0.05	mg/L	1.86	1.80	3.19	0% - 20%
EM1817421-028	Rinsate Blank	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2009516)									
EM1817286-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EM1817286-010	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2009924)									
EM1817404-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EM1817422-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2009924)									
EM1817404-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EM1817422-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2009924)									
EM1817404-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EM1817422-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Page : 9 of 16
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 2011178)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	91.1	78	107
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	87.5	76	110
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	98.2	84	113
EG005T: Boron	7440-42-8	50	mg/kg	<50	33.2 mg/kg	109	84	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	85.7	76	108
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	87.0	78	110
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	87.0	78	112
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	85.3	78	108
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	86.2	78	106
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	89.4	81	110
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	92.0	80	109
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	97.2	92	110
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	88.4	78	106
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	93.8	79	110
EG005T: Total Metals by ICP-AES (QCLot: 2011180)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	91.1	78	107
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	85.6	76	110
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	94.0	84	113
EG005T: Boron	7440-42-8	50	mg/kg	<50	33.2 mg/kg	108	84	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	83.9	76	108
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	83.7	78	110
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	84.7	78	112
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	84.9	78	108
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	85.1	78	106
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	87.8	81	110
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	89.6	80	109
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	97.4	92	110
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	86.5	78	106
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	89.1	79	110
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2011179)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	91.8	77	104
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2011181)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	84.8	77	104
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2011381)								

Page : 10 of 16
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2011381) - continued								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	116	75	131
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	121	70	132
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	110	80	128
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	110	70	128
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	113	80	128
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	121	72	126
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	126	70	128
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	120	80	125
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	118	70	130
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	120	80	126
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	111	71	124
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	123	75	125
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	109	70	125
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	106	71	128
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	108	72	126
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	103	68	127
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2013363)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	107	75	131
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	92.6	70	132
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	98.1	80	128
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	94.3	70	128
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	101	80	128
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	104	72	126
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	99.0	70	128
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	104	80	125
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	91.7	70	130
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	106	80	126
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	89.2	71	124
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	108	75	125
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	88.0	70	125
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	84.4	71	128
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	82.2	72	126
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	84.9	68	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2009686)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	36 mg/kg	92.7	70	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2011114)								

Page : 11 of 16
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2011114) - continued								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	36 mg/kg	73.8	70	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2011382)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	806 mg/kg	82.6	80	120
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3006 mg/kg	92.4	84	115
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	1584 mg/kg	84.6	80	112
EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2013364)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	806 mg/kg	92.4	80	120
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3006 mg/kg	97.7	84	115
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	1584 mg/kg	92.7	80	112
EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2009686)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	89.4	68	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2011114)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	70.3	68	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2011382)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	1160 mg/kg	84.0	83	117
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	3978 mg/kg	87.4	82	114
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	313 mg/kg	79.6	73	115
EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2013364)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	1160 mg/kg	93.1	83	117
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	3978 mg/kg	96.4	82	114
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	313 mg/kg	88.2	73	115
EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080: BTEXN (QCLot: 2009686)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	90.0	74	124
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	105	77	125
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	105	73	125
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	108	77	128
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	106	81	128
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	106	66	130
EP080: BTEXN (QCLot: 2011114)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	79.6	74	124
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	86.1	77	125
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	79.8	73	125

Page : 12 of 16
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080: BTEXN (QCLot: 2011114) - continued								
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	81.9	77	128
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	85.6	81	128
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	82.2	66	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2009520)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	100	91	107
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	94.2	82	113
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	103	84	106
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	101	84	104
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	94.9	83	103
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	95.3	83	106
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	97.4	82	103
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.7	83	105
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	97.2	83	105
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.8	82	106
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	103	82	109
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	95.8	83	106
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	97.2	85	109
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	98.3	84	116
EG035F: Dissolved Mercury by FIMS (QCLot: 2009516)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	105	76	114
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2009411)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	75.0	48	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	82.4	50	117
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	76.3	53	117
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	79.9	54	118
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	88.4	59	119
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	89.0	51	113
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	91.2	61	120
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	89.1	56	120
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	88.6	53	120
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	87.7	57	122
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	101	56	131
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	103	59	124

Page : 13 of 16
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2009411) - continued								
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	102	54	124
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	89.4	55	124
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	88.8	54	124
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	89.5	56	124
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2009412)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	4331 µg/L	128	51	136
EP071: C15 - C28 Fraction	----	100	µg/L	<100	16952 µg/L	134	58	139
EP071: C29 - C36 Fraction	----	50	µg/L	<50	8695 µg/L	131	57	134
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2009924)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	111	68	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2009412)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	6292 µg/L	129	55	134
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	22143 µg/L	133	58	135
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1677 µg/L	134	57	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2009924)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	108	66	123
EP080: BTEXN (QCLot: 2009924)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	105	74	123
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	106	77	128
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	110	73	126
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	114	72	131
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	114	74	131
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	108	74	124

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005T: Total Metals by ICP-AES (QCLot: 2011178)							
EM1817384-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	111	78	124
		EG005T: Barium	7440-39-3	50 mg/kg	125	71	135
		EG005T: Beryllium	7440-41-7	50 mg/kg	105	85	125
		EG005T: Cadmium	7440-43-9	50 mg/kg	97.5	84	116
		EG005T: Chromium	7440-47-3	50 mg/kg	112	79	121

Page : 14 of 16
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 2011178) - continued							
EM1817384-001	Anonymous	EG005T: Copper	7440-50-8	50 mg/kg	99.4	82	124
		EG005T: Lead	7439-92-1	50 mg/kg	98.1	76	124
		EG005T: Manganese	7439-96-5	50 mg/kg	92.0	68	136
		EG005T: Nickel	7440-02-0	50 mg/kg	109	78	120
		EG005T: Selenium	7782-49-2	50 mg/kg	88.1	71	125
		EG005T: Vanadium	7440-62-2	50 mg/kg	101	76	124
		EG005T: Zinc	7440-66-6	50 mg/kg	115	74	128
EG005T: Total Metals by ICP-AES (QCLot: 2011180)							
EM1817421-010	BH22 3.4-3.5	EG005T: Lead	7439-92-1	50 mg/kg	84.5	76	124
EM1817421-010	BH22 3.4-3.5	EG005T: Arsenic	7440-38-2	50 mg/kg	94.0	78	124
		EG005T: Barium	7440-39-3	50 mg/kg	117	71	135
		EG005T: Beryllium	7440-41-7	50 mg/kg	94.2	85	125
		EG005T: Cadmium	7440-43-9	50 mg/kg	85.0	84	116
		EG005T: Chromium	7440-47-3	50 mg/kg	90.3	79	121
		EG005T: Copper	7440-50-8	50 mg/kg	98.6	82	124
		EG005T: Manganese	7439-96-5	50 mg/kg	# Not Determined	68	136
		EG005T: Nickel	7440-02-0	50 mg/kg	94.2	78	120
		EG005T: Selenium	7782-49-2	50 mg/kg	80.6	71	125
		EG005T: Vanadium	7440-62-2	50 mg/kg	110	76	124
		EG005T: Zinc	7440-66-6	50 mg/kg	93.3	74	128
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2011179)							
EM1817384-001	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	89.9	76	116
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2011181)							
EM1817421-010	BH22 3.4-3.5	EG035T: Mercury	7439-97-6	5 mg/kg	92.1	76	116
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2011381)							
EM1817421-002	BH21 1.5-1.6	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	103	67	117
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	118	52	148
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2013363)							
EM1817421-022	BH25 1.5-1.6	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	98.6	67	117
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	101	52	148
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2009686)							
EM1817421-002	BH21 1.5-1.6	EP080: C6 - C9 Fraction	----	28 mg/kg	77.7	42	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2011114)							
EM1817421-022	BH25 1.5-1.6	EP080: C6 - C9 Fraction	----	28 mg/kg	84.2	42	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2011382)							

Page : 15 of 16
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2011382) - continued							
EM1817421-003	BH21 2.5-2.6	EP071: C10 - C14 Fraction	----	806 mg/kg	81.2	53	123
		EP071: C15 - C28 Fraction	----	3006 mg/kg	92.8	70	124
		EP071: C29 - C36 Fraction	----	1584 mg/kg	84.5	64	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2013364)							
EM1817421-023	BH25 2.5-2.6	EP071: C10 - C14 Fraction	----	806 mg/kg	92.4	53	123
		EP071: C15 - C28 Fraction	----	3006 mg/kg	96.0	70	124
		EP071: C29 - C36 Fraction	----	1584 mg/kg	91.4	64	118
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2009686)							
EM1817421-002	BH21 1.5-1.6	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	74.2	39	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2011114)							
EM1817421-022	BH25 1.5-1.6	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	83.4	39	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2011382)							
EM1817421-003	BH21 2.5-2.6	EP071: >C10 - C16 Fraction	----	1160 mg/kg	81.2	65	123
		EP071: >C16 - C34 Fraction	----	3978 mg/kg	87.8	67	121
		EP071: >C34 - C40 Fraction	----	313 mg/kg	75.3	44	126
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2013364)							
EM1817421-023	BH25 2.5-2.6	EP071: >C10 - C16 Fraction	----	1160 mg/kg	92.1	65	123
		EP071: >C16 - C34 Fraction	----	3978 mg/kg	94.8	67	121
		EP071: >C34 - C40 Fraction	----	313 mg/kg	91.5	44	126
EP080: BTEXN (QCLot: 2009686)							
EM1817421-002	BH21 1.5-1.6	EP080: Benzene	71-43-2	2 mg/kg	91.9	50	136
		EP080: Toluene	108-88-3	2 mg/kg	103	56	139
EP080: BTEXN (QCLot: 2011114)							
EM1817421-022	BH25 1.5-1.6	EP080: Benzene	71-43-2	2 mg/kg	89.1	50	136
		EP080: Toluene	108-88-3	2 mg/kg	94.3	56	139

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2009520)							
EM1817404-009	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	119	85	131
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	99.2	73	141
		EG020A-F: Barium	7440-39-3	0.2 mg/L	90.2	75	127
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	90.1	81	133
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	100.0	71	135
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	91.1	78	132
		EG020A-F: Copper	7440-50-8	0.2 mg/L	99.9	76	130

Page	: 16 of 16
Work Order	: EM1817421
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2009520) - continued							
EM1817404-009	Anonymous	EG020A-F: Lead	7439-92-1	0.2 mg/L	92.0	75	133
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	74.2	64	134
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	93.3	73	131
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	93.0	73	131
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	93.6	75	131
EG035F: Dissolved Mercury by FIMS (QCLot: 2009516)							
EM1817286-002	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	107	70	120
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2009924)							
EM1817404-002	Anonymous	EP080: C6 - C9 Fraction	----	280 µg/L	68.6	43	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2009924)							
EM1817404-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	66.3	44	122
EP080: BTEXN (QCLot: 2009924)							
EM1817404-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	88.9	68	130
		EP080: Toluene	108-88-3	20 µg/L	92.4	72	132

Environmental Site Assessment (V9) 52 New Town Road, New Town. June 2025.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM1817421	Page	: 1 of 12
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Telephone	: +6138549 9630
Project	: 48-52	Date Samples Received	: 30-Oct-2018
Site	: ----	Issue Date	: 05-Nov-2018
Sampler	: GM	No. of samples received	: 28
Order number	:	No. of samples analysed	: 28

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Duplicate outliers exist - please see following pages for full details.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Page	: 2 of 12
Work Order	: EM1817421
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817421--011	BH23 0.5-0.6	**Phenanthrene**	85-01-8	74.2 %	0% - 50%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817421--001	BH21 0.5-0.6	**Fluoranthene**	206-44-0	28.9 %	0% - 20%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817421--011	BH23 0.5-0.6	**Fluoranthene**	206-44-0	69.0 %	0% - 20%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817421--001	BH21 0.5-0.6	**Pyrene**	129-00-0	27.0 %	0% - 20%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817421--011	BH23 0.5-0.6	**Pyrene**	129-00-0	66.9 %	0% - 20%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817421--001	BH21 0.5-0.6	**Benz(a)anthracene**	56-55-3	38.4 %	0% - 20%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817421--011	BH23 0.5-0.6	**Benz(a)anthracene**	56-55-3	75.9 %	0% - 50%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817421--001	BH21 0.5-0.6	**Chrysene**	218-01-9	37.6 %	0% - 20%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817421--001	BH21 0.5-0.6	**Benzo(b+j)fluoranthene**	205-99-2 205-82-3	40.7 %	0% - 20%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817421--011	BH23 0.5-0.6	**Benzo(b+j)fluoranthene**	205-99-2 205-82-3	77.3 %	0% - 50%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817421--001	BH21 0.5-0.6	**Benzo(a)pyrene**	50-32-8	41.8 %	0% - 20%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817421--011	BH23 0.5-0.6	**Benzo(a)pyrene**	50-32-8	78.9 %	0% - 50%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817421--001	BH21 0.5-0.6	**Benzo(g.h.i)perylene**	191-24-2	33.7 %	0% - 20%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817421--011	BH23 0.5-0.6	**Benzo(g.h.i)perylene**	191-24-2	81.0 %	0% - 50%	**RPD exceeds LOR based limits**
EP080/071: Total Petroleum Hydrocarbons	EM1817421--011	BH23 0.5-0.6	**C10 - C36 Fraction (sum)**	----	86.4 %	0% - 50%	**RPD exceeds LOR based limits**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2	EM1817421--011	BH23 0.5-0.6	**>C10 - C40 Fraction (sum)**	----	106 %	0% - 50%	**RPD exceeds LOR based limits**
Matrix Spike (MS) Recoveries							
EG005T: Total Metals by ICP-AES	EM1817421--010	BH22 3.4-3.5	**Manganese**	7439-96-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Regular Sample Surrogates

Sub-Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Samples Submitted							
EP075(SIM)T: PAH Surrogates	EM1817421-008	BH22 1.5-1.6	**4-Terphenyl-d14**	1718-51-0	135 %	67-133 %	**Recovery greater than upper data quality objective**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	4	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Page : 3 of 12
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Matrix Spikes (MS) - Continued					
TRH - Semivolatile Fraction	0	4	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
BH21 0.5-0.6,	BH21 1.5-1.6,	**24-Oct-2018**	----	----	----	**31-Oct-2018**	07-Nov-2018	✓
BH21 2.5-2.6,	BH21 3.5-3.6,							
BH21 4.5-4.6,	BH21 5.5-5.6,							
BH22 0.5-0.6,	BH22 1.5-1.6,							
BH22 2.5-2.6,	BH22 3.4-3.5,							
BH23 0.5-0.6,	BH23 1.5-1.6,							
BH23 2.5-2.6,	BH23 3.5-3.6,							
BH23 4.5-4.6,	BH23 5.5-5.6,							
BH24 0.5-0.6,	BH24 1.5-1.6,							
BH24 2.5-2.6,	BH24 3.3-3.4,							
BH25 0.5-0.6,	BH25 1.5-1.6,							
BH25 2.5-2.6,	BH25 3.5-3.6,							
BH25 4.5-4.6,	BH25 5.5-5.6,							
DUPLICATE 1								

Page : 4 of 12
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
BH21 0.5-0.6,	BH21 1.5-1.6,	**24-Oct-2018**	**31-Oct-2018**	22-Apr-2019	✓	**01-Nov-2018**	22-Apr-2019	✓
BH21 2.5-2.6,	BH21 3.5-3.6,							
BH21 4.5-4.6,	BH21 5.5-5.6,							
BH22 0.5-0.6,	BH22 1.5-1.6,							
BH22 2.5-2.6,	BH22 3.4-3.5,							
BH23 0.5-0.6,	BH23 1.5-1.6,							
BH23 2.5-2.6,	BH23 3.5-3.6,							
BH23 4.5-4.6,	BH23 5.5-5.6,							
BH24 0.5-0.6,	BH24 1.5-1.6,							
BH24 2.5-2.6,	BH24 3.3-3.4,							
BH25 0.5-0.6,	BH25 1.5-1.6,							
BH25 2.5-2.6,	BH25 3.5-3.6,							
BH25 4.5-4.6,	BH25 5.5-5.6,							
DUPLICATE 1								
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
BH21 0.5-0.6,	BH21 1.5-1.6,	**24-Oct-2018**	**31-Oct-2018**	21-Nov-2018	✓	**01-Nov-2018**	21-Nov-2018	✓
BH21 2.5-2.6,	BH21 3.5-3.6,							
BH21 4.5-4.6,	BH21 5.5-5.6,							
BH22 0.5-0.6,	BH22 1.5-1.6,							
BH22 2.5-2.6,	BH22 3.4-3.5,							
BH23 0.5-0.6,	BH23 1.5-1.6,							
BH23 2.5-2.6,	BH23 3.5-3.6,							
BH23 4.5-4.6,	BH23 5.5-5.6,							
BH24 0.5-0.6,	BH24 1.5-1.6,							
BH24 2.5-2.6,	BH24 3.3-3.4,							
BH25 0.5-0.6,	BH25 1.5-1.6,							
BH25 2.5-2.6,	BH25 3.5-3.6,							
BH25 4.5-4.6,	BH25 5.5-5.6,							
DUPLICATE 1								

Page	: 5 of 12
Work Order	: EM1817421
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
BH21 0.5-0.6,	BH21 1.5-1.6,	**24-Oct-2018**	**01-Nov-2018**	07-Nov-2018	✓	**01-Nov-2018**	11-Dec-2018	✓
BH21 2.5-2.6,	BH21 3.5-3.6,							
BH21 4.5-4.6,	BH21 5.5-5.6,							
BH22 0.5-0.6,	BH22 1.5-1.6,							
BH22 2.5-2.6,	BH22 3.4-3.5,							
BH23 0.5-0.6,	BH23 1.5-1.6,							
BH23 2.5-2.6,	BH23 3.5-3.6,							
BH23 4.5-4.6,	BH23 5.5-5.6,							
BH24 0.5-0.6,	BH24 1.5-1.6,							
BH24 2.5-2.6,	BH24 3.3-3.4,							
BH25 0.5-0.6,	BH25 1.5-1.6,							
BH25 2.5-2.6,	BH25 3.5-3.6,							
BH25 4.5-4.6,	BH25 5.5-5.6,							
DUPLICATE 1								

Page : 6 of 12
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP071)								
BH21 0.5-0.6,	BH21 1.5-1.6,	**24-Oct-2018**	**01-Nov-2018**	07-Nov-2018	✓	**01-Nov-2018**	11-Dec-2018	✓
BH21 2.5-2.6,	BH21 3.5-3.6,							
BH21 4.5-4.6,	BH21 5.5-5.6,							
BH22 0.5-0.6,	BH22 1.5-1.6,							
BH22 2.5-2.6,	BH22 3.4-3.5,							
BH23 0.5-0.6,	BH23 1.5-1.6,							
BH23 2.5-2.6,	BH23 3.5-3.6,							
BH23 4.5-4.6,	BH23 5.5-5.6,							
BH24 0.5-0.6,	BH24 1.5-1.6,							
BH24 2.5-2.6,	BH24 3.3-3.4,							
BH25 0.5-0.6,	BH25 1.5-1.6,							
BH25 2.5-2.6,	BH25 3.5-3.6,							
BH25 4.5-4.6,	BH25 5.5-5.6,							
DUPLICATE 1								
Soil Glass Jar - Unpreserved (EP080)								
BH25 0.5-0.6,	BH25 1.5-1.6,	**24-Oct-2018**	**31-Oct-2018**	07-Nov-2018	✓	**01-Nov-2018**	07-Nov-2018	✓
BH25 2.5-2.6,	BH25 3.5-3.6,							
BH25 4.5-4.6,	BH25 5.5-5.6,							
DUPLICATE 1								
Soil Glass Jar - Unpreserved (EP080)								
BH21 0.5-0.6,	BH21 1.5-1.6,	**24-Oct-2018**	**31-Oct-2018**	07-Nov-2018	✓	**31-Oct-2018**	07-Nov-2018	✓
BH21 2.5-2.6,	BH21 3.5-3.6,							
BH21 4.5-4.6,	BH21 5.5-5.6,							
BH22 0.5-0.6,	BH22 1.5-1.6,							
BH22 2.5-2.6,	BH22 3.4-3.5,							
BH23 0.5-0.6,	BH23 1.5-1.6,							
BH23 2.5-2.6,	BH23 3.5-3.6,							
BH23 4.5-4.6,	BH23 5.5-5.6,							
BH24 0.5-0.6,	BH24 1.5-1.6,							
BH24 2.5-2.6,	BH24 3.3-3.4							

Page : 7 of 12
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP071)								
BH21 0.5-0.6,	BH21 1.5-1.6,	**24-Oct-2018**	**01-Nov-2018**	07-Nov-2018	✓	**01-Nov-2018**	11-Dec-2018	✓
BH21 2.5-2.6,	BH21 3.5-3.6,							
BH21 4.5-4.6,	BH21 5.5-5.6,							
BH22 0.5-0.6,	BH22 1.5-1.6,							
BH22 2.5-2.6,	BH22 3.4-3.5,							
BH23 0.5-0.6,	BH23 1.5-1.6,							
BH23 2.5-2.6,	BH23 3.5-3.6,							
BH23 4.5-4.6,	BH23 5.5-5.6,							
BH24 0.5-0.6,	BH24 1.5-1.6,							
BH24 2.5-2.6,	BH24 3.3-3.4,							
BH25 0.5-0.6,	BH25 1.5-1.6,							
BH25 2.5-2.6,	BH25 3.5-3.6,							
BH25 4.5-4.6,	BH25 5.5-5.6,							
DUPLICATE 1								
Soil Glass Jar - Unpreserved (EP080)								
BH25 0.5-0.6,	BH25 1.5-1.6,	**24-Oct-2018**	**31-Oct-2018**	07-Nov-2018	✓	**01-Nov-2018**	07-Nov-2018	✓
BH25 2.5-2.6,	BH25 3.5-3.6,							
BH25 4.5-4.6,	BH25 5.5-5.6,							
DUPLICATE 1								
Soil Glass Jar - Unpreserved (EP080)								
BH21 0.5-0.6,	BH21 1.5-1.6,	**24-Oct-2018**	**31-Oct-2018**	07-Nov-2018	✓	**31-Oct-2018**	07-Nov-2018	✓
BH21 2.5-2.6,	BH21 3.5-3.6,							
BH21 4.5-4.6,	BH21 5.5-5.6,							
BH22 0.5-0.6,	BH22 1.5-1.6,							
BH22 2.5-2.6,	BH22 3.4-3.5,							
BH23 0.5-0.6,	BH23 1.5-1.6,							
BH23 2.5-2.6,	BH23 3.5-3.6,							
BH23 4.5-4.6,	BH23 5.5-5.6,							
BH24 0.5-0.6,	BH24 1.5-1.6,							
BH24 2.5-2.6,	BH24 3.3-3.4							

Page : 8 of 12
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
BH25 0.5-0.6, BH25 1.5-1.6, BH25 2.5-2.6, BH25 3.5-3.6, BH25 4.5-4.6, BH25 5.5-5.6, DUPLICATE 1	24-Oct-2018	31-Oct-2018	07-Nov-2018	✓	01-Nov-2018	07-Nov-2018	✓
Soil Glass Jar - Unpreserved (EP080)							
BH21 0.5-0.6, BH21 1.5-1.6, BH21 2.5-2.6, BH21 3.5-3.6, BH21 4.5-4.6, BH21 5.5-5.6, BH22 0.5-0.6, BH22 1.5-1.6, BH22 2.5-2.6, BH22 3.4-3.5, BH23 0.5-0.6, BH23 1.5-1.6, BH23 2.5-2.6, BH23 3.5-3.6, BH23 4.5-4.6, BH23 5.5-5.6, BH24 0.5-0.6, BH24 1.5-1.6, BH24 2.5-2.6, BH24 3.3-3.4	24-Oct-2018	31-Oct-2018	07-Nov-2018	✓	31-Oct-2018	07-Nov-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)							
Rinsate Blank	24-Oct-2018	----	----	----	31-Oct-2018	22-Apr-2019	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG035F)							
Rinsate Blank	24-Oct-2018	----	----	----	31-Oct-2018	21-Nov-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
Rinsate Blank	24-Oct-2018	30-Oct-2018	31-Oct-2018	✓	31-Oct-2018	09-Dec-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
Rinsate Blank	24-Oct-2018	30-Oct-2018	31-Oct-2018	✓	31-Oct-2018	09-Dec-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
Rinsate Blank	24-Oct-2018	30-Oct-2018	07-Nov-2018	✓	31-Oct-2018	07-Nov-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
Rinsate Blank	24-Oct-2018	30-Oct-2018	31-Oct-2018	✓	31-Oct-2018	09-Dec-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
Rinsate Blank	24-Oct-2018	30-Oct-2018	07-Nov-2018	✓	31-Oct-2018	07-Nov-2018	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
Rinsate Blank	24-Oct-2018	30-Oct-2018	07-Nov-2018	✓	31-Oct-2018	07-Nov-2018	✓

Page : 9 of 12
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	4	38	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	28	10.71	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	28	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	28	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	3	38	7.89	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	28	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Dissolved Mercury by FIMS	EG035F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	1	0.00	10.00	*	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	4	0.00	10.00	*	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Page	: 10 of 12
Work Order	: EM1817421
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS) - Continued							
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	1	0.00	5.00	×	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	4	0.00	5.00	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Page	: 11 of 12
Work Order	: EM1817421
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)

Page	: 12 of 12
Work Order	: EM1817421
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM1817821**	Page	: 1 of 3
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Project	: 48-52	Date Samples Received	: 30-Oct-2018
Order number	:	Date Analysis Commenced	: 07-Nov-2018
C-O-C number	: ----	Issue Date	: 09-Nov-2018
Sampler	: ----		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 13		
No. of samples analysed	: 13		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Eric Chau	Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

RIGHT SOLUTIONS | RIGHT PARTNER

Page	: 2 of 3
Work Order	: EM1817821
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005C: Leachable Metals by ICPAES (QC Lot: 2025425)									
EM1817571-004	Anonymous	EG005C: Barium	7440-39-3	0.1	mg/L	0.2	0.2	0.00	No Limit
		EG005C: Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EM1817548-001	Anonymous	EG005C: Barium	7440-39-3	0.1	mg/L	0.1	0.1	0.00	No Limit
		EG005C: Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit

Page : 3 of 3
Work Order : EM1817821
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005C: Leachable Metals by ICPAES (QCLot: 2025425)								
EG005C: Barium	7440-39-3	0.1	mg/L	<0.1	1 mg/L	96.6	85	112
EG005C: Copper	7440-50-8	0.1	mg/L	<0.1	1 mg/L	94.6	88	115
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2025353)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	85.2	48	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	87.5	50	117
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	83.7	53	117
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	84.8	54	118
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	87.8	59	119
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	88.9	51	113
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	88.6	61	120
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	87.8	56	120
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	86.9	53	120
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	89.7	57	122
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	97.9	56	131
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	99.3	59	124
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	97.8	54	124
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	87.4	55	124
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	86.8	54	124
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	88.8	56	124

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005C: Leachable Metals by ICPAES (QCLot: 2025425)							
EM1817548-002	Anonymous	EG005C: Barium	7440-39-3	1 mg/L	98.5	87	119
		EG005C: Copper	7440-50-8	1 mg/L	104	91	121

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM1817821	Page	: 1 of 5
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Telephone	: +6138549 9630
Project	: 48-52	Date Samples Received	: 30-Oct-2018
Site	: ----	Issue Date	: 09-Nov-2018
Sampler	: ----	No. of samples received	: 13
Order number	:	No. of samples analysed	: 13

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Page : 2 of 5
Work Order : EM1817821
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	13	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	13	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EN33: TCLP Leach							
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN33a)							
BH21 0.5-0.6, BH21 4.5-4.6, BH21 5.5-5.6, BH22 0.5-0.6, BH23 0.5-0.6, BH23 1.5-1.6, BH23 2.5-2.6, BH23 3.5-3.6, BH23 4.5-4.6, BH23 5.5-5.6, BH24 0.5-0.6, BH25 3.5-3.6, BH25 4.5-4.6	**24-Oct-2018**	**07-Nov-2018**	07-Nov-2018	✓	----	----	----

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG005C: Leachable Metals by ICPAES							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG005C)							
BH23 3.5-3.6	**07-Nov-2018**	**08-Nov-2018**	06-May-2019	✓	**08-Nov-2018**	06-May-2019	✓

Page	: 3 of 5
Work Order	: EM1817821
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP075(SIM))								
BH21 0.5-0.6,	BH21 4.5-4.6,	**07-Nov-2018**	**08-Nov-2018**	14-Nov-2018	✓	**08-Nov-2018**	18-Dec-2018	✓
BH21 5.5-5.6,	BH22 0.5-0.6,							
BH23 0.5-0.6,	BH23 1.5-1.6,							
BH23 2.5-2.6,	BH23 3.5-3.6,							
BH23 4.5-4.6,	BH23 5.5-5.6,							
BH24 0.5-0.6,	BH25 3.5-3.6,							
BH25 4.5-4.6								

Page	: 4 of 5
Work Order	: EM1817821
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Leachable Metals by ICPAES	EG005C	2	7	**28.57**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	13	**0.00**	**10.00**	*	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Leachable Metals by ICPAES	EG005C	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Leachable Metals by ICPAES	EG005C	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Leachable Metals by ICPAES	EG005C	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	13	**0.00**	**5.00**	*	NEPM 2013 B3 & ALS QC Standard

Page	: 5 of 5
Work Order	: EM1817821
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Leachable Metals by ICPAES	EG005C	SOIL	In house: referenced to APHA 3120; USEPA SW 846 - 6010: The ICPAES technique ionises leachate sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
Digestion for Total Recoverable Metals in TCLP Leachate	EN25C	SOIL	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
TCLP for Non & Semivolatile Analytes	EN33a	SOIL	In house QWI-EN/33 referenced to USEPA SW846-1311: The TCLP procedure is designed to determine the mobility of both organic and inorganic analytes present in wastes. The standard TCLP leach is for non-volatile and Semivolatile test parameters.
Separatory Funnel Extraction of Liquids	ORG14	SOIL	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM1817564**	Page	: 1 of 19
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Project	: 48-52	Date Samples Received	: 01-Nov-2018
Order number	:	Date Analysis Commenced	: 01-Nov-2018
C-O-C number	: ----	Issue Date	: 09-Nov-2018
Sampler	: AARON PLUMMER		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 43		
No. of samples analysed	: 43		

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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Eric Chau	Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

RIGHT SOLUTIONS | RIGHT PARTNER

Page	: 2 of 19
Work Order	: EM1817564
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2016235)									
EM1817503-001	Anonymous	EA055: Moisture Content	----	0.1	%	1.4	1.4	0.00	No Limit
EM1817555-001	Anonymous	EA055: Moisture Content	----	0.1	%	14.0	16.2	14.2	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2016236)									
EM1817564-005	BH27 1.0-1.1	EA055: Moisture Content	----	0.1	%	19.4	19.9	2.22	0% - 50%
EM1817564-015	BH30 0.3-0.4	EA055: Moisture Content	----	0.1	%	14.3	16.2	13.1	0% - 50%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2016237)									
EM1817564-028	BH37 0.5-0.6	EA055: Moisture Content	----	0.1	%	11.5	9.1	23.4	0% - 50%
EM1817564-038	BH40 0.5-0.6	EA055: Moisture Content	----	0.1	%	5.7	7.7	30.1	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 2016191)									
EM1817564-001	BH26 0.1-0.2	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	30	40	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	6	6	0.00	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	4	4	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	4	3	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	23	32	32.5	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	14	16	10.6	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	56	57	0.00	0% - 50%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	33	30	12.2	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	30	33	9.31	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EM1817564-010	BH28 1.0-1.1	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit

Page : 3 of 19
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005T: Total Metals by ICP-AES (QC Lot: 2016191) - continued									
EM1817564-010	BH28 1.0-1.1	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	30	50	48.2	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	12	13	13.9	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	2	5	77.8	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	6	8	39.4	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	14	95.3	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	12	34	97.8	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	124	116	6.56	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	28	36	23.6	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	43	49	11.9	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 2016193)									
EM1817564-021	BH35 0.5-0.6	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	140	130	10.8	0% - 50%
		EG005T: Chromium	7440-47-3	2	mg/kg	12	11	0.00	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	11	13	19.1	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	12	12	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	32	38	15.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	152	136	11.5	0% - 20%
		EG005T: Manganese	7439-96-5	5	mg/kg	267	267	0.00	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	40	36	9.08	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	163	162	0.693	0% - 20%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EM1817564-033	BH38 1.5-1.6	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	170	120	35.9	0% - 50%
		EG005T: Chromium	7440-47-3	2	mg/kg	9	7	22.0	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	17	23	30.7	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	13	17	27.7	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	14	11	24.3	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	89	94	5.18	0% - 50%
		EG005T: Manganese	7439-96-5	5	mg/kg	174	164	6.40	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	17	14	21.8	No Limit

Page : 4 of 19
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005T: Total Metals by ICP-AES (QC Lot: 2016193) - continued									
EM1817564-033	BH38 1.5-1.6	EG005T: Zinc	7440-66-6	5	mg/kg	108	93	14.6	0% - 20%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2016192)									
EM1817564-001	BH26 0.1-0.2	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EM1817564-010	BH28 1.0-1.1	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.1	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2016194)									
EM1817564-021	BH35 0.5-0.6	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.2	0.2	0.00	No Limit
EM1817564-033	BH38 1.5-1.6	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2014835)									
EM1817564-001	BH26 0.1-0.2	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EM1817564-011	BH28 1.2-1.3	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	1.1	0.6	67.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	1.1	1.1	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	8.7	7.5	14.9	0% - 50%
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	3.4	2.6	27.8	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	15.6	# 10.8	36.7	0% - 20%
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	17.0	# 11.7	36.9	0% - 20%
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	8.0	5.0	45.6	0% - 50%
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	7.2	4.5	46.9	0% - 50%
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	7.6	4.8	44.3	0% - 50%
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	3.0	1.9	46.7	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	7.3	4.7	43.9	0% - 50%

Page : 5 of 19
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2014835) - continued									
EM1817564-011	BH28 1.2-1.3	EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	3.3	2.0	45.7	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	0.9	<0.5	57.8	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	4.2	2.6	47.3	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2014838)									
EM1817564-021	BH35 0.5-0.6	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	2.8	3.6	27.1	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	0.8	1.2	34.7	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	5.0	5.4	7.99	0% - 50%
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	5.1	5.4	5.08	0% - 50%
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	2.3	2.2	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	2.1	2.0	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	3.1	2.9	5.46	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	1.0	0.9	13.7	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	2.7	2.6	7.05	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	1.6	1.3	20.9	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	2.1	1.7	20.4	No Limit
EM1817564-034	BH38 2.5-2.6	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2014557)									
EM1817564-001	BH26 0.1-0.2	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit

Page : 6 of 19
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2014557) - continued									
EM1817564-011	BH28 1.2-1.3	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2014561)									
EM1817564-021	BH35 0.5-0.6	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EM1817564-034	BH38 2.5-2.6	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2014836)									
EM1817564-001	BH26 0.1-0.2	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EM1817564-011	BH28 1.2-1.3	EP071: C15 - C28 Fraction	----	100	mg/kg	350	250	33.5	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	200	150	29.1	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	550	400	31.6	0% - 50%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2014839)									
EM1817564-021	BH35 0.5-0.6	EP071: C15 - C28 Fraction	----	100	mg/kg	130	150	14.3	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	140	120	19.1	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	270	270	0.00	No Limit
EM1817564-034	BH38 2.5-2.6	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2014557)									
EM1817564-001	BH26 0.1-0.2	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EM1817564-011	BH28 1.2-1.3	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2014561)									
EM1817564-021	BH35 0.5-0.6	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EM1817564-034	BH38 2.5-2.6	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2014836)									
EM1817564-001	BH26 0.1-0.2	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EM1817564-011	BH28 1.2-1.3	EP071: >C16 - C34 Fraction	----	100	mg/kg	480	350	31.9	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	480	350	31.3	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2014839)									
EM1817564-021	BH35 0.5-0.6	EP071: >C16 - C34 Fraction	----	100	mg/kg	230	230	0.00	No Limit

Page : 7 of 19
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2014839) - continued									
EM1817564-021	BH35 0.5-0.6	EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	230	230	0.00	No Limit
EM1817564-034	BH38 2.5-2.6	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EP080: BTEXN (QC Lot: 2014557)									
EM1817564-001	BH26 0.1-0.2	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EM1817564-011	BH28 1.2-1.3	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP080: BTEXN (QC Lot: 2014561)									
EM1817564-021	BH35 0.5-0.6	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EM1817564-034	BH38 2.5-2.6	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2015070)									

Page : 8 of 19
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2015070) - continued									
EM1817519-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.019	0.018	0.00	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.019	0.018	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.10	0.10	0.00	No Limit
EM1817530-004	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.003	0.002	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.045	0.047	4.78	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.015	0.014	0.00	0% - 50%
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.007	0.007	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.150	0.146	2.98	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.049	0.047	3.56	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.038	0.036	4.54	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	0.01	0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.27	0.25	7.34	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2015073)									
EM1817564-026	Rinsate 4	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit

Page : 9 of 19
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2015073) - continued									
EM1817564-026	Rinsate 4	EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EM1817591-004	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0002	0.0002	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.028	0.030	5.36	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.069	0.068	2.28	0% - 20%
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.008	0.008	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.128	0.130	1.37	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.008	0.008	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.157	0.156	1.04	0% - 20%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	5.13	5.52	7.30	0% - 20%
EG035F: Dissolved Mercury by FIMS (QC Lot: 2015072)									
EM1817530-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EM1817530-010	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2015114)									
EM1817591-002	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EM1817591-004	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2015114)									
EM1817591-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EM1817591-004	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2015114)									
EM1817591-002	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EM1817591-004	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit

Page	: 10 of 19
Work Order	: EM1817564
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 2015114) - continued									
EM1817591-004	Anonymous	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Page : 11 of 19
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 2016191)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	88.8	78	107
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	94.2	76	110
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	97.3	84	113
EG005T: Boron	7440-42-8	50	mg/kg	<50	33.2 mg/kg	102	84	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	85.5	76	108
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	94.0	78	110
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	88.4	78	112
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	87.8	78	108
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	85.8	78	106
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	96.1	81	110
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	93.0	80	109
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	99.6	92	110
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	90.9	78	106
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	90.6	79	110
EG005T: Total Metals by ICP-AES (QCLot: 2016193)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	89.2	78	107
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	96.2	76	110
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	97.6	84	113
EG005T: Boron	7440-42-8	50	mg/kg	<50	33.2 mg/kg	103	84	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	86.3	76	108
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	94.5	78	110
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	88.9	78	112
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	88.4	78	108
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	86.7	78	106
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	97.0	81	110
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	93.5	80	109
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	98.7	92	110
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	91.4	78	106
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	90.6	79	110
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2016192)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	83.3	77	104
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2016194)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	83.4	77	104
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2014835)								

Page : 12 of 19
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2014835) - continued								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	97.0	75	131
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	95.2	70	132
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	89.9	80	128
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	87.3	70	128
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	90.2	80	128
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	93.8	72	126
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	91.4	70	128
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	96.1	80	125
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	89.5	70	130
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	94.7	80	126
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	90.0	71	124
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	103	75	125
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	92.1	70	125
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	83.7	71	128
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	82.9	72	126
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	84.3	68	127
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2014838)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	100	75	131
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	100	70	132
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	97.8	80	128
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	97.4	70	128
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	98.3	80	128
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	105	72	126
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	102	70	128
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	102	80	125
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	99.0	70	130
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	104	80	126
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	90.1	71	124
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	105	75	125
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	94.5	70	125
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	94.6	71	128
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	94.9	72	126
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	93.4	68	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2014557)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	36 mg/kg	78.7	70	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2014561)								

Page : 13 of 19
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2014561) - continued								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	36 mg/kg	78.1	70	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2014836)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	806 mg/kg	87.6	80	120
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3006 mg/kg	103	84	115
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	1584 mg/kg	91.5	80	112
EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2014839)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	806 mg/kg	93.2	80	120
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3006 mg/kg	103	84	115
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	1584 mg/kg	93.8	80	112
EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2014557)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	76.4	68	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2014561)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	75.6	68	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2014836)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	1160 mg/kg	97.6	83	117
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	3978 mg/kg	96.7	82	114
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	313 mg/kg	74.0	73	115
EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2014839)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	1160 mg/kg	97.4	83	117
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	3978 mg/kg	95.5	82	114
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	313 mg/kg	82.6	73	115
EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080: BTEXN (QCLot: 2014557)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	77.3	74	124
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	83.5	77	125
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	78.9	73	125
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	85.9	77	128
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	87.6	81	128
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	86.5	66	130
EP080: BTEXN (QCLot: 2014561)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	78.0	74	124
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	84.7	77	125
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	81.1	73	125

Page : 14 of 19
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP080: BTEXN (QCLot: 2014561) - continued								
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	85.9	77	128
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	88.4	81	128
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	85.7	66	130

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2015070)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	100	91	107
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	91.8	82	113
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	102	84	106
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.3	84	104
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	99.4	83	103
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	101	83	106
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	98.0	82	103
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	101	83	105
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	99.7	83	105
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	97.0	82	106
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	98.4	82	109
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	100	83	106
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	98.8	85	109
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	96.2	84	116
EG020F: Dissolved Metals by ICP-MS (QCLot: 2015073)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	100	91	107
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	99.0	82	113
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	100.0	84	106
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	93.8	84	104
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	94.8	83	103
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	100	83	106
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	98.3	82	103
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	103	83	105
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	101	83	105
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.6	82	106
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	98.5	82	109
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	98.2	83	106
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	103	85	109
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	101	84	116
EG035F: Dissolved Mercury by FIMS (QCLot: 2015072)								

Page : 15 of 19
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EG035F: Dissolved Mercury by FIMS (QCLot: 2015072) - continued								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	88.6	76	114
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2014424)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	49.1	48	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	59.9	50	117
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	57.5	53	117
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	71.0	54	118
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	86.7	59	119
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	87.3	51	113
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	94.4	61	120
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	93.4	56	120
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	93.5	53	120
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	90.8	57	122
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	102	56	131
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	106	59	124
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	104	54	124
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	91.1	55	124
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	90.7	54	124
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	91.4	56	124
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2014422)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	4331 µg/L	80.8	51	136
EP071: C15 - C28 Fraction	----	100	µg/L	<100	16952 µg/L	88.0	58	139
EP071: C29 - C36 Fraction	----	50	µg/L	<50	8695 µg/L	89.1	57	134
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2015114)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	105	68	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2014422)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	6292 µg/L	82.7	55	134
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	22143 µg/L	89.7	58	135
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1677 µg/L	89.7	57	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2015114)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	103	66	123
EP080: BTEXN (QCLot: 2015114)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	108	74	123
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	109	77	128
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	105	73	126
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	111	72	131
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	110	74	131

Page : 16 of 19
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080: BTEXN (QCLot: 2015114) - continued								
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	112	74	124

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005T: Total Metals by ICP-AES (QCLot: 2016191)							
EM1817564-002	BH26 0.5-0.6	EG005T: Barium	7440-39-3	50 mg/kg	# Not Determined	71	135
		EG005T: Manganese	7439-96-5	50 mg/kg	# Not Determined	68	136
EM1817564-002	BH26 0.5-0.6	EG005T: Arsenic	7440-38-2	50 mg/kg	96.5	78	124
		EG005T: Beryllium	7440-41-7	50 mg/kg	105	85	125
		EG005T: Cadmium	7440-43-9	50 mg/kg	97.6	84	116
		EG005T: Chromium	7440-47-3	50 mg/kg	97.1	79	121
		EG005T: Copper	7440-50-8	50 mg/kg	97.8	82	124
		EG005T: Lead	7439-92-1	50 mg/kg	93.2	76	124
		EG005T: Nickel	7440-02-0	50 mg/kg	86.0	78	120
		EG005T: Selenium	7782-49-2	50 mg/kg	95.1	71	125
		EG005T: Vanadium	7440-62-2	50 mg/kg	89.3	76	124
		EG005T: Zinc	7440-66-6	50 mg/kg	87.1	74	128
EG005T: Total Metals by ICP-AES (QCLot: 2016193)							
EM1817564-022	BH35 1.5-1.6	EG005T: Copper	7440-50-8	50 mg/kg	# 269	82	124
		EG005T: Manganese	7439-96-5	50 mg/kg	# Not Determined	68	136
		EG005T: Nickel	7440-02-0	50 mg/kg	98.4	78	120
EM1817564-022	BH35 1.5-1.6	EG005T: Arsenic	7440-38-2	50 mg/kg	99.1	78	124
		EG005T: Barium	7440-39-3	50 mg/kg	71.0	71	135
		EG005T: Beryllium	7440-41-7	50 mg/kg	90.3	85	125
		EG005T: Cadmium	7440-43-9	50 mg/kg	98.0	84	116
		EG005T: Chromium	7440-47-3	50 mg/kg	104	79	121
		EG005T: Lead	7439-92-1	50 mg/kg	98.5	76	124
		EG005T: Selenium	7782-49-2	50 mg/kg	73.2	71	125
		EG005T: Vanadium	7440-62-2	50 mg/kg	85.8	76	124
		EG005T: Zinc	7440-66-6	50 mg/kg	97.9	74	128
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2016192)							

Page : 17 of 19
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2016192) - continued							
EM1817564-002	BH26 0.5-0.6	EG035T: Mercury	7439-97-6	5 mg/kg	76.8	76	116
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2016194)							
EM1817564-022	BH35 1.5-1.6	EG035T: Mercury	7439-97-6	5 mg/kg	81.9	76	116
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2014835)							
EM1817564-002	BH26 0.5-0.6	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	88.3	67	117
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	94.9	52	148
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2014838)							
EM1817564-022	BH35 1.5-1.6	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	90.5	67	117
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	52.0	52	148
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2014557)							
EM1817564-002	BH26 0.5-0.6	EP080: C6 - C9 Fraction	----	28 mg/kg	63.8	42	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2014561)							
EM1817564-022	BH35 1.5-1.6	EP080: C6 - C9 Fraction	----	28 mg/kg	57.5	42	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2014836)							
EM1817564-003	BH27 0.1-0.2	EP071: C10 - C14 Fraction	----	806 mg/kg	87.7	53	123
		EP071: C15 - C28 Fraction	----	3006 mg/kg	103	70	124
		EP071: C29 - C36 Fraction	----	1584 mg/kg	92.1	64	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2014839)							
EM1817564-023	Duplicate 2	EP071: C10 - C14 Fraction	----	806 mg/kg	95.4	53	123
		EP071: C15 - C28 Fraction	----	3006 mg/kg	94.4	70	124
		EP071: C29 - C36 Fraction	----	1584 mg/kg	86.0	64	118
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2014557)							
EM1817564-002	BH26 0.5-0.6	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	60.3	39	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2014561)							
EM1817564-022	BH35 1.5-1.6	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	54.8	39	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2014836)							
EM1817564-003	BH27 0.1-0.2	EP071: >C10 - C16 Fraction	----	1160 mg/kg	96.9	65	123
		EP071: >C16 - C34 Fraction	----	3978 mg/kg	96.6	67	121
		EP071: >C34 - C40 Fraction	----	313 mg/kg	75.0	44	126
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2014839)							
EM1817564-023	Duplicate 2	EP071: >C10 - C16 Fraction	----	1160 mg/kg	98.0	65	123
		EP071: >C16 - C34 Fraction	----	3978 mg/kg	87.4	67	121
		EP071: >C34 - C40 Fraction	----	313 mg/kg	57.6	44	126
EP080: BTEXN (QCLot: 2014557)							
EM1817564-002	BH26 0.5-0.6	EP080: Benzene	71-43-2	2 mg/kg	84.8	50	136

Page : 18 of 19
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080: BTEXN (QCLot: 2014557) - continued							
EM1817564-002	BH26 0.5-0.6	EP080: Toluene	108-88-3	2 mg/kg	90.4	56	139
EP080: BTEXN (QCLot: 2014561)							
EM1817564-022	BH35 1.5-1.6	EP080: Benzene	71-43-2	2 mg/kg	80.5	50	136
		EP080: Toluene	108-88-3	2 mg/kg	88.1	56	139

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2015070)							
EM1817519-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	103	85	131
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	92.2	73	141
		EG020A-F: Barium	7440-39-3	0.2 mg/L	99.5	75	127
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	87.5	81	133
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	96.3	71	135
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	105	78	132
		EG020A-F: Copper	7440-50-8	0.2 mg/L	97.1	76	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	95.3	75	133
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	94.0	64	134
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	98.4	73	131
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	99.9	73	131
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	97.6	75	131
EG020F: Dissolved Metals by ICP-MS (QCLot: 2015073)							
EM1817564-026	Rinsate 4	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	96.2	85	131
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	100	73	141
		EG020A-F: Barium	7440-39-3	0.2 mg/L	95.0	75	127
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	91.0	81	133
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	94.6	71	135
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	97.6	78	132
		EG020A-F: Copper	7440-50-8	0.2 mg/L	95.1	76	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	101	75	133
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	101	64	134
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	96.4	73	131
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	98.6	73	131
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	100	75	131
EG035F: Dissolved Mercury by FIMS (QCLot: 2015072)							
EM1817530-002	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	77.6	70	120
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2015114)							
EM1817547-002	Anonymous	EP080: C6 - C9 Fraction	---	280 µg/L	84.4	43	125

Page	: 19 of 19
Work Order	: EM1817564
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2015114)							
EM1817547-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	83.6	44	122
EP080: BTEXN (QCLot: 2015114)							
EM1817547-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	98.1	68	130
		EP080: Toluene	108-88-3	20 µg/L	85.2	72	132

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM1817564	Page	: 1 of 16
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Telephone	: +6138549 9630
Project	: 48-52	Date Samples Received	: 01-Nov-2018
Site	: ----	Issue Date	: 09-Nov-2018
Sampler	: AARON PLUMMER	No. of samples received	: 43
Order number	:	No. of samples analysed	: 43

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Duplicate outliers exist - please see following pages for full details.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Page : 2 of 16
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817564--011	BH28 1.2-1.3	**Fluoranthene**	206-44-0	36.7 %	0% - 20%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817564--011	BH28 1.2-1.3	**Pyrene**	129-00-0	36.9 %	0% - 20%	**RPD exceeds LOR based limits**
Matrix Spike (MS) Recoveries							
EG005T: Total Metals by ICP-AES	EM1817564--002	BH26 0.5-0.6	**Barium**	7440-39-3	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG005T: Total Metals by ICP-AES	EM1817564--022	BH35 1.5-1.6	**Copper**	7440-50-8	269 %	82-124%	**Recovery greater than upper data quality objective**
EG005T: Total Metals by ICP-AES	EM1817564--002	BH26 0.5-0.6	**Manganese**	7439-96-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG005T: Total Metals by ICP-AES	EM1817564--022	BH35 1.5-1.6	**Manganese**	7439-96-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	16	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	18	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	16	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	18	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	***Sample Date***	*Extraction / Preparation*			*Analysis*		
Container / *Client Sample ID(s)*		***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*

Page : 3 of 16
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
BH26 0.1-0.2, BH26 0.5-0.6, BH27 0.1-0.2, BH27 0.5-0.6, BH27 1.0-1.1, BH27 1.5-1.6, BH27 1.9-2.0, BH28 0.1-0.2, BH28 0.5-0.6, BH28 1.0-1.1, BH28 1.2-1.3	**29-Oct-2018**	----	----	----	**02-Nov-2018**	12-Nov-2018	✓
Soil Glass Jar - Unpreserved (EA055)							
BH29 0.5-0.6, BH29 1.5-1.6, BH29 2.1-2.2, BH30 0.3-0.4, BH31 0.5-0.6, BH31 1.5-1.6, BH32 0.5-0.6, BH33 0.5-0.6, BH34 0.5-0.6, BH35 0.5-0.6, BH35 1.5-1.6, Duplicate 2	**30-Oct-2018**	----	----	----	**02-Nov-2018**	13-Nov-2018	✓
Soil Glass Jar - Unpreserved (EA055)							
BH36 0.5-0.6, BH37 0.5-0.6, BH37 1.5-1.6, BH37 2.5-2.6, BH37 3.5-3.6, BH38 0.5-0.6, BH38 1.5-1.6, BH38 2.5-2.6, BH39 0.5-0.6, BH39 1.5-1.6, BH39 2.5-2.6, BH40 0.5-0.6, BH40 1.5-1.6, BH40 2.5-2.6, BH40 3.5-3.6, Duplicate 3, Duplicate 4	**31-Oct-2018**	----	----	----	**02-Nov-2018**	14-Nov-2018	✓

Page : 4 of 16
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
BH26 0.1-0.2,	BH26 0.5-0.6,	**29-Oct-2018**	**05-Nov-2018**	27-Apr-2019	✓	**05-Nov-2018**	27-Apr-2019	✓
BH27 0.1-0.2,	BH27 0.5-0.6,							
BH27 1.0-1.1,	BH27 1.5-1.6,							
BH27 1.9-2.0,	BH28 0.1-0.2,							
BH28 0.5-0.6,	BH28 1.0-1.1,							
BH28 1.2-1.3								
Soil Glass Jar - Unpreserved (EG005T)								
BH29 0.5-0.6,	BH29 1.5-1.6,	**30-Oct-2018**	**05-Nov-2018**	28-Apr-2019	✓	**05-Nov-2018**	28-Apr-2019	✓
BH29 2.1-2.2,	BH30 0.3-0.4,							
BH31 0.5-0.6,	BH31 1.5-1.6,							
BH32 0.5-0.6,	BH33 0.5-0.6,							
BH34 0.5-0.6,	BH35 0.5-0.6,							
BH35 1.5-1.6,	Duplicate 2							
Soil Glass Jar - Unpreserved (EG005T)								
BH36 0.5-0.6,	BH37 0.5-0.6,	**31-Oct-2018**	**05-Nov-2018**	29-Apr-2019	✓	**05-Nov-2018**	29-Apr-2019	✓
BH37 1.5-1.6,	BH37 2.5-2.6,							
BH37 3.5-3.6,	BH38 0.5-0.6,							
BH38 1.5-1.6,	BH38 2.5-2.6,							
BH39 0.5-0.6,	BH39 1.5-1.6,							
BH39 2.5-2.6,	BH40 0.5-0.6,							
BH40 1.5-1.6,	BH40 2.5-2.6,							
BH40 3.5-3.6,	Duplicate 3,							
Duplicate 4								

Page : 5 of 16
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
BH26 0.1-0.2, BH26 0.5-0.6, BH27 0.1-0.2, BH27 0.5-0.6, BH27 1.0-1.1, BH27 1.5-1.6, BH27 1.9-2.0, BH28 0.1-0.2, BH28 0.5-0.6, BH28 1.0-1.1, BH28 1.2-1.3	**29-Oct-2018**	**05-Nov-2018**	26-Nov-2018	✓	**05-Nov-2018**	26-Nov-2018	✓
Soil Glass Jar - Unpreserved (EG035T)							
BH29 0.5-0.6, BH29 1.5-1.6, BH29 2.1-2.2, BH30 0.3-0.4, BH31 0.5-0.6, BH31 1.5-1.6, BH32 0.5-0.6, BH33 0.5-0.6, BH34 0.5-0.6, BH35 0.5-0.6, BH35 1.5-1.6, Duplicate 2	**30-Oct-2018**	**05-Nov-2018**	27-Nov-2018	✓	**05-Nov-2018**	27-Nov-2018	✓
Soil Glass Jar - Unpreserved (EG035T)							
BH36 0.5-0.6, BH37 0.5-0.6, BH37 1.5-1.6, BH37 2.5-2.6, BH37 3.5-3.6, BH38 0.5-0.6, BH38 1.5-1.6, BH38 2.5-2.6, BH39 0.5-0.6, BH39 1.5-1.6, BH39 2.5-2.6, BH40 0.5-0.6, BH40 1.5-1.6, BH40 2.5-2.6, BH40 3.5-3.6, Duplicate 3, Duplicate 4	**31-Oct-2018**	**05-Nov-2018**	28-Nov-2018	✓	**05-Nov-2018**	28-Nov-2018	✓

Page : 6 of 16
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
BH26 0.1-0.2,	BH26 0.5-0.6,	**29-Oct-2018**	**05-Nov-2018**	12-Nov-2018	✓	**05-Nov-2018**	15-Dec-2018	✓
BH27 0.1-0.2,	BH27 0.5-0.6,							
BH27 1.0-1.1,	BH27 1.5-1.6,							
BH27 1.9-2.0,	BH28 0.1-0.2,							
BH28 0.5-0.6,	BH28 1.0-1.1,							
BH28 1.2-1.3								
Soil Glass Jar - Unpreserved (EP075(SIM))								
BH29 0.5-0.6,	BH29 1.5-1.6,	**30-Oct-2018**	**05-Nov-2018**	13-Nov-2018	✓	**05-Nov-2018**	15-Dec-2018	✓
BH29 2.1-2.2,	BH30 0.3-0.4,							
BH31 0.5-0.6,	BH31 1.5-1.6,							
BH32 0.5-0.6,	BH33 0.5-0.6,							
BH34 0.5-0.6,	BH35 0.5-0.6,							
BH35 1.5-1.6,	Duplicate 2							
Soil Glass Jar - Unpreserved (EP075(SIM))								
BH36 0.5-0.6,	BH37 0.5-0.6,	**31-Oct-2018**	**05-Nov-2018**	14-Nov-2018	✓	**05-Nov-2018**	15-Dec-2018	✓
BH37 1.5-1.6,	BH37 2.5-2.6,							
BH37 3.5-3.6,	BH38 0.5-0.6,							
BH38 1.5-1.6,	BH38 2.5-2.6,							
BH39 0.5-0.6,	BH39 1.5-1.6,							
BH39 2.5-2.6,	BH40 0.5-0.6,							
BH40 1.5-1.6,	BH40 2.5-2.6,							
BH40 3.5-3.6,	Duplicate 3,							
Duplicate 4								

Page	: 7 of 16
Work Order	: EM1817564
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080)								
BH26 0.1-0.2,	BH26 0.5-0.6,	**29-Oct-2018**	**01-Nov-2018**	12-Nov-2018	✓	**02-Nov-2018**	12-Nov-2018	✓
BH27 0.1-0.2,	BH27 0.5-0.6,							
BH27 1.0-1.1,	BH27 1.5-1.6,							
BH27 1.9-2.0,	BH28 0.1-0.2,							
BH28 0.5-0.6,	BH28 1.0-1.1,							
BH28 1.2-1.3								
Soil Glass Jar - Unpreserved (EP071)								
BH26 0.1-0.2,	BH26 0.5-0.6,	**29-Oct-2018**	**05-Nov-2018**	12-Nov-2018	✓	**05-Nov-2018**	15-Dec-2018	✓
BH27 0.1-0.2,	BH27 0.5-0.6,							
BH27 1.0-1.1,	BH27 1.5-1.6,							
BH27 1.9-2.0,	BH28 0.1-0.2,							
BH28 0.5-0.6,	BH28 1.0-1.1,							
BH28 1.2-1.3								
Soil Glass Jar - Unpreserved (EP080)								
BH29 0.5-0.6,	BH29 1.5-1.6,	**30-Oct-2018**	**01-Nov-2018**	13-Nov-2018	✓	**02-Nov-2018**	13-Nov-2018	✓
BH29 2.1-2.2,	BH30 0.3-0.4,							
BH31 0.5-0.6,	BH31 1.5-1.6,							
BH32 0.5-0.6,	BH33 0.5-0.6,							
BH34 0.5-0.6,	BH35 0.5-0.6,							
BH35 1.5-1.6,	Duplicate 2							
Soil Glass Jar - Unpreserved (EP071)								
BH29 0.5-0.6,	BH29 1.5-1.6,	**30-Oct-2018**	**05-Nov-2018**	13-Nov-2018	✓	**05-Nov-2018**	15-Dec-2018	✓
BH29 2.1-2.2,	BH30 0.3-0.4,							
BH31 0.5-0.6,	BH31 1.5-1.6,							
BH32 0.5-0.6,	BH33 0.5-0.6,							
BH34 0.5-0.6,	BH35 0.5-0.6,							
BH35 1.5-1.6,	Duplicate 2							
Soil Glass Jar - Unpreserved (EP080)								
BH36 0.5-0.6,	BH37 0.5-0.6,	**31-Oct-2018**	**01-Nov-2018**	14-Nov-2018	✓	**02-Nov-2018**	14-Nov-2018	✓
BH37 1.5-1.6,	BH37 2.5-2.6,							
BH37 3.5-3.6,	BH38 0.5-0.6,							
BH38 1.5-1.6,	BH38 2.5-2.6,							
BH39 0.5-0.6,	BH39 1.5-1.6,							
BH39 2.5-2.6,	BH40 0.5-0.6,							
BH40 1.5-1.6,	BH40 2.5-2.6,							
BH40 3.5-3.6,	Duplicate 3,							
Duplicate 4								
Soil Glass Jar - Unpreserved (EP071)								

Page : 8 of 16
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons - Continued								
BH36 0.5-0.6,	BH37 0.5-0.6,	**31-Oct-2018**	**05-Nov-2018**	14-Nov-2018	✓	**05-Nov-2018**	15-Dec-2018	✓
BH37 1.5-1.6,	BH37 2.5-2.6,							
BH37 3.5-3.6,	BH38 0.5-0.6,							
BH38 1.5-1.6,	BH38 2.5-2.6,							
BH39 0.5-0.6,	BH39 1.5-1.6,							
BH39 2.5-2.6,	BH40 0.5-0.6,							
BH40 1.5-1.6,	BH40 2.5-2.6,							
BH40 3.5-3.6,	Duplicate 3,							
Duplicate 4								

Page : 9 of 16
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP080)								
BH26 0.1-0.2,	BH26 0.5-0.6,	**29-Oct-2018**	**01-Nov-2018**	12-Nov-2018	✓	**02-Nov-2018**	12-Nov-2018	✓
BH27 0.1-0.2,	BH27 0.5-0.6,							
BH27 1.0-1.1,	BH27 1.5-1.6,							
BH27 1.9-2.0,	BH28 0.1-0.2,							
BH28 0.5-0.6,	BH28 1.0-1.1,							
BH28 1.2-1.3								
Soil Glass Jar - Unpreserved (EP071)								
BH26 0.1-0.2,	BH26 0.5-0.6,	**29-Oct-2018**	**05-Nov-2018**	12-Nov-2018	✓	**05-Nov-2018**	15-Dec-2018	✓
BH27 0.1-0.2,	BH27 0.5-0.6,							
BH27 1.0-1.1,	BH27 1.5-1.6,							
BH27 1.9-2.0,	BH28 0.1-0.2,							
BH28 0.5-0.6,	BH28 1.0-1.1,							
BH28 1.2-1.3								
Soil Glass Jar - Unpreserved (EP080)								
BH29 0.5-0.6,	BH29 1.5-1.6,	**30-Oct-2018**	**01-Nov-2018**	13-Nov-2018	✓	**02-Nov-2018**	13-Nov-2018	✓
BH29 2.1-2.2,	BH30 0.3-0.4,							
BH31 0.5-0.6,	BH31 1.5-1.6,							
BH32 0.5-0.6,	BH33 0.5-0.6,							
BH34 0.5-0.6,	BH35 0.5-0.6,							
BH35 1.5-1.6,	Duplicate 2							
Soil Glass Jar - Unpreserved (EP071)								
BH29 0.5-0.6,	BH29 1.5-1.6,	**30-Oct-2018**	**05-Nov-2018**	13-Nov-2018	✓	**05-Nov-2018**	15-Dec-2018	✓
BH29 2.1-2.2,	BH30 0.3-0.4,							
BH31 0.5-0.6,	BH31 1.5-1.6,							
BH32 0.5-0.6,	BH33 0.5-0.6,							
BH34 0.5-0.6,	BH35 0.5-0.6,							
BH35 1.5-1.6,	Duplicate 2							
Soil Glass Jar - Unpreserved (EP080)								
BH36 0.5-0.6,	BH37 0.5-0.6,	**31-Oct-2018**	**01-Nov-2018**	14-Nov-2018	✓	**02-Nov-2018**	14-Nov-2018	✓
BH37 1.5-1.6,	BH37 2.5-2.6,							
BH37 3.5-3.6,	BH38 0.5-0.6,							
BH38 1.5-1.6,	BH38 2.5-2.6,							
BH39 0.5-0.6,	BH39 1.5-1.6,							
BH39 2.5-2.6,	BH40 0.5-0.6,							
BH40 1.5-1.6,	BH40 2.5-2.6,							
BH40 3.5-3.6,	Duplicate 3,							
Duplicate 4								
Soil Glass Jar - Unpreserved (EP071)								

Page : 10 of 16
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Matrix: **SOIL** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued							
BH36 0.5-0.6, BH37 0.5-0.6, BH37 1.5-1.6, BH37 2.5-2.6, BH37 3.5-3.6, BH38 0.5-0.6, BH38 1.5-1.6, BH38 2.5-2.6, BH39 0.5-0.6, BH39 1.5-1.6, BH39 2.5-2.6, BH40 0.5-0.6, BH40 1.5-1.6, BH40 2.5-2.6, BH40 3.5-3.6, Duplicate 3, Duplicate 4	31-Oct-2018	05-Nov-2018	14-Nov-2018	✓	05-Nov-2018	15-Dec-2018	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
BH26 0.1-0.2, BH26 0.5-0.6, BH27 0.1-0.2, BH27 0.5-0.6, BH27 1.0-1.1, BH27 1.5-1.6, BH27 1.9-2.0, BH28 0.1-0.2, BH28 0.5-0.6, BH28 1.0-1.1, BH28 1.2-1.3	29-Oct-2018	01-Nov-2018	12-Nov-2018	✓	02-Nov-2018	12-Nov-2018	✓
Soil Glass Jar - Unpreserved (EP080)							
BH29 0.5-0.6, BH29 1.5-1.6, BH29 2.1-2.2, BH30 0.3-0.4, BH31 0.5-0.6, BH31 1.5-1.6, BH32 0.5-0.6, BH33 0.5-0.6, BH34 0.5-0.6, BH35 0.5-0.6, BH35 1.5-1.6, Duplicate 2	30-Oct-2018	01-Nov-2018	13-Nov-2018	✓	02-Nov-2018	13-Nov-2018	✓
Soil Glass Jar - Unpreserved (EP080)							
BH36 0.5-0.6, BH37 0.5-0.6, BH37 1.5-1.6, BH37 2.5-2.6, BH37 3.5-3.6, BH38 0.5-0.6, BH38 1.5-1.6, BH38 2.5-2.6, BH39 0.5-0.6, BH39 1.5-1.6, BH39 2.5-2.6, BH40 0.5-0.6, BH40 1.5-1.6, BH40 2.5-2.6, BH40 3.5-3.6, Duplicate 3, Duplicate 4	31-Oct-2018	01-Nov-2018	14-Nov-2018	✓	02-Nov-2018	14-Nov-2018	✓

Matrix: **WATER** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation

Page : 11 of 16
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) Rinsate 2	29-Oct-2018	----	----	----	02-Nov-2018	27-Apr-2019	✓
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) Rinsate 3	30-Oct-2018	----	----	----	02-Nov-2018	28-Apr-2019	✓
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) Rinsate 4	31-Oct-2018	----	----	----	02-Nov-2018	29-Apr-2019	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG035F) Rinsate 2	29-Oct-2018	----	----	----	02-Nov-2018	26-Nov-2018	✓
Clear Plastic Bottle - Filtered; Lab-acidified (EG035F) Rinsate 3	30-Oct-2018	----	----	----	02-Nov-2018	27-Nov-2018	✓
Clear Plastic Bottle - Filtered; Lab-acidified (EG035F) Rinsate 4	31-Oct-2018	----	----	----	02-Nov-2018	28-Nov-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) Rinsate 2	29-Oct-2018	01-Nov-2018	05-Nov-2018	✓	02-Nov-2018	11-Dec-2018	✓
Amber Glass Bottle - Unpreserved (EP075(SIM)) Rinsate 3	30-Oct-2018	01-Nov-2018	06-Nov-2018	✓	02-Nov-2018	11-Dec-2018	✓
Amber Glass Bottle - Unpreserved (EP075(SIM)) Rinsate 4	31-Oct-2018	01-Nov-2018	07-Nov-2018	✓	02-Nov-2018	11-Dec-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) Rinsate 2	29-Oct-2018	01-Nov-2018	05-Nov-2018	✓	02-Nov-2018	11-Dec-2018	✓
Amber Glass Bottle - Unpreserved (EP071) Rinsate 3	30-Oct-2018	01-Nov-2018	06-Nov-2018	✓	02-Nov-2018	11-Dec-2018	✓
Amber Glass Bottle - Unpreserved (EP071) Rinsate 4	31-Oct-2018	01-Nov-2018	07-Nov-2018	✓	02-Nov-2018	11-Dec-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) Rinsate 2	29-Oct-2018	02-Nov-2018	12-Nov-2018	✓	02-Nov-2018	12-Nov-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) Rinsate 3	30-Oct-2018	02-Nov-2018	13-Nov-2018	✓	02-Nov-2018	13-Nov-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) Rinsate 4	31-Oct-2018	02-Nov-2018	14-Nov-2018	✓	02-Nov-2018	14-Nov-2018	✓

Page : 12 of 16
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) Rinsate 2	29-Oct-2018	01-Nov-2018	05-Nov-2018	✓	02-Nov-2018	11-Dec-2018	✓
Amber Glass Bottle - Unpreserved (EP071) Rinsate 3	30-Oct-2018	01-Nov-2018	06-Nov-2018	✓	02-Nov-2018	11-Dec-2018	✓
Amber Glass Bottle - Unpreserved (EP071) Rinsate 4	31-Oct-2018	01-Nov-2018	07-Nov-2018	✓	02-Nov-2018	11-Dec-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) Rinsate 2	29-Oct-2018	02-Nov-2018	12-Nov-2018	✓	02-Nov-2018	12-Nov-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) Rinsate 3	30-Oct-2018	02-Nov-2018	13-Nov-2018	✓	02-Nov-2018	13-Nov-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) Rinsate 4	31-Oct-2018	02-Nov-2018	14-Nov-2018	✓	02-Nov-2018	14-Nov-2018	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) Rinsate 2	29-Oct-2018	02-Nov-2018	12-Nov-2018	✓	02-Nov-2018	12-Nov-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) Rinsate 3	30-Oct-2018	02-Nov-2018	13-Nov-2018	✓	02-Nov-2018	13-Nov-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) Rinsate 4	31-Oct-2018	02-Nov-2018	14-Nov-2018	✓	02-Nov-2018	14-Nov-2018	✓

Page : 13 of 16
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	6	60	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	4	40	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Dissolved Mercury by FIMS	EG035F	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	34	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	16	0.00	10.00	*	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	18	0.00	10.00	*	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Dissolved Mercury by FIMS	EG035F	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Page	: 14 of 16
Work Order	: EM1817564
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS) - Continued							
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	34	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Dissolved Mercury by FIMS	EG035F	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	34	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Dissolved Mercury by FIMS	EG035F	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	34	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	16	0.00	5.00	×	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	18	0.00	5.00	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Page	15 of 16
Work Order	EM1817564
Client	GEO-ENVIRONMENTAL SOLUTIONS
Project	48-52

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)

Page	: 16 of 16
Work Order	: EM1817564
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM1818156**	Page	: 1 of 3
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Project	: 48-52	Date Samples Received	: 01-Nov-2018
Order number	:	Date Analysis Commenced	: 13-Nov-2018
C-O-C number	: ----	Issue Date	: 15-Nov-2018
Sampler	: ----		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 13		
No. of samples analysed	: 13		

Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Eric Chau	Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

Page	: 2 of 3
Work Order	: EM1818156
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

- **No Laboratory Duplicate (DUP) Results are required to be reported.**

Page : 3 of 3
Work Order : EM1818156
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2035435)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	75.6	48	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	81.3	50	117
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	70.6	53	117
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	72.6	54	118
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	72.2	59	119
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	72.6	51	113
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	72.5	61	120
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	73.0	56	120
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	72.1	53	120
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	68.1	57	122
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	81.4	56	131
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	84.4	59	124
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	85.4	54	124
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	73.0	55	124
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	71.8	54	124
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	73.0	56	124

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM1818156	Page	: 1 of 5
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Telephone	: +6138549 9630
Project	: 48-52	Date Samples Received	: 01-Nov-2018
Site	: ----	Issue Date	: 15-Nov-2018
Sampler	: ----	No. of samples received	: 13
Order number	:	No. of samples analysed	: 13

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Page : 2 of 5
Work Order : EM1818156
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EN33: TCLP Leach							
Non-Volatile Leach: 14 day HT(e.g. SV organics)							
BH27 1.0-1.1,	BH28 1.2-1.3	13-Nov-2018	12-Nov-2018	1	----	----	----

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	14	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	14	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EN33: TCLP Leach								
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN33a)								
BH27 1.0-1.1,	BH28 1.2-1.3	29-Oct-2018	13-Nov-2018	12-Nov-2018	×	----	----	----
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN33a)								
BH29 0.5-0.6,	BH35 0.5-0.6	30-Oct-2018	13-Nov-2018	13-Nov-2018	✓	----	----	----
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN33a)								
BH37 0.5-0.6,	BH37 1.5-1.6,	31-Oct-2018	13-Nov-2018	14-Nov-2018	✓	----	----	----
BH37 2.5-2.6,	BH37 3.5-3.6,							
BH39 1.5-1.6,	BH39 2.5-2.6,							
BH40 0.5-0.6,	BH40 1.5-1.6,							
BH40 3.5-3.6								

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation

Page : 3 of 5
Work Order : EM1818156
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
BH27 1.0-1.1, BH28 1.2-1.3, BH29 0.5-0.6, BH35 0.5-0.6, BH37 0.5-0.6, BH37 1.5-1.6, BH37 2.5-2.6, BH37 3.5-3.6, BH39 1.5-1.6, BH39 2.5-2.6, BH40 0.5-0.6, BH40 1.5-1.6, BH40 3.5-3.6	**13-Nov-2018**	**14-Nov-2018**	20-Nov-2018	✓	**14-Nov-2018**	24-Dec-2018	✓

Page	: 4 of 5
Work Order	: EM1818156
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	14	0.00	10.00	*	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	14	0.00	5.00	*	NEPM 2013 B3 & ALS QC Standard

Page	: 5 of 5
Work Order	: EM1818156
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TCLP for Non & Semivolatile Analytes	EN33a	SOIL	In house QWI-EN/33 referenced to USEPA SW846-1311: The TCLP procedure is designed to determine the mobility of both organic and inorganic analytes present in wastes. The standard TCLP leach is for non-volatile and Semivolatile test parameters.
Separatory Funnel Extraction of Liquids	ORG14	SOIL	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM1817824**	Page	: 1 of 16
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Project	: 48-52	Date Samples Received	: 07-Nov-2018
Order number	:	Date Analysis Commenced	: 07-Nov-2018
C-O-C number	: ----	Issue Date	: 12-Nov-2018
Sampler	: AP		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 29		
No. of samples analysed	: 29		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

Page : 2 of 16
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2023696)									
EM1817824-001	BH41 0.5-0.6	EA055: Moisture Content	----	0.1	%	14.8	16.2	8.68	0% - 50%
EM1817824-011	BH44 2.5-2.6	EA055: Moisture Content	----	0.1	%	13.2	12.8	3.65	0% - 50%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2023697)									
EM1817824-021	BH50 0.5-0.6	EA055: Moisture Content	----	0.1	%	16.6	16.8	1.27	0% - 50%
EG005T: Total Metals by ICP-AES (QC Lot: 2023270)									
EM1817786-002	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	90	80	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	28	26	0.00	0% - 50%
		EG005T: Cobalt	7440-48-4	2	mg/kg	10	9	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	20	19	6.13	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	6	6	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	30	29	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	25	25	0.00	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	508	430	16.6	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	38	37	2.84	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	164	159	2.90	0% - 20%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EM1817786-023	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	70	80	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	24	24	0.00	0% - 50%
		EG005T: Cobalt	7440-48-4	2	mg/kg	7	7	0.00	No Limit

Page : 3 of 16
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005T: Total Metals by ICP-AES (QC Lot: 2023270) - continued									
EM1817786-023	Anonymous	EG005T: Nickel	7440-02-0	2	mg/kg	12	12	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	14	15	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	25	26	5.38	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	263	272	3.34	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	34	35	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	39	41	3.84	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 2023272)									
EM1817824-009	BH44 0.5-0.6	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	80	130	46.3	0% - 50%
		EG005T: Chromium	7440-47-3	2	mg/kg	12	12	0.00	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	10	10	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	12	12	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	6	5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	16	15	7.70	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	62	63	0.00	0% - 50%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	17	17	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	41	38	6.00	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EM1817824-018	BH48 1.5-1.6	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	130	140	0.00	0% - 50%
		EG005T: Chromium	7440-47-3	2	mg/kg	10	10	0.00	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	9	9	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	12	13	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	59	63	6.40	0% - 50%
		EG005T: Lead	7439-92-1	5	mg/kg	180	213	16.7	0% - 20%
		EG005T: Manganese	7439-96-5	5	mg/kg	232	245	5.32	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	36	30	17.1	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	254	270	5.90	0% - 20%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2023271)									
EM1817786-002	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit

Page : 4 of 16
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2023271) - continued									
EM1817786-023	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2023273)									
EM1817824-009	BH44 0.5-0.6	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EM1817824-018	BH48 1.5-1.6	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.4	0.4	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2023773)									
EM1817824-001	BH41 0.5-0.6	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EM1817824-011	BH44 2.5-2.6	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	0.7	1.2	51.8	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	4.2	6.8	48.8	0% - 50%
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	0.8	1.5	58.6	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	9.8	# 18.3	60.6	0% - 20%
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	3.3	# 5.9	57.6	0% - 50%
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	22.8	# 38.7	51.6	0% - 20%
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	26.8	# 44.7	49.9	0% - 20%
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	14.5	# 24.2	50.0	0% - 20%
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	13.4	# 22.5	50.9	0% - 20%
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	23.0	# 38.4	50.4	0% - 20%
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	7.3	# 12.0	49.4	0% - 20%
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	21.6	# 35.9	49.9	0% - 20%
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	9.8	# 16.5	50.6	0% - 20%
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	2.5	4.4	53.4	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	12.1	# 20.0	49.4	0% - 20%
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2025069)									

Page : 5 of 16
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2025069) - continued									
EM1817783-002	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EM1817785-003	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	1.7	1.7	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	0.6	0.6	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	3.2	3.3	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	3.5	3.6	3.50	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	2.6	2.6	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	2.5	2.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	4.9	5.3	8.07	0% - 50%
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	1.8	1.9	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	4.2	4.7	10.4	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	2.6	2.8	5.48	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	0.6	0.7	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	3.2	3.3	3.26	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2023263)									
EM1817824-001	BH41 0.5-0.6	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EM1817824-011	BH44 2.5-2.6	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2023513)									
EM1817824-021	BH50 0.5-0.6	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2023774)									

Page : 6 of 16
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2023774) - continued									
EM1817824-001	BH41 0.5-0.6	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EM1817824-011	BH44 2.5-2.6	EP071: C15 - C28 Fraction	----	100	mg/kg	1000	620	47.6	0% - 50%
		EP071: C29 - C36 Fraction	----	100	mg/kg	680	430	43.7	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	1680	# 1050	46.2	0% - 20%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2025068)									
EM1817783-002	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EM1817785-003	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	110	110	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	120	120	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	230	230	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2023263)									
EM1817824-001	BH41 0.5-0.6	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EM1817824-011	BH44 2.5-2.6	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2023513)									
EM1817824-021	BH50 0.5-0.6	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2023774)									
EM1817824-001	BH41 0.5-0.6	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EM1817824-011	BH44 2.5-2.6	EP071: >C16 - C34 Fraction	----	100	mg/kg	1480	930	45.8	0% - 50%
		EP071: >C34 - C40 Fraction	----	100	mg/kg	320	210	42.3	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	1800	# 1140	44.9	0% - 20%
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2025068)									
EM1817783-002	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EM1817785-003	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	200	210	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit

Page : 7 of 16
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2025068) - continued									
EM1817785-003	Anonymous	EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	200	210	4.88	No Limit
EP080: BTEXN (QC Lot: 2023263)									
EM1817824-001	BH41 0.5-0.6	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EM1817824-011	BH44 2.5-2.6	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP080: BTEXN (QC Lot: 2023513)									
EM1817824-021	BH50 0.5-0.6	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2024852)									
EM1817721-004	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.017	0.018	10.0	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.014	0.014	0.00	0% - 50%
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit

Page : 8 of 16
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2024852) - continued									
EM1817721-004	Anonymous	EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EM1817825-007	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.012	0.012	0.00	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.007	0.008	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2024851)									
EM1817890-006	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EM1817665-024	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2023754)									
EM1817702-032	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EM1817702-043	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	900	890	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2023754)									
EM1817702-032	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EM1817702-043	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	760	770	1.78	No Limit
EP080: BTEXN (QC Lot: 2023754)									
EM1817702-032	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EM1817702-043	Anonymous	EP080: Benzene	71-43-2	1	µg/L	596	611	2.45	0% - 20%
		EP080: Toluene	108-88-3	2	µg/L	10	10	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	9	10	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	43	47	9.12	0% - 20%
		EP080: Naphthalene	91-20-3	5	µg/L	5	6	0.00	No Limit

Page : 9 of 16
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 2023270)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	93.6	78	107
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	92.8	76	110
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	105	84	113
EG005T: Boron	7440-42-8	50	mg/kg	<50	33.2 mg/kg	110	84	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	87.6	76	108
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	95.8	78	110
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	92.3	78	112
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	93.3	78	108
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	92.6	78	106
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	98.9	81	110
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	96.1	80	109
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	101	92	110
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	94.2	78	106
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	101	79	110
EG005T: Total Metals by ICP-AES (QCLot: 2023272)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	93.3	78	107
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	94.2	76	110
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	102	84	113
EG005T: Boron	7440-42-8	50	mg/kg	<50	33.2 mg/kg	111	84	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	85.9	76	108
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	88.4	78	110
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	88.6	78	112
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	96.5	78	108
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	92.7	78	106
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	97.0	81	110
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	92.4	80	109
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	101	92	110
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	92.1	78	106
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	95.2	79	110
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2023271)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	88.8	77	104
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2023273)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	83.2	77	104
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2023773)								

Page : 10 of 16
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2023773) - continued								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	100.0	75	131
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	99.5	70	132
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	91.3	80	128
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	90.7	70	128
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	93.2	80	128
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	96.8	72	126
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	93.2	70	128
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	94.7	80	125
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	90.4	70	130
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	93.2	80	126
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	97.7	71	124
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	101	75	125
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	94.9	70	125
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	85.7	71	128
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	86.4	72	126
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	86.1	68	127
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2025069)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	111	75	131
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	107	70	132
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	106	80	128
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	102	70	128
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	105	80	128
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	107	72	126
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	106	70	128
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	108	80	125
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	105	70	130
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	109	80	126
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	118	71	124
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	114	75	125
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	104	70	125
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	97.6	71	128
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	99.9	72	126
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	98.0	68	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2023263)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	36 mg/kg	99.7	70	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2023513)								

Page : 11 of 16
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2023513) - continued								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	36 mg/kg	106	61	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2023774)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	806 mg/kg	86.4	80	120
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3006 mg/kg	100	84	115
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	1584 mg/kg	92.0	80	112
EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2025068)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	806 mg/kg	81.3	80	120
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3006 mg/kg	92.5	84	115
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	1584 mg/kg	84.0	80	112
EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2023263)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	99.8	68	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2023513)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	100	60	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2023774)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	1160 mg/kg	86.6	83	117
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	3978 mg/kg	97.2	82	114
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	313 mg/kg	75.7	73	115
EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2025068)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	1160 mg/kg	85.9	83	117
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	3978 mg/kg	89.4	82	114
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	313 mg/kg	78.0	73	115
EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080: BTEXN (QCLot: 2023263)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	93.0	74	124
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	99.1	77	125
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	96.6	73	125
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	106	77	128
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	104	81	128
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	90.2	66	130
EP080: BTEXN (QCLot: 2023513)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	92.2	63	119
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	106	67	126
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	103	66	124

Page : 12 of 16
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP080: BTEXN (QCLot: 2023513) - continued								
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	116	68	128
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	115	73	128
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	91.0	61	123

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2024852)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	99.0	91	107
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	96.3	82	113
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	92.0	84	106
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	92.5	84	104
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	91.2	83	103
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	91.6	83	106
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	97.3	82	103
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	95.4	83	105
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	94.5	83	105
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	97.0	82	106
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	91.9	82	109
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	94.7	83	106
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	99.8	85	109
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	99.0	84	116
EG035F: Dissolved Mercury by FIMS (QCLot: 2024851)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	91.9	76	114
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2023666)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	67.8	48	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	72.0	50	117
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	68.2	53	117
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	70.4	54	118
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	72.7	59	119
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	72.9	51	113
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	72.9	61	120
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	72.6	56	120
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	72.2	53	120
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	73.2	57	122
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	82.2	56	131
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	80.4	59	124

Page : 13 of 16
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	LCS Recovery (%)	Recovery Limits (%): Low	Recovery Limits (%): High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2023666) - continued								
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	80.3	54	124
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	72.2	55	124
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	72.5	54	124
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	73.0	56	124
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2023664)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	4331 µg/L	101	51	136
EP071: C15 - C28 Fraction	----	100	µg/L	<100	16952 µg/L	104	58	139
EP071: C29 - C36 Fraction	----	50	µg/L	<50	8695 µg/L	106	57	134
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2023754)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	110	68	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2023664)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	6292 µg/L	102	55	134
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	22143 µg/L	105	58	135
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1677 µg/L	109	57	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2023754)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	109	66	123
EP080: BTEXN (QCLot: 2023754)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	110	74	123
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	101	77	128
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	104	73	126
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	115	72	131
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	118	74	131
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	89.1	74	124

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005T: Total Metals by ICP-AES (QCLot: 2023270)							
EM1817786-004	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	93.7	78	124
		EG005T: Barium	7440-39-3	50 mg/kg	83.5	71	135
		EG005T: Beryllium	7440-41-7	50 mg/kg	100	85	125
		EG005T: Cadmium	7440-43-9	50 mg/kg	87.6	84	116
		EG005T: Chromium	7440-47-3	50 mg/kg	90.2	79	121

Page : 14 of 16
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 2023270) - continued							
EM1817786-004	Anonymous	EG005T: Copper	7440-50-8	50 mg/kg	99.0	82	124
		EG005T: Lead	7439-92-1	50 mg/kg	91.3	76	124
		EG005T: Manganese	7439-96-5	50 mg/kg	# Not Determined	68	136
		EG005T: Nickel	7440-02-0	50 mg/kg	88.9	78	120
		EG005T: Selenium	7782-49-2	50 mg/kg	82.1	71	125
		EG005T: Vanadium	7440-62-2	50 mg/kg	86.1	76	124
		EG005T: Zinc	7440-66-6	50 mg/kg	101	74	128
EG005T: Total Metals by ICP-AES (QCLot: 2023272)							
EM1817824-010	BH44 1.5-1.6	EG005T: Arsenic	7440-38-2	50 mg/kg	93.4	78	124
		EG005T: Barium	7440-39-3	50 mg/kg	89.7	71	135
		EG005T: Beryllium	7440-41-7	50 mg/kg	96.8	85	125
		EG005T: Cadmium	7440-43-9	50 mg/kg	84.6	84	116
		EG005T: Chromium	7440-47-3	50 mg/kg	86.3	79	121
		EG005T: Copper	7440-50-8	50 mg/kg	94.0	82	124
		EG005T: Lead	7439-92-1	50 mg/kg	87.4	76	124
		EG005T: Manganese	7439-96-5	50 mg/kg	# Not Determined	68	136
		EG005T: Nickel	7440-02-0	50 mg/kg	83.5	78	120
		EG005T: Selenium	7782-49-2	50 mg/kg	82.8	71	125
		EG005T: Vanadium	7440-62-2	50 mg/kg	81.6	76	124
		EG005T: Zinc	7440-66-6	50 mg/kg	88.4	74	128
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2023271)							
EM1817786-004	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	82.7	76	116
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2023273)							
EM1817824-010	BH44 1.5-1.6	EG035T: Mercury	7439-97-6	5 mg/kg	91.8	76	116
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2023773)							
EM1817824-002	BH42 0.5-0.6	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	91.3	67	117
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	# Not Determined	52	148
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2025069)							
EM1817783-010	Anonymous	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	102	67	117
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	105	52	148
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2023263)							
EM1817824-002	BH42 0.5-0.6	EP080: C6 - C9 Fraction	----	28 mg/kg	91.5	42	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2023513)							
EM1817824-022	BH50 1.5-1.6	EP080: C6 - C9 Fraction	----	28 mg/kg	90.6	42	131

Page : 15 of 16
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2023774)							
EM1817824-003	BH42 1.5-1.6	EP071: C10 - C14 Fraction	----	806 mg/kg	91.3	53	123
		EP071: C15 - C28 Fraction	----	3006 mg/kg	98.6	70	124
		EP071: C29 - C36 Fraction	----	1584 mg/kg	92.0	64	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2025068)							
EM1817783-006	Anonymous	EP071: C10 - C14 Fraction	----	806 mg/kg	92.6	53	123
		EP071: C15 - C28 Fraction	----	3006 mg/kg	103	70	124
		EP071: C29 - C36 Fraction	----	1584 mg/kg	92.9	64	118
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2023263)							
EM1817824-002	BH42 0.5-0.6	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	90.2	39	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2023513)							
EM1817824-022	BH50 1.5-1.6	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	85.6	39	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2023774)							
EM1817824-003	BH42 1.5-1.6	EP071: >C10 - C16 Fraction	----	1160 mg/kg	90.5	65	123
		EP071: >C16 - C34 Fraction	----	3978 mg/kg	96.4	67	121
		EP071: >C34 - C40 Fraction	----	313 mg/kg	85.4	44	126
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2025068)							
EM1817783-006	Anonymous	EP071: >C10 - C16 Fraction	----	1160 mg/kg	92.8	65	123
		EP071: >C16 - C34 Fraction	----	3978 mg/kg	99.6	67	121
		EP071: >C34 - C40 Fraction	----	313 mg/kg	83.8	44	126
EP080: BTEXN (QCLot: 2023263)							
EM1817824-002	BH42 0.5-0.6	EP080: Benzene	71-43-2	2 mg/kg	119	50	136
		EP080: Toluene	108-88-3	2 mg/kg	122	56	139
EP080: BTEXN (QCLot: 2023513)							
EM1817824-022	BH50 1.5-1.6	EP080: Benzene	71-43-2	2 mg/kg	106	50	136
		EP080: Toluene	108-88-3	2 mg/kg	115	56	139

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2024852)							
EM1817721-004	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	103	85	131
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	101	73	141
		EG020A-F: Barium	7440-39-3	0.2 mg/L	95.4	75	127
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	99.5	81	133
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	94.4	71	135
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	97.9	78	132
		EG020A-F: Copper	7440-50-8	0.2 mg/L	102	76	130

Page : 16 of 16
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2024852) - continued							
EM1817721-004	Anonymous	EG020A-F: Lead	7439-92-1	0.2 mg/L	98.0	75	133
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	98.2	64	134
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	103	73	131
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	98.4	73	131
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	102	75	131
EG035F: Dissolved Mercury by FIMS (QCLot: 2024851)							
EM1817693-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	73.4	70	120
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2023754)							
EM1817702-033	Anonymous	EP080: C6 - C9 Fraction	----	280 µg/L	79.2	43	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2023754)							
EM1817702-033	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	77.4	44	122
EP080: BTEXN (QCLot: 2023754)							
EM1817702-033	Anonymous	EP080: Benzene	71-43-2	20 µg/L	96.6	68	130
		EP080: Toluene	108-88-3	20 µg/L	90.0	72	132

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM1817824	Page	: 1 of 11
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Telephone	: +6138549 9630
Project	: 48-52	Date Samples Received	: 07-Nov-2018
Site	: ----	Issue Date	: 12-Nov-2018
Sampler	: AP	No. of samples received	: 29
Order number	:	No. of samples analysed	: 29

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Duplicate outliers exist - please see following pages for full details.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Page	: 2 of 11
Work Order	: EM1817824
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817824--011	BH44 2.5-2.6	**Phenanthrene**	85-01-8	60.6 %	0% - 20%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817824--011	BH44 2.5-2.6	**Anthracene**	120-12-7	57.6 %	0% - 50%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817824--011	BH44 2.5-2.6	**Fluoranthene**	206-44-0	51.6 %	0% - 20%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817824--011	BH44 2.5-2.6	**Pyrene**	129-00-0	49.9 %	0% - 20%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817824--011	BH44 2.5-2.6	**Benz(a)anthracene**	56-55-3	50.0 %	0% - 20%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817824--011	BH44 2.5-2.6	**Chrysene**	218-01-9	50.9 %	0% - 20%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817824--011	BH44 2.5-2.6	**Benzo(b+j)fluoranthene**	205-99-2 205-82-3	50.4 %	0% - 20%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817824--011	BH44 2.5-2.6	**Benzo(k)fluoranthene**	207-08-9	49.4 %	0% - 20%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817824--011	BH44 2.5-2.6	**Benzo(a)pyrene**	50-32-8	49.9 %	0% - 20%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817824--011	BH44 2.5-2.6	**Indeno(1.2.3.cd)pyrene**	193-39-5	50.6 %	0% - 20%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817824--011	BH44 2.5-2.6	**Benzo(g.h.i)perylene**	191-24-2	49.4 %	0% - 20%	**RPD exceeds LOR based limits**
EP080/071: Total Petroleum Hydrocarbons	EM1817824--011	BH44 2.5-2.6	**C10 - C36 Fraction (sum)**	----	46.2 %	0% - 20%	**RPD exceeds LOR based limits**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2	EM1817824--011	BH44 2.5-2.6	**>C10 - C40 Fraction (sum)**	----	44.9 %	0% - 20%	**RPD exceeds LOR based limits**
Matrix Spike (MS) Recoveries							
EG005T: Total Metals by ICP-AES	EM1817786--004	Anonymous	**Manganese**	7439-96-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG005T: Total Metals by ICP-AES	EM1817824--010	BH44 1.5-1.6	**Manganese**	7439-96-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EM1817824--002	BH42 0.5-0.6	**Pyrene**	129-00-0	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	8	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	8	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Page : 3 of 11
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
BH41 0.5-0.6,	BH42 0.5-0.6,	**05-Nov-2018**	----	----	----	**07-Nov-2018**	19-Nov-2018	✓
BH42 1.5-1.6,	BH42 2.5-2.6,							
BH43 0.5-0.6,	BH43 1.5-1.6,							
BH43 2.5-2.6,	BH43 3.5-3.6,							
BH44 0.5-0.6,	BH44 1.5-1.6,							
BH44 2.5-2.6,	BH44 3.5-3.6,							
BH45 0.5-0.6,	BH46 0.5-0.6,							
BH47 0.5-0.6,	BH47 1.5-1.6,							
BH48 0.5-0.6,	BH48 1.5-1.6,							
BH49 0.5-0.6,	BH49 1.5-1.6,							
BH50 0.5-0.6,	BH50 1.5-1.6,							
BH51 0.5-0.6,	BH51 1.5-1.6,							
BH52 0.5-0.6,	BH52 1.5-1.6,							
BH53 0.5-0.6,	BH53 1.5-1.6							
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
BH41 0.5-0.6,	BH42 0.5-0.6,	**05-Nov-2018**	**08-Nov-2018**	04-May-2019	✓	**08-Nov-2018**	04-May-2019	✓
BH42 1.5-1.6,	BH42 2.5-2.6,							
BH43 0.5-0.6,	BH43 1.5-1.6,							
BH43 2.5-2.6,	BH43 3.5-3.6,							
BH44 0.5-0.6,	BH44 1.5-1.6,							
BH44 2.5-2.6,	BH44 3.5-3.6,							
BH45 0.5-0.6,	BH46 0.5-0.6,							
BH47 0.5-0.6,	BH47 1.5-1.6,							
BH48 0.5-0.6,	BH48 1.5-1.6,							
BH49 0.5-0.6,	BH49 1.5-1.6,							
BH50 0.5-0.6,	BH50 1.5-1.6,							
BH51 0.5-0.6,	BH51 1.5-1.6,							
BH52 0.5-0.6,	BH52 1.5-1.6,							
BH53 0.5-0.6,	BH53 1.5-1.6							

Page : 4 of 11
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
BH41 0.5-0.6,	BH42 0.5-0.6,	**05-Nov-2018**	**08-Nov-2018**	03-Dec-2018	✓	**08-Nov-2018**	03-Dec-2018	✓
BH42 1.5-1.6,	BH42 2.5-2.6,							
BH43 0.5-0.6,	BH43 1.5-1.6,							
BH43 2.5-2.6,	BH43 3.5-3.6,							
BH44 0.5-0.6,	BH44 1.5-1.6,							
BH44 2.5-2.6,	BH44 3.5-3.6,							
BH45 0.5-0.6,	BH46 0.5-0.6,							
BH47 0.5-0.6,	BH47 1.5-1.6,							
BH48 0.5-0.6,	BH48 1.5-1.6,							
BH49 0.5-0.6,	BH49 1.5-1.6,							
BH50 0.5-0.6,	BH50 1.5-1.6,							
BH51 0.5-0.6,	BH51 1.5-1.6,							
BH52 0.5-0.6,	BH52 1.5-1.6,							
BH53 0.5-0.6,	BH53 1.5-1.6							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
BH41 0.5-0.6,	BH42 0.5-0.6,	**05-Nov-2018**	**07-Nov-2018**	19-Nov-2018	✓	**08-Nov-2018**	17-Dec-2018	✓
BH42 1.5-1.6,	BH42 2.5-2.6,							
BH43 0.5-0.6,	BH43 1.5-1.6,							
BH43 2.5-2.6,	BH43 3.5-3.6,							
BH44 0.5-0.6,	BH44 1.5-1.6,							
BH44 2.5-2.6,	BH44 3.5-3.6,							
BH45 0.5-0.6,	BH46 0.5-0.6,							
BH47 0.5-0.6,	BH47 1.5-1.6,							
BH48 0.5-0.6,	BH48 1.5-1.6,							
BH49 0.5-0.6,	BH49 1.5-1.6							
Soil Glass Jar - Unpreserved (EP075(SIM))								
BH50 0.5-0.6,	BH50 1.5-1.6,	**05-Nov-2018**	**08-Nov-2018**	19-Nov-2018	✓	**08-Nov-2018**	18-Dec-2018	✓
BH51 0.5-0.6,	BH51 1.5-1.6,							
BH52 0.5-0.6,	BH52 1.5-1.6,							
BH53 0.5-0.6,	BH53 1.5-1.6							

Page : 5 of 11
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080)								
BH41 0.5-0.6,	BH42 0.5-0.6,	**05-Nov-2018**	**07-Nov-2018**	19-Nov-2018	✓	**07-Nov-2018**	19-Nov-2018	✓
BH42 1.5-1.6,	BH42 2.5-2.6,							
BH43 0.5-0.6,	BH43 1.5-1.6,							
BH43 2.5-2.6,	BH43 3.5-3.6,							
BH44 0.5-0.6,	BH44 1.5-1.6,							
BH44 2.5-2.6,	BH44 3.5-3.6,							
BH45 0.5-0.6,	BH46 0.5-0.6,							
BH47 0.5-0.6,	BH47 1.5-1.6,							
BH48 0.5-0.6,	BH48 1.5-1.6,							
BH49 0.5-0.6,	BH49 1.5-1.6							
Soil Glass Jar - Unpreserved (EP080)								
BH41 0.5-0.6,	BH42 0.5-0.6,	**05-Nov-2018**	**07-Nov-2018**	19-Nov-2018	✓	**08-Nov-2018**	19-Nov-2018	✓
BH42 1.5-1.6,	BH42 2.5-2.6,							
BH43 0.5-0.6,	BH43 1.5-1.6,							
BH43 2.5-2.6,	BH43 3.5-3.6,							
BH44 0.5-0.6,	BH44 1.5-1.6,							
BH44 2.5-2.6,	BH44 3.5-3.6,							
BH45 0.5-0.6,	BH46 0.5-0.6,							
BH47 0.5-0.6,	BH47 1.5-1.6,							
BH48 0.5-0.6,	BH48 1.5-1.6,							
BH49 0.5-0.6,	BH49 1.5-1.6,							
BH50 0.5-0.6,	BH50 1.5-1.6,							
BH51 0.5-0.6,	BH51 1.5-1.6,							
BH52 0.5-0.6,	BH52 1.5-1.6,							
BH53 0.5-0.6,	BH53 1.5-1.6							
Soil Glass Jar - Unpreserved (EP071)								
BH50 0.5-0.6,	BH50 1.5-1.6,	**05-Nov-2018**	**08-Nov-2018**	19-Nov-2018	✓	**08-Nov-2018**	18-Dec-2018	✓
BH51 0.5-0.6,	BH51 1.5-1.6,							
BH52 0.5-0.6,	BH52 1.5-1.6,							
BH53 0.5-0.6,	BH53 1.5-1.6							

Page : 6 of 11
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP080)								
BH41 0.5-0.6,	BH42 0.5-0.6,	**05-Nov-2018**	**07-Nov-2018**	19-Nov-2018	✓	**07-Nov-2018**	19-Nov-2018	✓
BH42 1.5-1.6,	BH42 2.5-2.6,							
BH43 0.5-0.6,	BH43 1.5-1.6,							
BH43 2.5-2.6,	BH43 3.5-3.6,							
BH44 0.5-0.6,	BH44 1.5-1.6,							
BH44 2.5-2.6,	BH44 3.5-3.6,							
BH45 0.5-0.6,	BH46 0.5-0.6,							
BH47 0.5-0.6,	BH47 1.5-1.6,							
BH48 0.5-0.6,	BH48 1.5-1.6,							
BH49 0.5-0.6,	BH49 1.5-1.6							
Soil Glass Jar - Unpreserved (EP080)								
BH41 0.5-0.6,	BH42 0.5-0.6,	**05-Nov-2018**	**07-Nov-2018**	19-Nov-2018	✓	**08-Nov-2018**	19-Nov-2018	✓
BH42 1.5-1.6,	BH42 2.5-2.6,							
BH43 0.5-0.6,	BH43 1.5-1.6,							
BH43 2.5-2.6,	BH43 3.5-3.6,							
BH44 0.5-0.6,	BH44 1.5-1.6,							
BH44 2.5-2.6,	BH44 3.5-3.6,							
BH45 0.5-0.6,	BH46 0.5-0.6,							
BH47 0.5-0.6,	BH47 1.5-1.6,							
BH48 0.5-0.6,	BH48 1.5-1.6,							
BH49 0.5-0.6,	BH49 1.5-1.6,							
BH50 0.5-0.6,	BH50 1.5-1.6,							
BH51 0.5-0.6,	BH51 1.5-1.6,							
BH52 0.5-0.6,	BH52 1.5-1.6,							
BH53 0.5-0.6,	BH53 1.5-1.6							
Soil Glass Jar - Unpreserved (EP071)								
BH50 0.5-0.6,	BH50 1.5-1.6,	**05-Nov-2018**	**08-Nov-2018**	19-Nov-2018	✓	**08-Nov-2018**	18-Dec-2018	✓
BH51 0.5-0.6,	BH51 1.5-1.6,							
BH52 0.5-0.6,	BH52 1.5-1.6,							
BH53 0.5-0.6,	BH53 1.5-1.6							

Page : 7 of 11
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
BH41 0.5-0.6, BH42 0.5-0.6,	05-Nov-2018	07-Nov-2018	19-Nov-2018	✓	07-Nov-2018	19-Nov-2018	✓
BH42 1.5-1.6, BH42 2.5-2.6,							
BH43 0.5-0.6, BH43 1.5-1.6,							
BH43 2.5-2.6, BH43 3.5-3.6,							
BH44 0.5-0.6, BH44 1.5-1.6,							
BH44 2.5-2.6, BH44 3.5-3.6,							
BH45 0.5-0.6, BH46 0.5-0.6,							
BH47 0.5-0.6, BH47 1.5-1.6,							
BH48 0.5-0.6, BH48 1.5-1.6,							
BH49 0.5-0.6, BH49 1.5-1.6							
Soil Glass Jar - Unpreserved (EP080)							
BH50 0.5-0.6, BH50 1.5-1.6,	05-Nov-2018	07-Nov-2018	19-Nov-2018	✓	08-Nov-2018	19-Nov-2018	✓
BH51 0.5-0.6, BH51 1.5-1.6,							
BH52 0.5-0.6, BH52 1.5-1.6,							
BH53 0.5-0.6, BH53 1.5-1.6							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)							
Rinsate 5	05-Nov-2018	----	----	----	08-Nov-2018	04-May-2019	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG035F)							
Rinsate 5	05-Nov-2018	----	----	----	09-Nov-2018	03-Dec-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
Rinsate 5	05-Nov-2018	07-Nov-2018	12-Nov-2018	✓	08-Nov-2018	17-Dec-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
Rinsate 5	05-Nov-2018	07-Nov-2018	12-Nov-2018	✓	08-Nov-2018	17-Dec-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
Rinsate 5	05-Nov-2018	07-Nov-2018	19-Nov-2018	✓	07-Nov-2018	19-Nov-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
Rinsate 5	05-Nov-2018	07-Nov-2018	12-Nov-2018	✓	08-Nov-2018	17-Dec-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
Rinsate 5	05-Nov-2018	07-Nov-2018	19-Nov-2018	✓	07-Nov-2018	19-Nov-2018	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
Rinsate 5	05-Nov-2018	07-Nov-2018	19-Nov-2018	✓	07-Nov-2018	19-Nov-2018	✓

Page : 8 of 11
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	3	28	10.71	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	28	10.71	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	28	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	28	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	28	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Dissolved Mercury by FIMS	EG035F	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	1	0.00	10.00	*	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	8	0.00	10.00	*	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Dissolved Mercury by FIMS	EG035F	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Page	: 9 of 11
Work Order	: EM1817824
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS) - Continued							
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Dissolved Mercury by FIMS	EG035F	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Dissolved Mercury by FIMS	EG035F	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	1	0.00	5.00	×	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	8	0.00	5.00	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Page	: 10 of 11
Work Order	: EM1817824
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)

Page	: 11 of 11
Work Order	: EM1817824
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM1818266**	Page	: 1 of 3
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Project	: 48-52	Date Samples Received	: 07-Nov-2018
Order number	: ----	Date Analysis Commenced	: 16-Nov-2018
C-O-C number	: ----	Issue Date	: 19-Nov-2018
Sampler	: ----		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 17		
No. of samples analysed	: 17		

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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC

Page	: 2 of 3
Work Order	: EM1818266
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

- **No Laboratory Duplicate (DUP) Results are required to be reported.**

Page : 3 of 3
Work Order : EM1818266
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2043178)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	70.6	48	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	79.3	50	117
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	70.9	53	117
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	72.9	54	118
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	72.2	59	119
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	72.3	51	113
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	73.8	61	120
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	70.6	56	120
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	70.0	53	120
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	68.6	57	122
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	82.6	56	131
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	78.2	59	124
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	80.0	54	124
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	78.6	55	124
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	78.7	54	124
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	78.8	56	124

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM1818266	Page	: 1 of 5
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Telephone	: +6138549 9630
Project	: 48-52	Date Samples Received	: 07-Nov-2018
Site	: ----	Issue Date	: 19-Nov-2018
Sampler	: ----	No. of samples received	: 17
Order number	: ----	No. of samples analysed	: 17

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

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Page : 2 of 5
Work Order : EM1818266
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	17	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	17	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EN33: TCLP Leach							
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN33a)							
BH42 0.5-0.6, BH42 1.5-1.6, BH43 0.5-0.6, BH43 1.5-1.6, BH43 2.5-2.6, BH43 3.5-3.6, BH44 0.5-0.6, BH44 1.5-1.6, BH44 2.5-2.6, BH44 3.5-3.6, BH45 0.5-0.6, BH46 0.5-0.6, BH47 0.5-0.6, BH47 1.5-1.6, BH48 0.5-0.6, BH48 1.5-1.6, BH51 1.5-1.6	**05-Nov-2018**	**16-Nov-2018**	19-Nov-2018	✓	----	----	----

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation

Page	: 3 of 5
Work Order	: EM1818266
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP075(SIM))								
BH42 0.5-0.6,	BH42 1.5-1.6,	**16-Nov-2018**	**19-Nov-2018**	23-Nov-2018	✓	**19-Nov-2018**	29-Dec-2018	✓
BH43 0.5-0.6,	BH43 1.5-1.6,							
BH43 2.5-2.6,	BH43 3.5-3.6,							
BH44 0.5-0.6,	BH44 1.5-1.6,							
BH44 2.5-2.6,	BH44 3.5-3.6,							
BH45 0.5-0.6,	BH46 0.5-0.6,							
BH47 0.5-0.6,	BH47 1.5-1.6,							
BH48 0.5-0.6,	BH48 1.5-1.6,							
BH51 1.5-1.6								

Page	: 4 of 5
Work Order	: EM1818266
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	17	**0.00**	**10.00**	*	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	17	**0.00**	**5.00**	*	NEPM 2013 B3 & ALS QC Standard

Page	: 5 of 5
Work Order	: EM1818266
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TCLP for Non & Semivolatile Analytes	EN33a	SOIL	In house QWI-EN/33 referenced to USEPA SW846-1311: The TCLP procedure is designed to determine the mobility of both organic and inorganic analytes present in wastes. The standard TCLP leach is for non-volatile and Semivolatile test parameters.
Separatory Funnel Extraction of Liquids	ORG14	SOIL	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1833261**	Page	: 1 of 8
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Sydney
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Project	: 48 - 52	Date Samples Received	: 08-Nov-2018
Order number	:	Date Analysis Commenced	: 09-Nov-2018
C-O-C number	: ----	Issue Date	: 12-Nov-2018
Sampler	: AP		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 2		
No. of samples analysed	: 2		

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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

Page	: 2 of 8
Work Order	: ES1833261
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48 - 52

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2027113)									
ES1833209-003	Anonymous	EA055: Moisture Content	----	0.1	%	8.4	8.3	1.71	No Limit
ES1833253-001	Anonymous	EA055: Moisture Content	----	0.1	%	16.1	17.7	9.79	0% - 50%
EG005T: Total Metals by ICP-AES (QC Lot: 2027200)									
ES1832975-006	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	100	110	0.00	0% - 50%
		EG005T: Chromium	7440-47-3	2	mg/kg	26	26	0.00	0% - 50%
		EG005T: Cobalt	7440-48-4	2	mg/kg	5	5	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	5	5	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	7	7	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	36	31	14.6	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	185	181	1.89	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	26	24	4.92	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	22	24	7.92	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
ES1833016-001	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	<10	<10	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.00	No Limit

Page : 3 of 8
Work Order : ES1833261
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48 - 52

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report: Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005T: Total Metals by ICP-AES (QC Lot: 2027200) - continued									
ES1833016-001	Anonymous	EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	6	5	0.00	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 2027202)									
ES1833261-002	Triplicate 2 1.5-1.6	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	130	120	0.00	0% - 50%
		EG005T: Chromium	7440-47-3	2	mg/kg	10	10	0.00	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	16	20	26.0	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	14	9	46.2	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	15	12	18.4	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	102	# 62	48.9	0% - 20%
		EG005T: Manganese	7439-96-5	5	mg/kg	161	# 218	29.7	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	26	18	31.8	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	70	61	13.6	0% - 50%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2027201)									
ES1832996-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1833016-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2026485)									
ES1833261-001	Triplicate 1 0.5-0.6	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	1.8	3.5	60.2	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	0.6	0.7	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	4.7	5.2	10.8	0% - 50%
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	4.7	5.0	6.77	0% - 50%
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	1.8	1.7	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	1.8	1.7	7.48	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	2.4	2.3	6.64	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	1.2	0.8	47.1	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	2.7	2.2	22.5	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	1.6	1.2	30.0	No Limit

Page : 4 of 8
Work Order : ES1833261
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48 - 52

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2026485) - continued									
ES1833261-001	Triplicate 1 0.5-0.6	EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	2.4	1.5	45.6	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	25.7	25.8	0.388	0% - 20%
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	3.4	2.8	19.4	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2026486)									
ES1833261-001	Triplicate 1 0.5-0.6	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2028881)									
ES1831956-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2026486)									
ES1833261-001	Triplicate 1 0.5-0.6	EP071: >C16 - C34 Fraction	----	100	mg/kg	150	110	25.5	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2028881)									
ES1831956-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080: BTEXN (QC Lot: 2028881)									
ES1831956-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Page : 5 of 8
Work Order : ES1833261
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48 - 52

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 2027200)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	100	86	126
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	98.1	85	115
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	108	90	113
EG005T: Boron	7440-42-8	50	mg/kg	<50	----	----	----	----
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	102	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	92.3	76	128
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	105	88	120
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	100	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	98.3	80	114
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	106	85	117
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	104	87	123
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	75.7	75	131
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	107	92	122
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	106	80	122
EG005T: Total Metals by ICP-AES (QCLot: 2027202)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	90.2	86	126
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	98.2	85	115
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	106	90	113
EG005T: Boron	7440-42-8	50	mg/kg	<50	----	----	----	----
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	98.6	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	88.9	76	128
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	103	88	120
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	96.0	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	94.8	80	114
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	104	85	117
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	99.7	87	123
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	79.3	75	131
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	104	92	122
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	105	80	122
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2027201)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	80.9	70	105
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2026485)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	92.9	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	92.1	72	124

Page : 6 of 8
Work Order : ES1833261
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48 - 52

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2026485) - continued								
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	95.6	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	92.6	72	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	96.2	75	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	98.6	77	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	96.9	73	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	100	74	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	87.1	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	90.5	75	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	86.6	68	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	91.2	74	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	90.0	70	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	86.8	61	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	89.4	62	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	84.2	63	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2026486)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	101	75	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	106	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	100	71	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2028881)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	101	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2026486)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	105	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	100	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	87.3	63	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2028881)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	107	68	128
EP080: BTEXN (QCLot: 2028881)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	82.8	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	82.9	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	82.0	65	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	99.3	66	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	90.9	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	96.8	63	119

Matrix Spike (MS) Report

Page : 7 of 8
Work Order : ES1833261
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48 - 52

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 2027200)							
ES1832996-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	91.4	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	103	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	108	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	103	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	102	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	105	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	95.1	70	130
EG005T: Total Metals by ICP-AES (QCLot: 2027202)							
ES1833261-002	Triplicate 2 1.5-1.6	EG005T: Arsenic	7440-38-2	50 mg/kg	94.3	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	103	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	98.4	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	103	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	97.8	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	99.5	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	110	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2027201)							
ES1832996-001	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	95.3	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2026485)							
ES1833261-001	Triplicate 1 0.5-0.6	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	99.5	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	93.0	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2026486)							
ES1833261-001	Triplicate 1 0.5-0.6	EP071: C10 - C14 Fraction	----	523 mg/kg	97.0	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	116	53	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	115	52	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2028881)							
ES1831956-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	74.0	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2026486)							
ES1833261-001	Triplicate 1 0.5-0.6	EP071: >C10 - C16 Fraction	----	860 mg/kg	108	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	110	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	114	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2028881)							
ES1831956-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	71.5	70	130
EP080: BTEXN (QCLot: 2028881)							
ES1831956-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	70.0	70	130

Page	: 8 of 8
Work Order	: ES1833261
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48 - 52

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080: BTEXN (QCLot: 2028881) - continued							
ES1831956-001	Anonymous	EP080: Toluene	108-88-3	2.5 mg/kg	71.7	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	73.2	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	71.4	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	80.0	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	87.8	70	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1833261	Page	: 1 of 4
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Sydney
Contact	: DR JOHN PAUL CUMMING	Telephone	: +6138549 9630
Project	: 48 - 52	Date Samples Received	: 08-Nov-2018
Site	: ----	Issue Date	: 12-Nov-2018
Sampler	: AP	No. of samples received	: 2
Order number	:	No. of samples analysed	: 2

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **Duplicate outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Page : 2 of 4
Work Order : ES1833261
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48 - 52

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EG005T: Total Metals by ICP-AES	ES1833261--002	Triplicate 2 1.5-1.6	**Lead**	7439-92-1	48.9 %	0% - 20%	**RPD exceeds LOR based limits**
EG005T: Total Metals by ICP-AES	ES1833261--002	Triplicate 2 1.5-1.6	**Manganese**	7439-96-5	29.7 %	0% - 20%	**RPD exceeds LOR based limits**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container / Client Sample ID(s)*		*Sample Date*	*Extraction / Preparation*			*Analysis*		
			Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
Triplicate 1 0.5-0.6,	Triplicate 2 1.5-1.6	**05-Nov-2018**	----	----	----	**09-Nov-2018**	19-Nov-2018	✓
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
Triplicate 1 0.5-0.6,	Triplicate 2 1.5-1.6	**05-Nov-2018**	**09-Nov-2018**	04-May-2019	✓	**09-Nov-2018**	04-May-2019	✓
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
Triplicate 1 0.5-0.6,	Triplicate 2 1.5-1.6	**05-Nov-2018**	**09-Nov-2018**	03-Dec-2018	✓	**09-Nov-2018**	03-Dec-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
Triplicate 1 0.5-0.6,	Triplicate 2 1.5-1.6	**05-Nov-2018**	**09-Nov-2018**	19-Nov-2018	✓	**09-Nov-2018**	19-Dec-2018	✓
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080)								
Triplicate 1 0.5-0.6,	Triplicate 2 1.5-1.6	**05-Nov-2018**	**09-Nov-2018**	19-Nov-2018	✓	**09-Nov-2018**	19-Nov-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP080)								
Triplicate 1 0.5-0.6,	Triplicate 2 1.5-1.6	**05-Nov-2018**	**09-Nov-2018**	19-Nov-2018	✓	**09-Nov-2018**	19-Nov-2018	✓
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080)								
Triplicate 1 0.5-0.6,	Triplicate 2 1.5-1.6	**05-Nov-2018**	**09-Nov-2018**	19-Nov-2018	✓	**09-Nov-2018**	19-Nov-2018	✓

Page : 3 of 4
Work Order : ES1833261
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48 - 52

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	3	23	**13.04**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	23	**8.70**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	23	**8.70**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	23	**8.70**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Page	: 4 of 4
Work Order	: ES1833261
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48 - 52

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM1819122**	Page	: 1 of 8
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Project	: 48-52	Date Samples Received	: 28-Nov-2018
Order number	:	Date Analysis Commenced	: 28-Nov-2018
C-O-C number	: ----	Issue Date	: 30-Nov-2018
Sampler	: MD		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 5		
No. of samples analysed	: 5		

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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

Page	: 2 of 8
Work Order	: EM1819122
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2062390)									
EM1819010-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.007	0.007	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.018	0.019	0.00	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.003	<0.001	109	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.131	0.128	2.45	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.82	0.80	3.46	0% - 50%
EM1819078-008	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit

Page : 3 of 8
Work Order : EM1819122
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2062390) - continued									
EM1819078-008	Anonymous	EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2062392)									
EM1819122-002	MW2	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.037	0.039	4.36	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.165	0.168	1.55	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.07	0.07	0.00	No Limit
EM1819139-010	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.071	0.068	3.56	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.011	0.012	0.00	0% - 50%
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	6.77	6.85	1.09	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.005	0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2062391)									
EM1819010-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	0.0002	0.0002	0.00	No Limit
EM1819078-008	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2062393)									
EM1819122-004	Duplicate	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2062129)									
EM1819068-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit

Page : 4 of 8
Work Order : EM1819122
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2062129) - continued									
EM1819122-004	Duplicate	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2062129)									
EM1819068-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EM1819122-004	Duplicate	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2062129)									
EM1819068-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EM1819122-004	Duplicate	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Page : 5 of 8
Work Order : EM1819122
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2062390)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	98.7	91	107
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	95.3	82	113
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	97.1	84	106
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	93.5	84	104
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	98.0	83	103
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	94.6	83	106
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	94.2	82	103
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.7	83	105
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	99.9	83	105
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	94.8	82	106
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	96.0	82	109
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	97.4	83	106
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	94.9	85	109
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	99.8	84	116
EG020F: Dissolved Metals by ICP-MS (QCLot: 2062392)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	97.8	91	107
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	90.9	82	113
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	96.8	84	106
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	93.2	84	104
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	96.7	83	103
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	94.4	83	106
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	96.0	82	103
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	97.2	83	105
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	97.2	83	105
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	95.1	82	106
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	93.6	82	109
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	95.9	83	106
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	98.3	85	109
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	98.1	84	116
EG035F: Dissolved Mercury by FIMS (QCLot: 2062391)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	90.2	76	114
EG035F: Dissolved Mercury by FIMS (QCLot: 2062393)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	88.2	76	114
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2061690)								

Page : 6 of 8
Work Order : EM1819122
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2061690) - continued								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	81.6	48	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	77.6	50	117
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	80.8	53	117
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	79.4	54	118
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	83.5	59	119
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	95.3	51	113
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	85.8	61	120
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	81.9	56	120
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	93.4	53	120
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	96.5	57	122
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	93.8	56	131
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	94.1	59	124
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	101	54	124
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	80.7	55	124
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	82.7	54	124
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	85.7	56	124
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2061691)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	4331 µg/L	76.6	51	136
EP071: C15 - C28 Fraction	----	100	µg/L	<100	16952 µg/L	80.7	58	139
EP071: C29 - C36 Fraction	----	50	µg/L	<50	8695 µg/L	80.9	57	134
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2062129)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	115	65	126
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2061691)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	6292 µg/L	76.6	55	134
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	22143 µg/L	81.8	58	135
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1677 µg/L	83.8	57	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2062129)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	113	64	124
EP080: BTEXN (QCLot: 2062129)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	109	69	123
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	104	73	124
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	106	71	125
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	116	72	129
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	112	76	129
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	94.2	70	125

Page	: 7 of 8
Work Order	: EM1819122
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2062390)							
EM1819010-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	96.4	85	131
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	92.1	73	141
		EG020A-F: Barium	7440-39-3	0.2 mg/L	95.8	75	127
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	86.4	81	133
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	94.2	71	135
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	93.4	78	132
		EG020A-F: Copper	7440-50-8	0.2 mg/L	91.9	76	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	90.4	75	133
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	90.4	64	134
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	91.8	73	131
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	94.5	73	131
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	93.9	75	131
EG020F: Dissolved Metals by ICP-MS (QCLot: 2062392)							
EM1819122-002	MW2	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	98.6	85	131
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	91.1	73	141
		EG020A-F: Barium	7440-39-3	0.2 mg/L	94.8	75	127
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	89.9	81	133
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	94.1	71	135
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	93.7	78	132
		EG020A-F: Copper	7440-50-8	0.2 mg/L	93.3	76	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	92.0	75	133
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	92.8	64	134
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	96.1	73	131
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	94.5	73	131
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	94.4	75	131
EG035F: Dissolved Mercury by FIMS (QCLot: 2062391)							
EM1819064-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	94.5	70	120
EG035F: Dissolved Mercury by FIMS (QCLot: 2062393)							
EM1819122-005	Rinsate	EG035F: Mercury	7439-97-6	0.01 mg/L	93.4	70	120
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2062129)							
EM1819068-002	Anonymous	EP080: C6 - C9 Fraction	----	280 µg/L	73.5	43	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2062129)							
EM1819068-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	70.9	44	122

Page	: 8 of 8
Work Order	: EM1819122
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080: BTEXN (QCLot: 2062129)							
EM1819068-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	91.9	68	130
		EP080: Toluene	108-88-3	20 µg/L	94.6	72	132

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM1819122	Page	: 1 of 5
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Telephone	: +6138549 9630
Project	: 48-52	Date Samples Received	: 28-Nov-2018
Site	: ----	Issue Date	: 30-Nov-2018
Sampler	: MD	No. of samples received	: 5
Order number	:	No. of samples analysed	: 5

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

RIGHT SOLUTIONS | RIGHT PARTNER

Page : 2 of 5
Work Order : EM1819122
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	6	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	6	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	6	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	6	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container / Client Sample ID(s)*	*Sample Date*	*Extraction / Preparation* Date extracted	Due for extraction	Evaluation	*Analysis* Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)							
MW1, MW2, MW3, Duplicate, Rinsate	**26-Nov-2018**	----	----	----	**29-Nov-2018**	25-May-2019	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG035F)							
MW1, MW2, MW3, Duplicate, Rinsate	**26-Nov-2018**	----	----	----	**30-Nov-2018**	24-Dec-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
MW1, MW2, MW3, Duplicate, Rinsate	**26-Nov-2018**	**28-Nov-2018**	03-Dec-2018	✓	**29-Nov-2018**	07-Jan-2019	✓

Page : 3 of 5
Work Order : EM1819122
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
MW1, MW2, MW3, Duplicate, Rinsate	**26-Nov-2018**	**28-Nov-2018**	03-Dec-2018	✓	**29-Nov-2018**	07-Jan-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
MW1, MW2, MW3, Duplicate, Rinsate	**26-Nov-2018**	**28-Nov-2018**	10-Dec-2018	✓	**28-Nov-2018**	10-Dec-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
MW1, MW2, MW3, Duplicate, Rinsate	**26-Nov-2018**	**28-Nov-2018**	03-Dec-2018	✓	**29-Nov-2018**	07-Jan-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
MW1, MW2, MW3, Duplicate, Rinsate	**26-Nov-2018**	**28-Nov-2018**	10-Dec-2018	✓	**28-Nov-2018**	10-Dec-2018	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
MW1, MW2, MW3, Duplicate, Rinsate	**26-Nov-2018**	**28-Nov-2018**	10-Dec-2018	✓	**28-Nov-2018**	10-Dec-2018	✓

Page	: 4 of 5
Work Order	: EM1819122
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Dissolved Mercury by FIMS	EG035F	3	22	13.64	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	6	0.00	10.00	*	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	6	0.00	10.00	*	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Dissolved Mercury by FIMS	EG035F	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Dissolved Mercury by FIMS	EG035F	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Dissolved Mercury by FIMS	EG035F	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	6	0.00	5.00	*	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	6	0.00	5.00	*	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Page	: 5 of 5
Work Order	: EM1819122
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Preparation Methods	**Method**	**Matrix**	**Method Descriptions**
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

Groundwater – Triplicate QA/QC included in the COA section of the document 15481 - Envirolab

Appendix 11 Bore log images



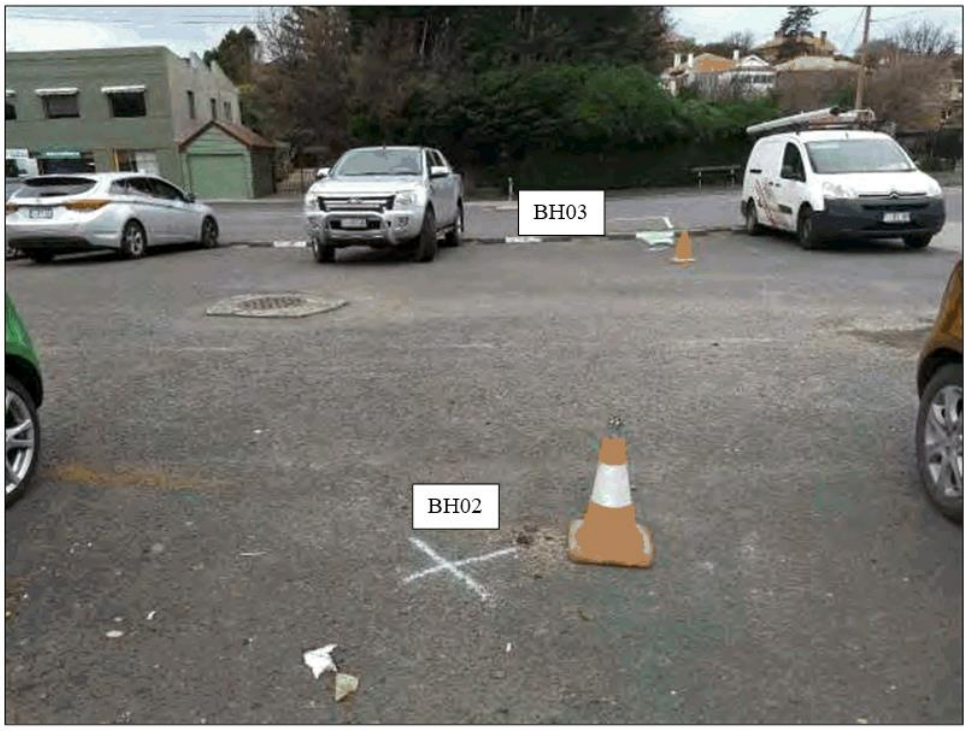
BH01 Location



BH01 Core with analytical samples



BH01 Core with analytical samples – Close up



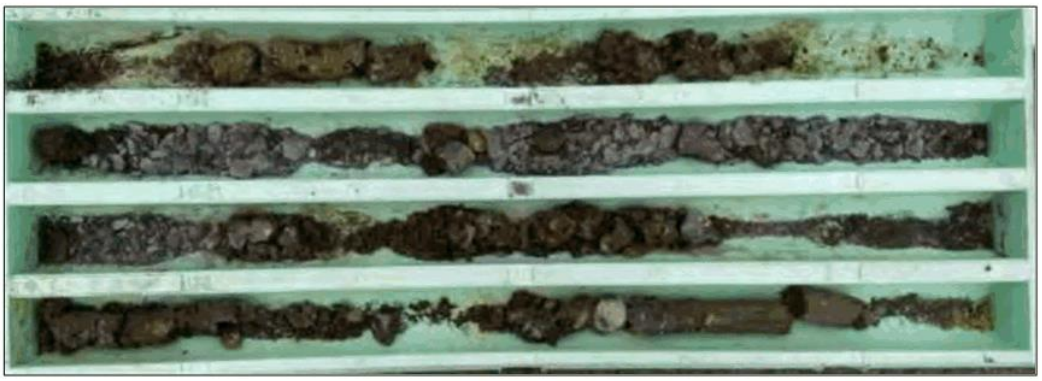
BH02 and BH03 Location



BH02 Core with analytical samples



BH03 Core with selected samples for analysis



BH03 Core



Location of BH04 , BH05 and BH07 (GT03)



BH04 Core



BH04 Core with selected samples for analysis



BH05 Location



BH05



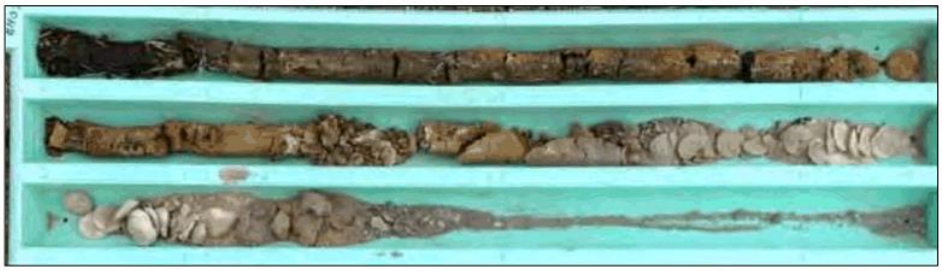
BH05 close up of end of hole



BH06, BH07 (BH04 and BH05 in back ground)



BH06 – three attempts



BH07 Core



BH07 Core with samples selected for analysis



BH08 Core with analytical samples



BH09 and BH08 Locations



BH09 Core with analytical samples



BH10 location



BH10 core (Incomplete log)



BH10 Core with analytical samples



Location of BH11



BH11 Core



BH11 Core with samples selected for analysis



Location of BH12



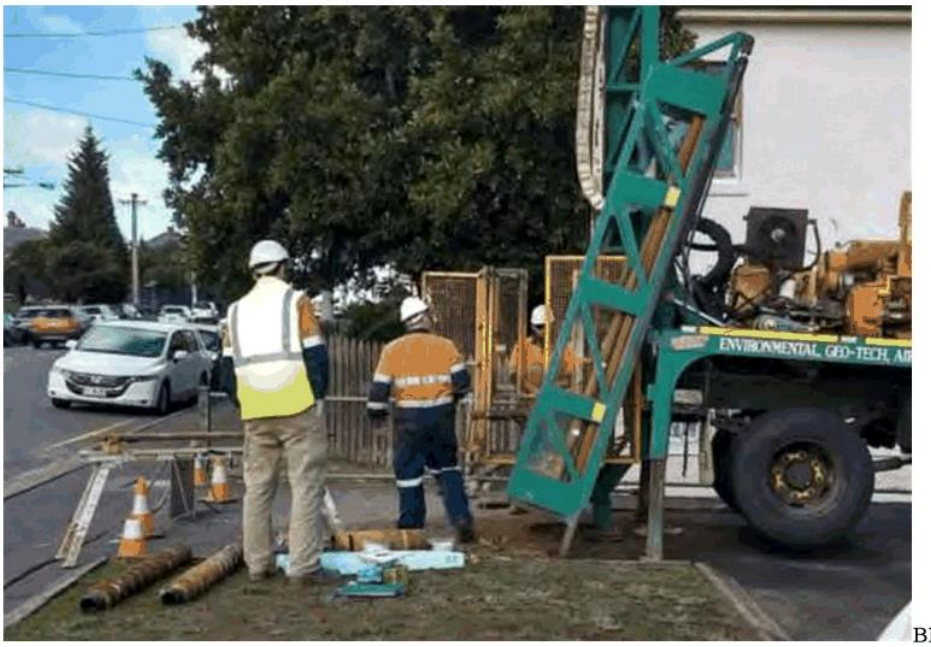
BH12 core



Location of BH13



Concrete Core BH13



BH13 Location



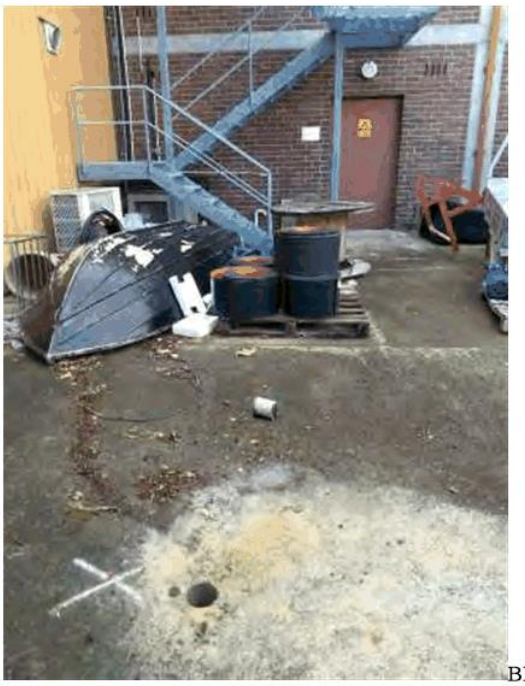
BH13 Core



BH14 Location



BH14



BH15 Location



BH15 Core



BH16 Location



BH16 core



BH16 Core with samples selected for analysis



BH17



BH17



BH18 location



BH18 core



BH18 Core with select samples for analysis.



BH19 Location



BH19 Core with select samples for analysis.



BH19 core close-up, black staining.

Appendix 12 Borehole Logs

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of MW1

EASTING: 525389.311 GDA94
NORTHING: 5254037.766 GDA94
ELEVATION AND DATUM: 59.15 m AHD
TOTAL DEPTH (m): 11.5
NATURAL (m): WATER TABLE (m):

BORING LOCATION: New Town
DRILLING CONTRACTOR: Tasmanian Drilling Services
EQUIPMENT/METHOD: Drill Mac 500 LOGGED BY S. Joyce
SAMPLING: Hollow Stem Auger DATE: 30/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	(B105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	CONCRETE	FILL	GP				Casing	59.0
	FILL: Silty sandy GRAVEL : Pale brown, medium dense, fine to coarse grained, sub-angular, moist, low plasticity. Gravels compn		GC					58.5
1.0	FILL: GRAVEL trace clay: Brown, medium dense, medium to coarse grained, sub-angular, dry, non-plastic							58.0
			CI					57.5
2.0	FILL: Gravelly sandy CLAY : Dark brown, stiff, moist, medium plasticity. Gravel comprises dolerite							57.0
								56.5
3.0	FILL GRAVELS AND COBBLES comprising dolerite.		GP					56.0
							▶3.4	55.5
4.0	FILL: Gravelly sandy CLAY : Dark brown, stiff, moist, medium plasticity. Gravel comprises dolerite.		CI					55.0
								54.5
5.0								54.0
	FILL: Gravelly sandy CLAY : Dark brown, stiff to very stiff, wet, medium plasticity. Gravel comprises dolerite.		CI					53.5
6.0								53.0
							Screen Sand	52.5
7.0	FILL: Dolerite GRAVEL, clay washed away.		GP					52.0
								51.5
8.0	MUDSTONE INTERBEDDED WITH SILTSTONE: Fine grained, dark grey and pale yellow brown, low strength, distinctly weathered, carbon	Rv						51.0
9.0								50.5
								50.0
10.0	MUDSTONE INTERBEDDED WITH SILTSTONE: Fine grained, dark grey and light grey, low to medium strength, slightly weathered, carbo							49.5
								49.0
11.0							End Cap	48.5
								48.0
12.0								

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2: 3 Level 3: 4 Level 4 | SAMPLE IN EXCAVATION | ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of MW2

EASTING: 525344.9 GDA94
NORTHING: 5254055 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.68 m AHD
DRILLING CONTRACTOR: Tasmanian Drilling Services
TOTAL DEPTH (m): 3.2
EQUIPMENT/METHOD: Drill Mac 500 LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Hollow Stem Auger DATE: 14/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	MONITORING WELL	ELEVATION (metres)
0.0	CONCRETE	FILL	P			Cement	57.5
0.2	FILL: Sandy Gravelly CLAY: brown, moist, stiff, medium plasticity. Contains gravels of siltstone, brick & charcoal fragments.		GP			Grout	
0.4							
0.6						BCasinge	57.0
0.8							
1.0							
1.2							56.5
1.4							
1.6	FILL: Sandy CLAY trace gravels: Dark brown, moist (wet at 3.2m), stiff, medium plasticity. Refusal on likely cobble		GC				56.0
1.8							
2.0							
2.2						Screen Sand	55.5
2.4							
2.6							
2.8	MUDSTONE INTERBEDDED WITH SILTSTONE: Fine grained, dark grey and pale yellow brown, low strength, distinctly weathered, carbon	Rv				2.8	55.0
3.0						End Cap	54.5

IB105 Analyte iL Exceedances: Arsenic, Barium, Beryllium, Cadmium, Chromium VI, Copper, Cobalt, Lead, Manganese, Molybdenum, Nickel, Selenium, Silver, Tin, Zinc, Aldrin+Dieldrin, DDT+DDE+DDD, Benzo(a)pyrene, Phenol, TPH C10 - C36, TPH C10 - C36 (F2), PAH Sum (TEQ), PCB's, Benzene, Toluene, Ethylbenzene, Total Xylenes, Cyanide

Tas EPA IB105 CLASSIFICATION: Level 1 Level 2 Level 3 Level 4 SAMPLE IN EXCAVATION APPROXIMATE GROUNDFLOOR LEVEL

Note excavation in MW2 to 51mAHD

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of MW3

EASTING: 525370.9 GDA94
NORTHING: 5254002 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 58.6 m AHD
DRILLING CONTRACTOR: Tasmanian Drilling Services
TOTAL DEPTH (m): 15
EQUIPMENT/METHOD: Drill Mac 500 LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Hollow Stem Auger DATE: 14/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	CONCRETE						Grout	58.5
	FILL: CLAYEY GRAVEL: brown, moist, medium dense, Contains occational gravels of dolerite, siltstone, charcoal fragments.	FILL	GC				0.5	58.0
1.0							Casing Bentonite	57.5
								57.0
2.0								56.5
								56.0
3.0								55.5
								55.0
4.0								54.5
								54.0
5.0								53.5
								53.0
6.0								52.5
								52.0
7.0								51.5
		RV						51.0
8.0	MUDSTONE INTERBEDDED WITH SILTSTONE: Fine grained, dark grey-brown, low strength, distinctly weathered,						Sand	50.5

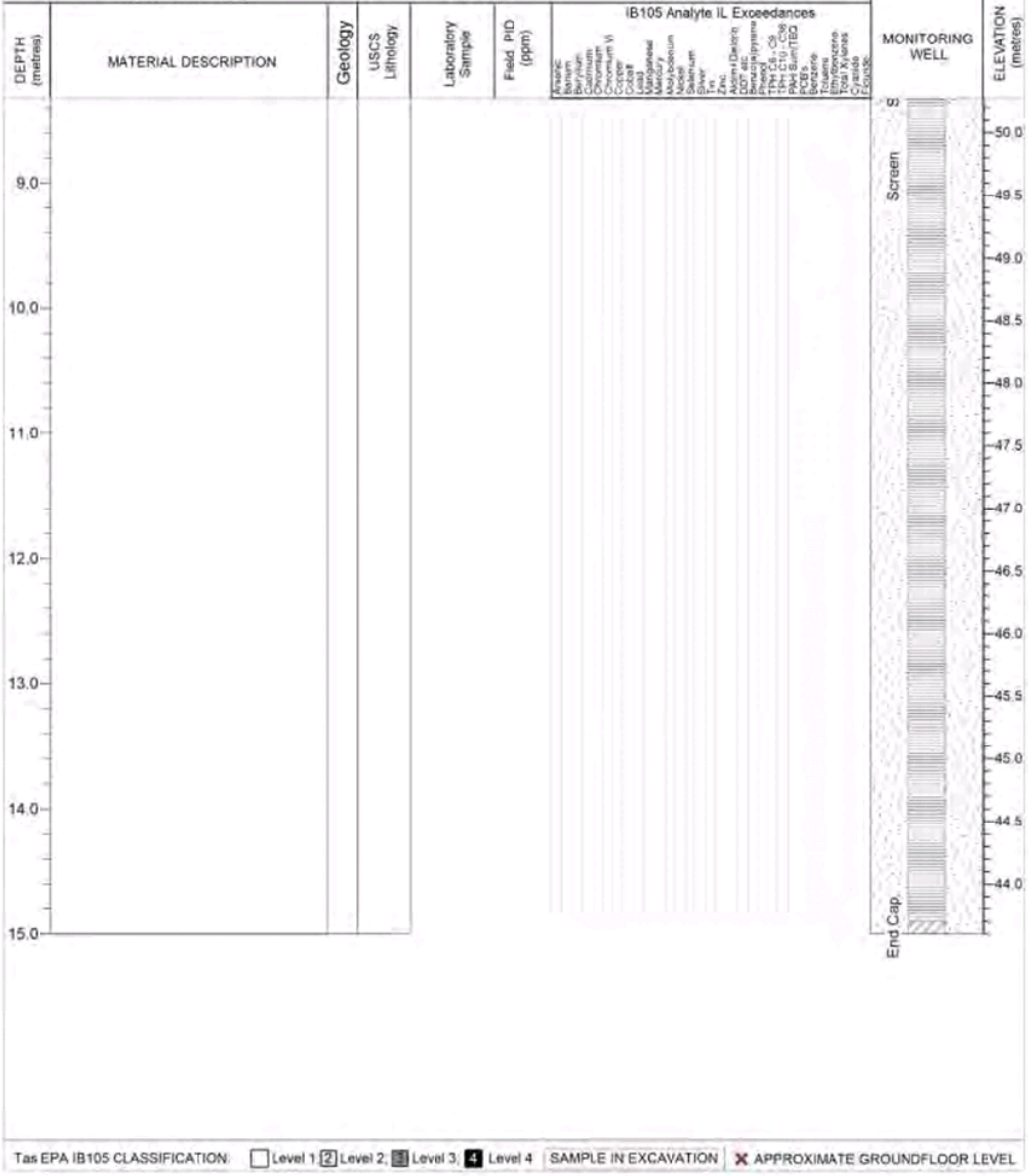
Tas EPA IB105 CLASSIFICATION: ☐ Level 1 ☐2 Level 2: ☐3 Level 3: ☐4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of MW3

EASTING: 525370.9 GDA94
NORTHING: 5254002 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 58.6 m AHD
DRILLING CONTRACTOR: Tasmanian Drilling Services
TOTAL DEPTH (m): 15
EQUIPMENT/METHOD: Drill Mac 500 LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Hollow Stem Auger DATE: 14/11/18



Tas EPA IB105 CLASSIFICATION: ☐ Level 1 ☐2 Level 2 ☐3 Level 3 ☐4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

Note: No Excavation in MW3

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH01

EASTING: 5254124.978 GDA94
NORTHING: 525375.976 GDA94
ELEVATION AND DATUM: 56.754 m AHD
TOTAL DEPTH (m): 4.5
NATURAL (m): WATER TABLE (m):

BORING LOCATION: New Town
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY: S. Joyce
SAMPLING: Direct Push DATE: 23/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Asphalt	FILL			0.6			56.6
0.1	FILL: Gravelly silty SAND: Pale yellow brown, fine to coarse grained, medium dense, non-plastic, dry. Gravel comprises dolerite		SP					56.4
0.4	FILL: Sandy gravelly CLAY: Pale grey brown, firm, moist, low plasticity. Gravel is rounded and angular siltstone, brick and cha		CL		0.0			56.2
0.7								56.0
1.0				BH01 1.0-1.1	0.1	1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1		55.8
1.1								55.6
1.5				BH01 1.5-1.6	0.5	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		55.4
1.6								55.2
1.8	FILL: Sandy CLAY trace gravels: Dark brown, firm, moist, medium to high plasticity. Contains occasional fragments of ceramic an		CI					55.0
2.1					0.1			54.8
2.2								54.6
2.5				BH01 2.5-2.6	0.4	1 1 1 1 1 1 1 1 1 1 2V 3A 1 1 1 1 1 1 1		54.4
2.6								54.2
3.0					0.0			54.0
3.1								53.8
3.3	FILL: CLAY with gravel: Dark brown, stiff, moist, high plasticity. Contains gravels of dolerite, siltstone, brick, glass, charc		CH					53.6
3.5				BH01 3.5-3.6	0.0	1 1 1 1 1 1 1 1 1 1 1 3A 1 1 1 1 1 1 1		53.4
3.6								53.2
3.8								53.0
4.0	FILL: Gravelly sandy CLAY: Yellow-brown, stiff, medium plasticity, moist. Gravel comprises angular dolerite. Refusal on likely		CI		0.0			52.8
4.1								52.6
4.4				BH01 4.4-4.5	0.1	1 1 1 1 1 1 1 2 2 1 1 1 3A 1 2 1 1 1 1		52.4
4.5								

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH02

EASTING: 525367.355 GDA94
NORTHING: 5254107.407 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.18 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 4.1
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 23/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Asphalt				0.1			57.0
0.1	FILL: Sandy GRAVEL: Pale yellow brown, fine to coarse grained, medium dense, non-plastic, dry. Gravel comprises dolerite		SP					
0.5				BH02 0.5-0.6	0.1	1 2 1 1 1 1 1 2 1 2 1 1 2 2 1 1 1 1 1 1		56.6
1.0				BH02 1.0-1.1	0.0	1 2 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1		56.2
1.4								55.8
1.5					0.1			55.6
2.0		FILL		BH02 2.0-2.1	0.0	1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		55.2
2.1	FILL: Sandy gravelly CLAY: Pale brown, moist, stiff, medium plasticity. Gravel is rounded and angular siltstone& dolerite, bric		CI					55.0
2.8				BH02 2.8-2.9	0.1	1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		54.4
3.5					0.1			53.8
4.0				BH02 4.0-4.1	0.0	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		53.2

Tas EPA IB105 CLASSIFICATION: Level 1 | 2 Level 2 | 3 Level 3 | 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH03

EASTING: 5254105.348 GDA94
NORTHING: 525380.051 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.054 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 4
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY S. Joyce
NATURAL (m) WATER TABLE (m)
SAMPLING: Direct Push DATE: 23/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCs Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Asphalt				0.0			57.0
0.5	FILL: Sandy gravelly CLAY: Pale grey brown, firm, moist, low plasticity. Gravel is rounded and angular siltstone, brick and cha		CL	BH03 0.5-0.6	0.2	1 1 1 1 1 1 2 1 1 1 1 2 1 1 1 1 1 1		56.8 56.6 56.4 56.2
1.0				BH03 1.0-1.1	0.2	1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1		56.0
1.3	FILL: GRAVEL with Clay: brown/dark grey, slightly moist, dense. Contains fragments of Slate	FILL	GW		0.1			55.8 55.6 55.4 55.2 55.0
2.5				BH03 2.5-2.6	0.2	1 1 1 1 1 1 1 1 1 1 1 3 1 1 1 1 1 1		54.8 54.6
3.0	FILL: CLAY with gravel: Dark brown, stiff, moist, high plasticity. Contains gravels of dolerite, siltstone, brick, glass, charc			BH03 3.0-3.1	0.3	1 1 1 1 1 1 1 1 1 2 1 3 1 2 1 1 1 1		54.4 54.2 54.0
3.5					0.2			53.8 53.6 53.4
3.9				BH03 3.9-4.0		1 1 1 1 1 1 1 1 1 1 1 3 1 1 1 1 1 1		53.2

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH04

EASTING: 5254104.766 GDA94
NORTHING: 525361.385 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.233 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 4.6
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 23/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Asphalt	FILL			0.0			57.2
0.6	FILL: Gravelly sandy CLAY: brown/trace yellow, moist, stiff, medium plasticity, Gravel comprises angular dolerite & mudstone		CI	BH04 0.5-0.6	0.0	1 1 1 1 1 1 1 1 1 1 2 3 1 1 1 1 1 1		56.6
1.4					0.0			56.2
1.5	FILL: Clayey Sandy GRAVEL: grey/brown, dry, dense, brick fragments		GW	BH04 1.5-1.6	0.0	1 1 1 1 1 1 1 1 1 1 1 4 1 2 1 1 1 1		55.6
2.3					0.0			55.2
2.4	FILL: Sandy gravelly CLAY: Pale brown, moist, stiff, medium plasticity, Gravel is rounded and angular siltstone& dolerite, bric		CI	BH04 2.5-2.6	0.0	1 2 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1		54.6
3.0				BH04 3.0-3.1	0.0	1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1		54.2
3.5	FILL: Gravelly sandy CLAY: Yellow-brown, stiff, medium plasticity, moist. Gravel comprises angular dolerite. Refusal on likely		CI	BH04 3.5-3.6	0.0	1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1		53.8
4.0					0.0			53.4
4.5				BH04 4.5-4.6	0.0	1 1 1 1 1 1 1 2 1 1 1 2 1 1 1 1 1 1		53.0
4.6								52.8

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH05

EASTING: 525356.395 GDA94
NORTHING: 5254082.471 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.58 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 4.6
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY S. Joyce
NATURAL (m) WATER TABLE (m)
SAMPLING: Direct Push DATE: 23/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.2	FILL: CLAYEY SAND: dark brown, moist, medium dense, trace gravels	FILL	SC		0.0			57.4
0.2–1.2	FILL: Sandy CLAY trace gravels: Dark brown, firm, moist, medium to high plasticity. Contains occational gravels of dolerite, si		CI	BH05 1.0-1.1	0.0	1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1		57.2 57.0 56.8 56.6
1.2–1.8					0.0			56.4
1.8	✕						✕	56.2
1.8–2.1				BH05 2.0-2.1	0.0	1 1 1 1 1 1 1 1 1 1 1 1 3 1 1 1 1 1		56.0 55.8 55.6
2.1–3.0	FILL: Gravelly sandy CLAY: Yellow-brown, stiff, medium plasticity, slightly moist. Gravel comprises angular dolerite & sandston		CI		0.0			55.4 55.2 55.0 54.8
3.0–3.1				BH05 3.0-3.1	0.0	1 1 1 1 1 1 1 1 1 1 2 2 1 1 1 1 1 1		54.6
3.1–4.0					0.0			54.4 54.2 54.0
4.0–4.1				BH05 4.0-4.1	0.0	1 1 1 1 1 1 1 1 1 1 2 3 1 1 1 1 1 1		53.8 53.6
4.1–4.5					0.2			53.4 53.2
4.5–4.6	FILL: Cobble - Sandstone: pale yellow-grey, dry, moderate rock		GP$_s$	BH05 4.5-4.6		1 1 1 1 1 1 1 1 1 1 1 3 1 1 1 1 1 1		53.0

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH06

EASTING: 5254075.47 GDA94
NORTHING: 525341.576 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.277 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 0.4
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 23/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCs Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0								
0.1	FILL: CLAYEY SAND: dark brown, moist, medium dense, trace gravels	FILL	SC		0.1			57.2
0.2	FILL: Sandy CLAY with gravels: Dark brown, firm, moist, medium plasticity. Contains gravels of dolerite		CI	BH06 0.2-0.3				57.0
0.3								
0.4	FILL: GRAVEL: blue-grey, moist, dense to Refusal		GP		0.2			

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 ☐ Level 2 ☐ Level 3 ☐ Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

Environmental Site Assessment (V9) 52 New Town Road, New Town. June 2025.

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH07

EASTING: 5254072.05 GDA94
NORTHING: 525342.579 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.482 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 2.3
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY S. Joyce
NATURAL (m) WATER TABLE (m)
SAMPLING: Direct Push DATE: 23/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.2	FILL: CLAYEY SAND: dark brown, moist, medium dense, trace gravels	FILL	SC		6.9			57.4
0.2–1.2	FILL: Sandy CLAY trace gravels: Dark brown, firm, moist, medium to high plasticity. Contains occational gravels of dolerite		CI		0.0			57.2 / 57.0 / 56.8 / 56.6
1.0–1.1				BH07 1.0-1.1	2.2			56.4
1.2–1.7					0.1			56.2 / 56.0 / 55.8
1.7–2.2	FILL: Clayey Sandy GRAVEL: grey, dry, dense to Refusal		GW	BH07 2.2-2.3	0.2 / 2.1			55.6 / 55.4 / 55.2

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 ☐ Level 2 ☐ Level 3 ☐ Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH08

EASTING: 525386.867 GDA94
NORTHING: 5254073.937 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.78 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 4.6
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY: S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 24/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCs Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.2	FILL: CLAYEY SAND: dark brown, moist, medium dense, trace gravels	FILL	SC		0.0			57.6
0.3–0.9					0.0			57.4–57.0
1.0–1.1				BH08_1.0-1.1	0.0	1 1 1 1 1 1 1 1 1 1 1 1 4 1 2 1 1 1 1		56.8
1.2–1.9					0.0			56.6–56.0
2.0–2.1				BH08_2.0-2.1	0.0	1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1		55.8
2.2–2.6	FILL: Gravelly sandy CLAY: brown/yellow-brown/grey, stiff, medium plasticity, slightly moist. Gravel comprises angular dolerite		CI	BH08_2.5-2.6	0.0	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		55.6–55.2
2.7–3.9					0.0			55.0–54.8
4.0–4.1					0.0			54.6–54.2
4.2–4.5					0.0			54.0–53.8
4.6				BH08_4.5-4.6	0.0	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		53.6–53.2

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH09

EASTING: 5254043.755 GDA94
NORTHING: 525388.559 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 58.83 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 6.4
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY S. Joyce
NATURAL (m) WATER TABLE (m)
SAMPLING: Direct Push DATE: 24/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete slab		P					58.8
0.1					0.3			58.6
0.2								
0.3					0.0			58.4
0.4								
0.5								58.2
0.6								
0.7								58.0
0.8								
0.9								
1.0				BH09_1.0-1.1	5.8	1 1 1

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH10

EASTING: 525391.194 GDA94
NORTHING: 5254030.284 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 59.53 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 5.5
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 24/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Asphalt		P					59.4
0.1–0.2	FILL: Concrete slab							59.2
0.2–1.0	FILL: Sandy Gravelly CLAY: Pale brown, moist, stiff, low to medium plasticity. Gravel is rounded and angular dolerite	FILL	Cl		0.0			59.0–58.6
				BH10_1.0-1.1	0.0			58.4
1.0–1.9	FILL: Sandy SILTY CLAY: pale brown, moist, stiff, medium plasticity		Cl		0.0			58.2–57.8
1.9–2.6	FILL: Sandy CLAY trace gravels: Dark brown, moist, stiff, medium plasticity.		Cl		0.0			57.6–57.4
					0.0			57.2–57.0
				BH10_3.0-3.1	0.1			56.8–56.4
3.2–3.7	Silty SANDY CLAY: pale brown, moist, stiff, medium plasticity	Rs	Cl		0.1		✕	56.2–55.8
					0.1			55.6–55.4
4.1–5.0	Sandy CLAYEY SILT: pale brown, wet, loose, 'puggy' , fine grained sand		ML		0.0			55.2–54.8
				BH10_5.0-5.1	0.9			54.6–54.4
5.3–5.5	MUDSTONE INTERBEDDED WITH SILTSTONE: Fine grained, dark grey and pale yellow brown, low strength, distinctly weathered,							54.2

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH11

EASTING: 5254019.694 GDA94
NORTHING: 525386.54 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 59.837 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 3.4
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY: S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 24/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Concrete slab		P					59.8
0.1–0.4	FILL: CLAYEY GRAVEL: brown, moist, medium dense, Contains occational gravels of dolerite, siltstone, charcoal fragments.		GC					59.6–59.4
0.5					0.5			59.2–59.0
1.0–1.1				BH11_1.0-1.1	0.6	1 1 1 1 1 1 1 1 1 1 1 1 1 3 1 1 1 1 1 1		58.8
1.1–1.6								58.6–58.4
0.8					0.8			58.2–58.0
1.6–1.8		FILL						58.0
1.8–2.0	FILL: Gravelly sandy CLAY: brown/yellow-brown/grey, slightly moist, stiff, medium plasticity. Contains gravels of siltstone, ch		CI					58.0–57.8
2.0–2.1				BH11_2.0-2.1	0.8	1 1 2 1 1 1 1 1 1 1 1 1 1 1 3 1 1 1 1 1 1		57.8
2.1–2.5								57.8–57.4
2.5–2.6				BH11_2.5-2.6	1.0	1 1 1 1 1 1 1 1 1 1 1 2 2 1 1 1 1 1 1		57.4
2.6–3.1								57.2–57.0
1.0					1.0			56.8
3.2–3.3	MUDSTONE INTERBEDDED WITH SILTSTONE: Fine grained, dark grey-brown, low strength, distinctly weathered,	Rv						56.6
				BH11_3.3-3.4	0.9	1 1 2 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1		

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

Environmental Site Assessment (V9) 52 New Town Road, New Town. June 2025.

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH12

EASTING: 5254028.704 GDA94
NORTHING: 525384.995 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 59.565 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 4.5
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY: S. Joyce
NATURAL (m) WATER TABLE (m)
SAMPLING: Direct Push DATE: 24/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Concrete slab		P					59.4
0.1–1.9	FILL: Sandy Gravelly CLAY: brown, moist, stiff, medium plasticity. Contains gravels of siltstone, charcoal fragments.	FILL	CI		3.3			59.2
				BH12_1.0-1.1	2.0	1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1		59.0
					0.5			58.8
				BH12_2.0-2.1	1.6	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		58.6
				BH12_2.5-2.6	1.6	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		58.4
					1.5			58.2
				BH12_3.5-3.6	1.5	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		58.0
3.8							✕	57.8
3.9–4.4	Silty SANDY CLAY: pale brown, moist, stiff, medium plasticity	Rr	CI		0.4			57.6
4.4–4.5	MUDSTONE INTERBEDDED WITH SILTSTONE: Fine grained, dark grey-brown, low strength.							57.4

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH13

EASTING: 5254008.024 GDA94
NORTHING: 525398.145 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 60.436 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 3.2
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY S. Joyce
NATURAL (m) WATER TABLE (m)
SAMPLING: Direct Push DATE: 25/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Asphalt	FILL	P					60.4
0.1	FILL: Concrete slab							
0.2	FILL: Sandy clayey GRAVEL: Brown, medium dense, fine to coarse grained, moist, low plasticity.		GC		0.9			60.2
0.7								60.0
0.8	FILL: Layer of brick and concrete.							59.8
1.0				BH13 1.0-1.1	0.7	1 1 1 1 1 1 1 2 1 1 1 1 4 1 2 1 1 1 1		59.6
1.1	FILL: Sandy CLAY: Brown, firm becoming stiff, moist, high plasticity. Contains occasional fragments of brick.		CH					59.4
1.5				BH13 1.5-1.6	0.8	1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1		59.2
1.7								59.0
1.8	SILT: Pale brown, stiff, non-plastic, moist.		ML					58.8
1.9								58.6
2.0	Silty CLAY: Pale brown mottled orange, stiff, medium to high plasticity, moist.	RW	CH	BH13 2.0-2.1	0.1	1 1 1 1 1 1 1 2 1 1 1 1 2 1 1 1 1 1 1		58.4
2.5								58.2
2.6								58.0
2.7	SANDSTONE INTERBEDDED WITH MUDSTONE: Fine to medium grained, pale grey brown, medium strength, slightly weathered.							57.8
2.8								57.6
2.9								57.4
3.0								
3.1								

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH14

EASTING: 5254002.799 GDA94
NORTHING: 525363.871 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.758 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 0.5
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 25/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCs Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0 0.1	FILL: Concrete slab		P					
0.2 0.3 0.4	FILL: CLAYEY GRAVEL: brown, moist, medium dense, Contains occational gravels of dolerite, siltstone, charcoal fragments.	FILL	GC		1.3			57.6
0.5	MUDSTONE INTERBEDDED WITH SILTSTONE: Fine grained, dark grey-brown, low strength, distinctly weathered,			BH14 0.4-0.5	3.3			57.4

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✖ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH15

EASTING: 5254012.204 GDA94
NORTHING: 525357.875 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.707 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 0.65
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 25/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCs Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0 0.1	FILL: Concrete slab		P					57.6
0.2 0.3 0.4 0.5	FILL: CLAYEY GRAVEL: brown, moist, medium dense, Contains occational gravels of dolerite, siltstone, charcoal fragments.	FILL	GC		1.8			57.4
0.6	MUDSTONE INTERBEDDED WITH SILTSTONE: Fine grained, dark grey-brown, low strength, distinctly weathered,	R		BH15 0.55-0.65	0.7	1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1		57.2

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 ☐ Level 2 ☐ Level 3 ☐ Level 4 SAMPLE IN EXCAVATION ✖ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH16

EASTING: 5254017.943 GDA94
NORTHING: 5253501 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.704 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 0.4
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 25/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCs Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0 0.1	FILL: Concrete slab		P					57.6
0.2	FILL: GRAVEL: brown/grey, slightly moist, dense	FILL	GC		0.4			
0.3 0.4	FILL: CLAYEY GRAVEL: brown, moist, medium dense. Contains occational gravels of dolerite, siltstone, charcoal fragments.		GC	BH16 0.3-0.4	1.2			57.4

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 ☐ Level 2 ☐ Level 3 ☐ Level 4 SAMPLE IN EXCAVATION ✖ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH17

EASTING: 5254042.699 GDA94
NORTHING: 525330.158 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.587 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 1.2
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 25/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete slab		P					
0.1								
0.2	FILL: Gravelly sandy CLAY: brown/grey, slightly moist, stiff, medium plasticity	FILL	CI		0.3			57.4
0.3								
0.4								57.2
0.5	Sandy SILTY CLAY: pale brown, moist, stiff, medium to high plasticity	Q	CH	BH17 0.5-0.6	0.6	1 1 1 1 1 1 1 1 1 1 1 1 4 1 2 1 1 1 1 1		57.0
0.6								
0.7								
0.8								56.8
0.9					0.9			
1.0								56.6
1.1	SANDSTONE: Quartz rich, fine to medium grained, pale grey brown, medium strength, slightly weathered.	RW		BH17 1.1-1.2	1.0	1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		56.4
1.2								

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✖ APPROXIMATE GROUNDFLOOR LEVEL

Environmental Site Assessment (V9) 52 New Town Road, New Town. June 2025.

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH18

EASTING: 5254054.073 GDA94
NORTHING: 525344.624 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.718 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 3.6
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY: S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 25/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Concrete slab	FILL	P					57.6
0.1–1.5	FILL: Sandy Gravelly CLAY: brown, moist, stiff, medium plasticity. Contains gravels of siltstone, brick & charcoal fragments.		Cl	BH18 0.5-0.6	0.8	1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1		57.4–57.2
					0.8			57.0–56.8
1.5–1.9				BH18 1.5-1.6	1.1	1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1		56.6–56.2
					0.8			56.0–55.8
1.9–3.5	FILL: Sandy CLAY trace gravels: Dark brown, moist (wet at 3.2m), stiff, medium plasticity. Refusal on likely cobble		Cl	BH18 2.5-2.6	0.9	1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1		55.6–55.2
				BH18 2.7-2.8	1.2	1 2 1 1 1 1 1 2 1 2 1 1 2 2 1 1 1 1 1		55.0–54.8
				BH18 3.1-3.2	0.9	1 1 1 1 1 1 1 2 1 2 1 1 2 2 1 1 1 1 1		54.6–54.4
				BH18 3.5-3.6	0.8	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		54.2

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH19

EASTING: 5254044.768 GDA94
NORTHING: 525343.195 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.694 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 2.2
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 25/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Concrete slab		P					57.6
0.1–1.9	FILL: Sandy CLAY trace gravels: Dark brown, moist (perched water at 1.2m), stiff, medium plasticity	FILL	CI	BH19 1.0-1.1	0.8			57.4 / 57.2 / 57.0 / 56.8 / 56.6 / 56.4 / 56.2 / 56.0 / 55.8
1.9–2.1	MUDSTONE INTERBEDDED WITH SILTSTONE: Fine grained, dark grey-brown, low strength, distinctly weathered,	RK		BH19 2.1-2.2	1.1			55.6

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 ☐ Level 2 ☐ Level 3 ☐ Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH20

EASTING: 5254035.024 GDA94
NORTHING: 525338.362 GDA94
ELEVATION AND DATUM: 57.732 m AHD
TOTAL DEPTH (m): 3
NATURAL (m): WATER TABLE (m):

BORING LOCATION: New Town
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
EQUIPMENT/METHOD: Tasmanian Drilling Services LOGGED BY S. Joyce
SAMPLING: Hollow Stem Auger DATE: 30/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCs Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete slab	FILL	P					57.6
0.1								
0.2	FILL: Gravelly sandy CLAY: Pale grey, firm, fine to medium grained, angular, moist to wet, high plasticity. Gravel comprises do		CH					57.4
0.3								
0.4								
0.5				BH20 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1		57.2
0.6								
0.7	FILL: Sandy CLAY with gravel: Dark brown, firm, moist, high plasticity. Contains fine to coarse angular gravels of brick, dole		CH					57.0
0.8								
0.9								56.8
1.0				BH20 1.0-1.1		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
1.1								56.6
1.2								
1.3								56.4
1.4								
1.5								56.2
1.6								
1.7								56.0
1.8								
1.9	SANDSTONE: Fine grained, pale yellow brown, low to medium strength, slightly weathered.	RY						55.8
2.0								
2.1								55.6
2.2								
2.3								55.4
2.4								
2.5								55.2
2.6								
2.7								55.0
2.8	SANDSTONE: Fine grained, pale yellow brown, low strength, distinctly weathered.							
2.9								54.8

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH21

EASTING: 5254116.448 GDA94
NORTHING: 525378.118 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 56.821 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 4.2
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m) WATER TABLE (m)
SAMPLING: Direct Push DATE: 24/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Asphalt	FILL						56.8
0.1								
0.2								
0.3	FILL: Sandy Gravelly CLAY: Pale grey brown, firm, moist, low plasticity. Gravel is angular siltstone & Dolerite, brick and char		CL					
0.4								56.4
0.5				BH21 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1		
0.6								56.2
0.7								
0.8								56.0
0.9								
1.0								55.8
1.1								
1.2								55.6
1.3								
1.4								55.4
1.5				BH21 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1		
1.6								55.2
1.7								
1.8								55.0
1.9								
2.0								54.8
2.1								
2.2								54.6
2.3								
2.4	FILL: Gravelly Sandy CLAY: dark brown, firm to stiff, moist, medium to high plasticity. Gravel is angular siltstone & Dolerite.							54.4
2.5			CI					
2.6				BH21 2.5-2.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1		54.2
2.7								
2.8								54.0
2.9								
3.0								53.8
3.1								
3.2								53.6
3.3								
3.4								53.4
3.5				BH21 3.5-3.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1		
3.6								53.2
3.7								
3.8								53.0
3.9								
4.0								52.8
4.1								

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH22

EASTING: 525369.105 GDA94
NORTHING: 5254118.419 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 56.94 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 3.7
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 24/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Asphalt							56.8
0.1								
0.2								56.6
0.3								
0.4								56.4
0.5	FILL: Sandy Gravelly CLAY; Pale brown, moist, stiff, medium plasticity. Gravel is angular siltstone & dolerite, brick fragments	FILL	CI	BH22 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1		56.2
0.6								
0.7								56.0
0.8								
0.9								55.8
1.0								
1.1	FILL: Sandy GRAVEL: pale yellow-brown, slightly moist to dry, dense, fine to course angular Dolerite gravel		GC					55.6
1.2								
1.3								55.4
1.4	FILL: Sandy Clayey GRAVEL; grey/brown, dry, very dense, fine to coarse angular gravel (2-40mm), lense of brick fragments at bas		CH	BH22 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		55.2
1.5								
1.6								55.0
1.7	FILL: Sandy CLAY trace gravels, dark brown, moist, stiff, medium to high plasticity. Contains occational gravels of dolerite, s							
1.8								54.8
1.9								
2.0								54.6
2.1								
2.2								54.4
2.3		FILL						
2.4								54.2
2.5				BH22 2.5-2.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
2.6								54.0
2.7								
2.8	FILL: Sandy Clayey GRAVEL; grey/brown, dry, very dense, fine to coarse angular gravel (2-40mm)		GC					53.8
2.9								
3.0	EOH							53.6
3.1								
3.2								
3.3								53.4
3.4				BH22 3.4-3.5		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
3.5								
3.6								

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✖ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH23

EASTING: 5254094.233 GDA94
NORTHING: 525368.937 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.361 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 5.3
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 24/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Asphalt	FILL	SW					57.2
0.1–1.1	FILL: Gravelly Clayey SAND; brown, slightly moist, fine to coarse grained, medium dense, non-plastic, Gravel comprises dolerite			BH23 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1		57.0
1.1–1.2	FILL: Sandy Clayey GRAVEL; red/grey/brown, dry, dense, fine to medium angular gravel (2-10mm), brick fragments		GC					56.8
1.2–1.6	FILL: Sandy Gravelly CLAY; Pale brown, moist, stiff, medium plasticity, Gravel is angular siltstone & dolerite, brick fragments		CI	BH23 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 2 2 1 1 2 1 1 1 1		56.6
1.6–2.4	FILL: Sandy Clayey GRAVEL; red/grey/brown, dry, dense, fine to medium angular gravel (2-10mm), brick fragments		GC					56.4
2.4–3.1				BH23 2.5-2.6		1 1 1 1 1 1 1 1 1 1 1 2 1 3 2 1 1 1 1		56.2
3.1–3.4	FILL: Gravelly Sandy CLAY: dark brown, firm to stiff, moist, medium to high plasticity, Gravel is angular siltstone & Dolerite.		CI					56.0
3.4–4.1				BH23 3.5-3.6		1 2 1 1 1 1 1 1 1 1 2 2 1 1 2 1 1 1		55.8
4.1–5.3	FILL: Sandy Gravelly CLAY; Pale brown, moist, stiff, medium plasticity, Gravel is angular siltstone & dolerite. EOH		CI	BH23 4.5-4.6		1 1 1 1 1 1 1 2 1 1 1 1 2 1 1 2 1 1 1 1		55.6
								55.4
								55.2
								55.0
								54.8
								54.6
								54.4
								54.2
								54.0
								53.8
								53.6
								53.4
								53.2
								53.0
								52.8
								52.6
								52.4
								52.2

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH24

EASTING: 5254096.239 GDA94
NORTHING: 525357.19 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.3 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 3.6
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 24/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.2	FILL: Silty SAND; dark brown, trace fine grave, dry, meidum dense	FILL	SM					57.2
0.2–0.7	FILL: Sandy Clayey GRAVEL; grey/brown, dry, very dense, fine to coarse angular gravel (2-40mm)		GC	BH24 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1		57.0 / 56.8 / 56.6
0.7–1.5	FILL: Gravelly Sandy CLAY: pale yellow-brown, slightly moist, very stiff, medium plasticity. Gravel is angular siltstone & Dole		CI	BH24 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		56.4 / 56.2 / 56.0 / 55.8
1.5–2.5								55.6 / 55.4 / 55.2 / 55.0
2.5–3.4	FILL: Gravelly Sandy CLAY: grey/brown, slightly moist, very stiff, medium plasticity. Gravel is angular siltstone & Dolerite. E		CI	BH24 2.5-2.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		54.8 / 54.6 / 54.4 / 54.2
3.3–3.4				BH24 3.3-3.4		1 1 1 1 1 1 1 2 1 1 1 2 2 1 1 1 1 1 1		54.0 / 53.8

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH25

EASTING: 5254080.711 GDA94
NORTHING: 525350.801 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.587 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 5.8
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 24/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.5	FILL: Silty SAND; dark brown, trace fine grave, dry, meidum dense	FILL	SM					57.4
0.5–1.8	FILL: Sandy Clayey GRAVEL; grey/brown/'pink', dry, very dense, fine to coarse angular gravel (2-40mm), red brick fragments		GC	BH25 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1		57.2 57.0 56.8 56.6 56.4 56.2 56.0 55.8
1.8–2.5				BH25 1.5-1.8		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		55.6 55.4 55.2
2.5–4.1	FILL: Gravelly Sandy CLAY: grey/brown, slightly moist, very stiff, medium plasticity overall. Gravel is angular siltstone & Dol		CI	BH25 2.5-2.6		1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1		55.0 54.8 54.6 54.4 54.2
4.1–5.8	FILL: Mixed Gravelly Sandy CLAY: red/grey/dark brown, slightly moist, very stiff, medium plasticity overall. Gravel is angular		CI	BH25 3.5-3.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1		54.0 53.8 53.6 53.4 53.2
				BH25 4.5-4.6		1 1 1 1 1 1 2 1 1 1 2 2 1 1 2 1 1 1 1		53.0 52.8 52.6 52.4 52.2
				BH25 5.5-5.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		52.0 51.8

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH26

EASTING: 5254037.771 GDA94
NORTHING: 525329.284 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.605 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 0.7
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 30/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete		P					57.6
0.1	FILL: Clayey GRAVEL: dark orange-brown, slightly moist, very dense, fine to coarse angular Dolerite gravel	FILL	GC	BH26 0.1-0.2		1 1 1

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH27

EASTING: 5254040.377 GDA94
NORTHING: 525338.728 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.729 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 2
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 30/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete	FILL	P					
0.1				BH27 0.1-0.2		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1		57.6
0.2								
0.3								57.4
0.4	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff		CI					
0.5				BH27 0.5-0.6		2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		57.2
0.6								
0.7								57.0
0.8								
0.9	FILL: Sandy GRAVEL: orange, slightly moist, dense		GW					56.8
1.0				BH27 1.0-1.1		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1		
1.1	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff		CI					56.6
1.2								
1.3	Gravelly SILT: low plasticity, dark grey/black, moist, stiff		ML					56.4
1.4								
1.5				BH27 1.5-1.6		1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		56.2
1.6	Gravelly Silty CLAY: medium plasticity, pale brown-grey, moist, very stiff, gradual transition to	Q	CI					
1.7								56.0
1.8								
1.9	Sandy MUDSTONE: fine grained, yellow/pale brown/orange, slightly moist, low strength, extremely weathered	RM		BH27 1.9-2.0		1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1		55.8

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH28

EASTING: 5254047.014 GDA94
NORTHING: 525333.614 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.992 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1.4
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 30/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete		P					
0.1				BH28 0.1-0.2				57.8
0.2								
0.3								
0.4								57.6
0.5	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	CI	BH28 0.5-0.6				57.4
0.6								
0.7								
0.8								57.2
0.9								
1.0				BH28 1.0-1.1				57.0
1.1	FILL: Woodchips, black, moist, loose							
1.2								56.8
1.3	Gravelly SILT: low plasticity, dark grey/black, moist, stiff	O	ML	BH28 1.2-1.3				
	Sandy MUDSTONE: fine grained, yellow/pale brown/orange, slightly moist, low strength, extremely weathered							56.6

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH29

EASTING: 5254003.063 GDA94
NORTHING: 525381.977 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 59.713 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 2.2
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 30/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete	FILL	P					59.6
0.1								
0.2								59.4
0.3								
0.4								
0.5								59.2
0.6	FILL: Gravelly Sandy CLAY; medium plasticity, pale brown/grey, slightly moist, stiff, fine to coarse angular gravel			BH29 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1		
0.7			CI					59.0
0.8								
0.9								58.8
1.0								
1.1								58.6
1.2								
1.3								58.4
1.4	FILL: Sandy CLAY; medium plasticity, dark brown/black, slightly moist, very stiff		CI					
1.5				BH29 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		58.2
1.6	FILL: Brick fragments; red, dry, dense							
1.7								58.0
1.8	FILL: Sandy GRAVEL; orange, slightly moist, dense		GW					
1.9								57.8
2.0	Sandy Silty CLAY; high plasticity, dark grey, moist, very stiff	O	CH					
2.1								57.6
	Sandy MUDSTONE; fine grained, yellow/pale brown/orange, slightly moist, low strength, extremely weathered			BH29 2.1-2.2		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH30

EASTING: 5254000.95 GDA94
NORTHING: 5253372.89 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 58.412 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 0.4
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 30/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete		P					58.4
0.1	FILL: Gravelly Sandy CLAY; medium plasticity, pale brown/grey, slightly moist, stiff, fine to coarse angular gravel	FILL	CI					
0.2								58.2
0.3	Sandy Silty CLAY: high plasticity, dark grey, moist, very stiff	Q	CH	BH30 0.3-0.4				
0.4	Sandy MUDSTONE: fine grained, yellow/pale brown/orange, slightly moist, low strength, extremely weathered							

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✖ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH31

EASTING: 5254015.916 GDA94
NORTHING: 525314.878 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 60.523 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1.9
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 30/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Bitumen							60.4
0.1								
0.2								60.2
0.3								
0.4								
0.5	FILL: Gravelly Sandy CLAY; medium plasticity, pale brown/grey, slightly moist, stiff, fine to coarse angular gravel	FILL	CI	BH31 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		60.0
0.6								
0.7								59.8
0.8								
0.9								59.6
1.0								
1.1								59.4
1.2								
1.3	Sandy MUDSTONE: fine grained, yellow/pale brown/orange, slightly moist, low strength, extremely weathered	RWI						59.2
1.4								
1.5				BH31 1.5-1.6		1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1		59.0
1.6								
1.7								58.8
1.8								

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH32

EASTING: 5254009.27 GDA94
NORTHING: 525321.543 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 60.816 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1.2
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 30/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Bitumen							60.8
0.1								
0.2								60.6
0.3								
0.4								60.4
0.5	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	CI	BH32 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1		60.2
0.6								
0.7								
0.8								60.0
0.9								
1.0	Sandy MUDSTONE: fine grained, yellow/pale brown/orange, slightly moist, low strength, extremely weathered	RWI						59.8
1.1								
1.2								

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA

CLIENT: Swanbury Penglase Architects

Log of BH33

EASTING:	5254025.94	GDA94
NORTHING:	525321.493	GDA94

BORING LOCATION: New Town, Tasmania

ELEVATION AND DATUM: 59.262 m AHD

DRILLING CONTRACTOR: Geo-Environmental Solutions

TOTAL DEPTH (m): 1

EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer

NATURAL (m) WATER TABLE (m)

SAMPLING: Direct Push DATE: 30/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Bitumen							59.2
0.1	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	CI					59.0
0.5	Sandy Silty CLAY: high plasticity, dark grey, moist, very stiff	CI	CH	BH33 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		58.6
0.8	Sandy MUDSTONE: fine grained, yellow/pale brown/orange, slightly moist, low strength, extremely weathered	RW						58.4

Tas EPA IB105 CLASSIFICATION: Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH34

EASTING: 525330.254 GDA94
NORTHING: 5254019.551 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 59.42 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1.2
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 30/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Bitumen							59.4
0.1								
0.2								
0.3	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	CI					59.2
0.4								
0.5				BH34 0.5-0.6		1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		59.0
0.6								
0.7								58.8
0.8	Sandy Silty CLAY: high plasticity, dark grey, moist, very stiff	Cl	CH					
0.9								58.6
1.0								
1.1								58.4
1.2	Sandy MUDSTONE: fine grained, yellow/pale brown/orange, slightly moist, low strength, extremely weathered							

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH35

EASTING: 5254064.796 GDA94
NORTHING: 525336.154 GDA94
ELEVATION AND DATUM: 57.373 m AHD
TOTAL DEPTH (m): 2
NATURAL (m): WATER TABLE (m):

BORING LOCATION: New Town, Tasmania
DRILLING CONTRACTOR: Geo-Environmental Solutions
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
SAMPLING: Direct Push DATE: 30/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–1.9	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	Cl	BH35 0.5-0.6 BH35 1.5-1.6		Arsenic 1, Barium 1, Beryllium 1, Cadmium 1, Chromium VI 1, Copper 1, Cobalt 1, Lead 1, Manganese 1, Mercury 1, Molybdenum 1, Nickel 1, Selenium 1, Silver 1, Tin 1, Zinc 1, Aldrin+Dieldrin 1, DDT+DDE+DDD 1, Benzo(a)pyrene 2, Phenol 1, TPH C6 - C9 1, TPH C10 - C36 2, PAH Sum/TEQ 1, PCB's 1, Benzene 1, Toluene 1, Eth/Benzene 1, Total Xylenes 1, Cyanide 1, Fluoride 1		57.2 … 55.4

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH36

EASTING: 525343.65 GDA94
NORTHING: 5254033.037 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.72 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1.3
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 31/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Bitumen	FILL	P					57.6
0.1–0.8	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff		CI	BH36 0.5-0.6		1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1		57.4 57.2 57.0
0.8–1.2	Sandy Silty CLAY; high plasticity, dark grey, moist, very stiff	O	CH					56.8 56.6
1.3	Sandy MUDSTONE; fine grained, yellow/pale brown/orange, slightly moist, low strength, extremely weathered							

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

Environmental Site Assessment (V9) 52 New Town Road, New Town. June 2025.

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH37

EASTING: 525355.025 GDA94
NORTHING: 5254034.878 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.77 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 3.6
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 31/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Concrete		P					
0.1–2.0	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	CI	BH37 0.5-0.6 BH37 1.5-1.6 BH37 2.5-2.6				57.6–56.2
2.0–3.5	Silty Sandy CLAY; low plasticity, orange/yellow/pale brown, moist, firm to stiff, extremely weathered	CI	CL	BH37 3.5-3.6				56.0–54.2

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH38

EASTING: 525366.493 GDA94
NORTHING: 5254034.512 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.78 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 2.7
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 31/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete		P					57.6
0.5				BH38 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1		57.4
1.2	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	CI					57.2
1.5				BH38 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1		57.0
2.0								56.8
2.1								56.6
2.3								56.4
2.4	Sandy Clayey SILT: low plasticity, dark grey, moist, soft		ML					56.2
2.5	Sandy Silty CLAY: high plasticity, dark grey, moist, very stiff	O	CH	BH38 2.5-2.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		56.0
2.6	Sandy MUDSTONE: fine grained, yellow/pale brown/orange, slightly moist, low strength, extremely weathered							55.8
								55.6
								55.4
								55.2

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH39

EASTING: 5254035.33 GDA94
NORTHING: 525378.498 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 58.426 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 3.1
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 31/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Concrete		P					58.4
0.1–0.7	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff		Cl	BH39 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		58.2 58.0 57.8
0.7–2.6	FILL: Sandy Clayey GRAVEL: dark brown/black, slightly moist, medium dense, assorted debris including metal fragments	FILL	GC	BH39 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1		57.6 57.4 57.2 57.0 56.8 56.6 56.4 56.2 56.0
2.6–3.0				BH39 2.5-2.6		1 1 1 1 1 1 2 1 1 1 1 2 2 1 2 2 1 1 1 1		55.8 55.6 55.4

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

Environmental Site Assessment (V9) 52 New Town Road, New Town. June 2025.

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH40

EASTING: 5254036.898 GDA94
NORTHING: 525385.824 GDA94
ELEVATION AND DATUM: 59.048 m AHD
BORING LOCATION: New Town, Tasmania
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 4
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 31/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete		P					59.0
0.5				BH40 0.5-0.6				58.6
1.5				BH40 1.5-1.6				57.6
2.0	FILL: Sandy Clayey GRAVEL: dark brown/black, slightly moist, medium dense, assorted debris including metal fragments	FILL	GC					57.0
2.5				BH40 2.5-2.6				56.6
3.2							✕	55.8
3.5				BH40 3.5-3.6				55.6
3.9								55.2

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 ☐ Level 2 ☐ Level 3 ☐ Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH41

EASTING: 525359.526 GDA94
NORTHING: 5254017.36 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.75 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 0.8
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 1/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete		P					57.6
0.1								
0.2	FILL: Sandy Clayey GRAVEL: dark brown/black, slightly moist, medium dense, assorted debris including metal fragments	FILL	GC	BH41 0.5-0.6				57.4
0.3								
0.4								
0.5								57.2
0.6								
0.7								
0.8	Sandy MUDSTONE: fine grained, yellow/pale brown/orange, slightly moist, low strength, extremely weathered							57.0

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH42

EASTING: 5254020.873 GDA94
NORTHING: 525393.432 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 59.976 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 3.1
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 1/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Bitumen	FILL	P					59.8
0.1								
0.2	FILL: Concrete		P					59.6
0.3	FILL: SAND; pale grey, slightly moist, loose		SP					
0.4								59.4
0.5				BH42 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 2 1 1 1 1 1 1		
0.6								59.2
0.7								
0.8								59.0
0.9								
1.0								58.8
1.1								
1.2								58.6
1.3								
1.4								58.4
1.5	FILL: Gravelly Sandy CLAY; medium plasticity, pale brown/grey, slightly moist, stiff, fine to coarse angular gravel		CI	BH42 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 2 1 1 1 1 1 1		
1.6								58.2
1.7								
1.8								58.0
1.9								
2.0								57.8
2.1								
2.2								57.6
2.3								
2.4								57.4
2.5				BH42 2.5-2.6		1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
2.6								57.2
2.7								
2.8								57.0
2.9	Silty Sandy CLAY; medium to high plasticity, grey/brown, moist, stiff	Q	CH					
3.0	SANDSTONE: fine grained, yellow/pale brown/orange, slightly moist, low strength, extremely weathered	RW						

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH43

EASTING: 5254061.419 GDA94
NORTHING: 525385.491 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 58.43 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 4.1
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 1/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete		P					58.4
0.1	FILL: SAND; pale grey, slightly moist, loose		SP					
0.2								58.2
0.3								
0.4								58.0
0.5				BH43 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1 1 1		
0.6								57.8
0.7								
0.8								57.6
0.9								
1.0								57.4
1.1								
1.2								57.2
1.3								
1.4								57.0
1.5				BH43 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1 1 1		
1.6								56.8
1.7								
1.8								56.6
1.9								
2.0								56.4
2.1	FILL: Gravelly Sandy CLAY; medium plasticity, pale brown/grey, slightly moist, stiff, fine to coarse angular gravel	FILL	CI					56.2
2.2								
2.3								56.0
2.4								
2.5								
2.6				BH43 2.5-2.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1 1 1		55.8
2.7								
2.8								55.6
2.9								
3.0								55.4
3.1								
3.2								55.2
3.3								
3.4								55.0
3.5				BH43 3.5-3.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1 1 1		
3.6								54.8
3.7								
3.8								54.6
3.9								
4.0								54.4

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH44

EASTING: 5254075.885 GDA94
NORTHING: 525383.3 GDA94
ELEVATION AND DATUM: 58.908 m AHD
BORING LOCATION: New Town, Tasmania
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 3.9
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 1/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete	FILL	P					58.8
0.1								
0.2								58.6
0.3	FILL: Gravelly Sandy CLAY; medium plasticity, pale brown/grey, slightly moist, stiff, fine to coarse angular gravel							
0.4			CI					
0.5				BH44 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1 1 1		58.4
0.6								
0.7								58.2
0.8								
0.9								58.0
1.0								
1.1								57.8
1.2								
1.3								57.6
1.4								
1.5				BH44 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 2 1 1 1 1 1		57.4
1.6								
1.7								57.2
1.8								
1.9								57.0
2.0								
2.1								56.8
2.2	FILL: Sandy Clayey GRAVEL; dark brown/black, slightly moist, medium dense, assorted debris including metal fragments							
2.3			GC					56.6
2.4								
2.5				BH44 2.5-2.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 2 1 1 1 1 1		56.4
2.6								
2.7								56.2
2.8								
2.9								56.0
3.0								
3.1								55.8
3.2								
3.3								55.6
3.4								
3.5				BH44 3.5-3.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 2 1 1 1 1 1		55.4
3.6								
3.7								55.2
3.8								

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH45

EASTING: 5254068.651 GDA94
NORTHING: 525353.053 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.763 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 0.6
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 1/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0 – 0.2	FILL: Gravelly Sandy SILT; low plasticity, dark grey/brown, dry to slightly moist, stiff	FILL	ML					57.6
0.2 – 0.6	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	CI	BH45 0.5-0.6				57.4 / 57.2

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 ☐ Level 2 ☐ Level 3 ☐ Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH46

EASTING: 5254071.27 GDA94
NORTHING: 525364.124 GDA94
ELEVATION AND DATUM: 57.763 m AHD
TOTAL DEPTH (m): 1
NATURAL (m): WATER TABLE (m):

BORING LOCATION: New Town, Tasmania
DRILLING CONTRACTOR: Geo-Environmental Solutions
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
SAMPLING: Direct Push DATE: 1/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCs Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Gravelly Sandy SILT; low plasticity, dark grey/brown, dry to slightly moist, stiff	FILL	ML					57.6
0.5	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff		CI	BH46 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 2 1 1 1 1 1 1		57.4 57.2 57.0 56.8
1.0								

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✖ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH47

EASTING: 525348.989 GDA94
NORTHING: 5254050.965 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.87 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1.6
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 5/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Concrete		P					57.8
0.1–1.5	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	Cl	BH47 0.5-0.6; BH47 1.5-1.6				57.6 – 56.4

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH48

EASTING: 525350.219 GDA94
NORTHING: 5254044.577 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.87 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1.6
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 5/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Concrete		P					57.8
0.1–1.5	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	Cl	BH48 0.5-0.6; BH48 1.5-1.6				57.6 – 56.4

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH49

EASTING: 525354.935 GDA94
NORTHING: 5254047.511 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.87 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1.6
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 5/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Concrete		P					57.8
0.1–1.5	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	CI	BH49 0.5-0.6; BH49 1.5-1.6		1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1		57.6, 57.4, 57.2, 57.0, 56.8, 56.6, 56.4

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH50

EASTING: 525360.123 GDA94
NORTHING: 5254046.508 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.87 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1.6
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 5/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Concrete	FILL	P					57.8
0.1–1.5	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff		Cl	BH50 0.5-0.6; BH50 1.5-1.6				57.6, 57.4, 57.2, 57.0, 56.8, 56.6, 56.4

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH51

EASTING: 525358.911 GDA94
NORTHING: 5254052.724 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.87 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1.6
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 5/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Concrete	FILL	P					57.8
0.1–1.5	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	Cl	BH51 0.5-0.6		1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1		57.6 57.4 57.2 57.0 56.8 56.6 56.4
				BH51 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1 1 1		

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH52

EASTING: 525358.911 GDA94
NORTHING: 5254052.724 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.87 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1.6
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 5/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete	FILL	P					57.8
0.1								
0.2								57.6
0.3								
0.4								57.4
0.5				BH52 0.5-0.6		1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
0.6								57.2
0.7								
0.8	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff		CI					57.0
0.9								
1.0								
1.1								56.8
1.2								
1.3								56.6
1.4								
1.5				BH52 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		56.4

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH53

EASTING: 525360.123 GDA94
NORTHING: 5254046.508 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.87 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1.6
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 5/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete		P					57.8
0.1								
0.2								57.6
0.3								
0.4								57.4
0.5				BH53 0.5-0.6		1 1 2 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
0.6								57.2
0.7	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	CI					
0.8								57.0
0.9								
1.0								56.8
1.1								
1.2								56.6
1.3								
1.4								56.4
1.5				BH53 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2 3 Level 3 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

Appendix 13 Groundwater Gauging Forms

GROUNDWATER MONITORING LOG NEW TOWN RD

ENVIRONMENTAL SOLUTIONS

Client: | Date/Time:
Job No: | Sampled by:

Borehole No: MW1 0 | Easting: | Northing:
Surface RL (m): | Estimated Bore Yield (l/m): | Weather Conditions: Showers
Hole Depth RL (m): 0 | Height of Collar (mm): | Temperature: 13 degrees
dwater Depth RL (m): | Diameter of Bore (mm): | Rainfall 7 Days (mm): 2.2mm
(50mm/65mm) | Station: Brighton

ments from top of collar: | **Bore Water Purging:**

Borehole Depth (m): 8.43 A | Purging Method: 0
undwater Depth (m): 3.33 B | Sampling Method: 0
ater Column Volume: 5.1 (A-B) x F 10.2 x3 = | Volume to be Purged (L): 30.6
50mm: F=2 / 65mm: F=x3.3 | (Min. x3 Water Volume)

Cycles:	Cycle 1	Cycle 2	Cycle 3
Start Time	3.00	3.15	
Finish Time	3.10	3:30	
Minutes	10	15	
Volume (L)	10	15	
covery Time Minutes	5		
ter Quality Measurements:			
Temperature (oC)	16.2	15.4	
pH (units)	7.18	8.56	
Redox Potential (mV)	208.4	181.6	
Conductivity (uS/cm)	1595	1737	
Salinity (mg/L)			
Dissolved Oxygen (%)			
Dissolved Oxygen (mg/L)			
Turbidity	very		
Odour	slight		
Colour	br		
Sheen	slight		

DRY @ 2014.

Total Volume Purged (L):
Recovery Rate (L/m):
Calibration: | Comments:

g Details:

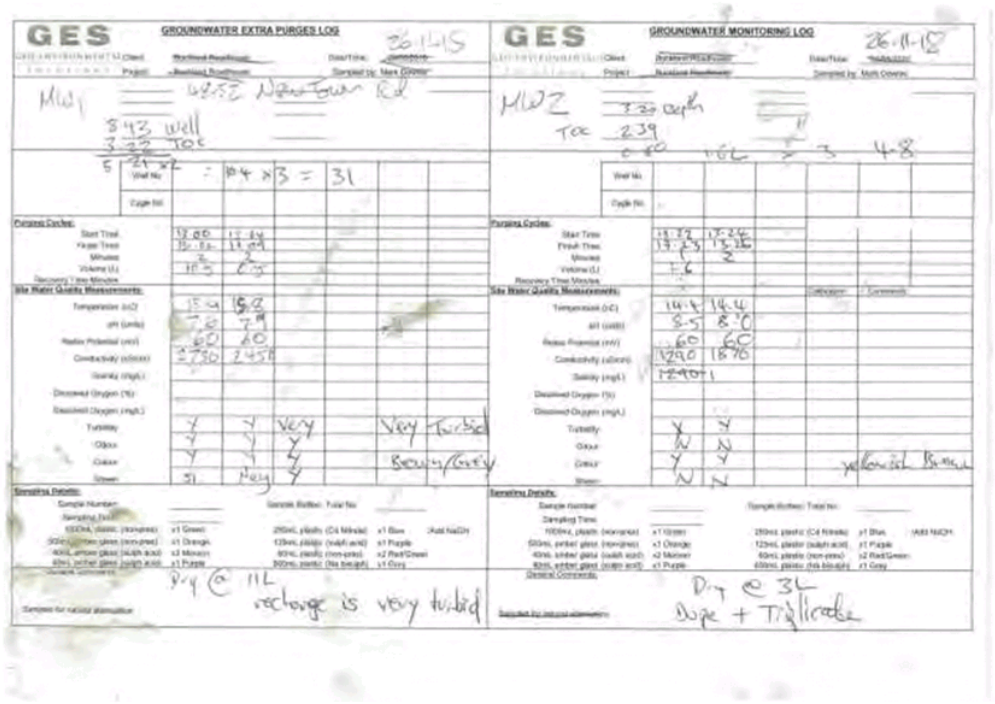
Sample Number: | Sample Bottles: Total No:
Sampling Time:

1000mL plastic (non-pres)	x1 Green	250mL plastic (Cd Nitrate)	x1 Blue	/Add NaOH
500mL amber glass (non-pres)	x1 Orange	125mL plastic (sulph acid)	x1 Purple	
40mL amber glass (sulph acid)	x2 Maroon	60mL plastic (non-pres)	x2 Red/Green	
40mL amber glass (sulph acid)	x1 Purple	600mL plastic (Na bisulph)	x1 Grey	

General Comments:

cate Sample Collected
cate Sample Collected
led for natural attenuation

Environmental Site Assessment (V9) 52 New Town Road, New Town. June 2025.



GES GROUNDWATER EXTRA PURGES LOG

26-11-15

Client: Richmond Roadhouse Date/Time: [illegible]
Project: Richmond Roadhouse Sampled by: Mark Downie

MW1 — 48.52 New Town Rd

8.43 well
3.22 TOC
5 | 21 x 2 = 10.4 x 3 = 31

Well No.						
Cycle No.						
Purging Cycles:						
Start Time	12.00	12.04				
Finish Time	12.02	12.09				
Minutes	2	2				
Volume (L)	10.5	0.5				
Recovery Time Minutes						
Site Water Quality Measurements:						
Temperature (oC)	15.4	15.8				
pH (units)	7.8	7.9				
Redox Potential (mV)	60	60				
Conductivity (uS/cm)	2730	2450				
Salinity (mg/L)						
Dissolved Oxygen (%)						
Dissolved Oxygen (mg/L)						
Turbidity	Y	Y	Very		Very Turbid	
Odour	Y	Y	Y			
Colour	Y	Y	Y		Brown/Grey	
Sheen	SI	Very	Y			
Sampling Details:						
Sample Number						
Sampling Time						
100mL plastic (non-preserved) x1 Green			250mL plastic (C4 Nitrate) x1 Blue			(Add NaOH)
500mL amber glass (non-preserved) x1 Orange			125mL plastic (sulph acid) x1 Purple			
40mL amber glass (sulph acid) x2 Maroon			60mL plastic (non-preserved) x2 Red/Green			
40mL amber glass (sulph acid) x1 Purple			500mL plastic (No bleach) x1 Grey			
General Comments: Dry @ 11L recharge is very turbid						

Sampled for natural attenuation

GES GROUNDWATER MONITORING LOG

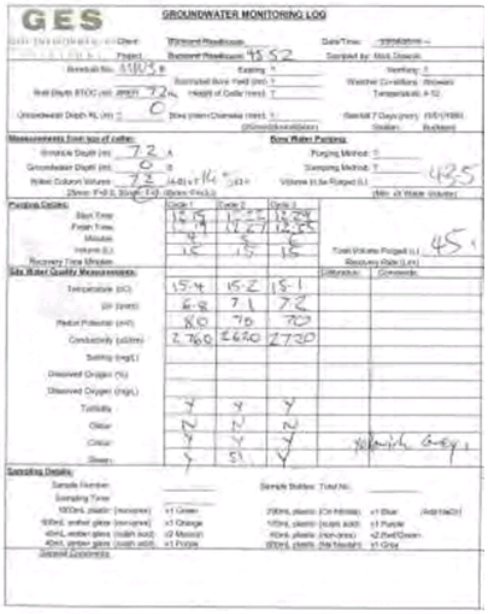
26-11-15

Client: Richmond Roadhouse Date/Time: [illegible]
Project: Richmond Roadhouse Sampled by: Mark Downie

MW2 — 3.20 depth
TOC 2.39
0.80 | 1.6L | 2 | 3 | 4.8

Well No.						
Cycle No.						
Purging Cycles:						
Start Time	13.22	13.24				
Finish Time	13.23	13.26				
Minutes	1	2				
Volume (L)	1.6					
Recovery Time Minutes						
Site Water Quality Measurements:					Calibration	Comments
Temperature (oC)	14.4	14.4				
pH (units)	8.5	8.0				
Redox Potential (mV)	60	60				
Conductivity (uS/cm)	1290	1870				
Salinity (mg/L)	1290+1					
Dissolved Oxygen (%)						
Dissolved Oxygen (mg/L)						
Turbidity	Y	Y				
Odour	N	N				
Colour	Y	Y				
Sheen	N	N				
Sampling Details:						
Sample Number						
Sampling Time						
100mL plastic (non-preserved) x1 Green			250mL plastic (C4 Nitrate) x1 Blue			(Add NaOH)
500mL amber glass (non-preserved) x1 Orange			125mL plastic (sulph acid) x1 Purple			
40mL amber glass (sulph acid) x2 Maroon			60mL plastic (non-preserved) x2 Red/Green			
40mL amber glass (sulph acid) x1 Purple			500mL plastic (No bleach) x1 Grey			
General Comments: Dry @ 3L Dupe + Triplicate						

Sampled for natural attenuation



GES GROUNDWATER MONITORING LOG

Client: Richmond Roadhouse Date/Time: [illegible]
Project: Richmond Roadhouse 48.52 Sampled by: Mark Downie

Borehole No. MW3 B Easting: ? Northing: ?
Estimated Bore Yield (mm): ? Weather Conditions: Showers
Well Depth BTOC (m): 7.2 Height of Collar (mm): ? Temperature: 4-12
Groundwater Depth RL (m): 0 Bore Water Chemistry (mm): ? Rainfall 7 Days (mm): [illegible]
(Groundwater/Water) Station: Richmond

Measurements from top of collar:
Borehole Depth (m): 7.2 A
Groundwater Depth (m): 0 B
Water Column Volume: 7.2 (A-B) x 14 (C) = 43.5
25mm: F=0.5, Slope: 1-2 (Bore Yield)

Bore Water Purging:
Purging Method: ?
Sampling Method: ?
Volume to be Purged (L): 43.5
(Min. of Water Volume)

Purging Cycles:	Cycle 1	Cycle 2	Cycle 3
Start Time	12.15	12.22	12.29
Finish Time	12.19	12.27	12.35
Minutes	4	5	6
Volume (L)	15	15	15
Recovery Time Minutes			

Total Volume Purged (L): 45
Recovery Rate (L/m)

Site Water Quality Measurements:				Calibration	Comments
Temperature (oC)	15.4	15.2	15.1		
pH (units)	6.8	7.1	7.2		
Redox Potential (mV)	80	70	70		
Conductivity (uS/cm)	2760	2620	2730		
Salinity (mg/L)					
Dissolved Oxygen (%)					
Dissolved Oxygen (mg/L)					
Turbidity	Y	Y	Y		
Odour	N	N	N		
Colour	Y	Y	Y		
Sheen	Y	SI	Y		
Sampling Details:					
Sample Number					
Sampling Time					
100mL plastic (non-preserved) x1 Green			250mL plastic (C4 Nitrate) x1 Blue		(Add NaOH)
500mL amber glass (non-preserved) x1 Orange			125mL plastic (sulph acid) x1 Purple		
40mL amber glass (sulph acid) x2 Maroon			60mL plastic (non-preserved) x2 Red/Green		
40mL amber glass (sulph acid) x1 Purple			500mL plastic (No bleach) x1 Grey		
General Comments:					

Sampled for natural attenuation

Appendix 11 Groundwater Purge Record *Page 642*

Appendix 14 Soil Analytical Results - Certificate of Analysis

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM1811858**	Page	: 1 of 21
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Project	: Newtown Rd	Date Samples Received	: 25-Jul-2018 09:05
Order number	:	Date Analysis Commenced	: 26-Jul-2018
C-O-C number	: ----	Issue Date	: 31-Jul-2018 15:12
Sampler	: SJ		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 59		
No. of samples analysed	: 23		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

RIGHT SOLUTIONS | RIGHT PARTNER

Page	: 2 of 21
Work Order	: EM1811858
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Page : 3 of 21
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH01 1.0-1.1	BH01 2.5-2.6	BH01 4.4-4.5	BH02 1.0-1.1	BH02 2.8-2.9
				Client sampling date / time	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811858-003	EM1811858-006	EM1811858-010	EM1811858-013	EM1811858-016
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	---	1.0	%		18.3	13.5	13.3	12.3	17.7
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	6	<5	<5
Barium	7440-39-3	10	mg/kg		50	30	50	440	730
Beryllium	7440-41-7	1	mg/kg		<1	<1	<1	<1	1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		8	10	6	10	16
Cobalt	7440-48-4	2	mg/kg		5	5	11	13	13
Copper	7440-50-8	5	mg/kg		8	15	54	46	12
Lead	7439-92-1	5	mg/kg		35	25	52	162	56
Manganese	7439-96-5	5	mg/kg		82	25	846	236	63
Nickel	7440-02-0	2	mg/kg		7	8	12	13	12
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		21	39	51	19	28
Zinc	7440-66-6	5	mg/kg		45	1100	66	132	71
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	1.0	0.4	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	1.2	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	1.5	4.0	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	0.8	0.6	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		0.9	9.7	7.9	0.8	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	2.6	2.9	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		1.5	14.9	20.8	1.5	<0.5
Pyrene	129-00-0	0.5	mg/kg		1.6	15.0	25.1	1.6	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		0.7	6.8	14.7	0.7	<0.5
Chrysene	218-01-9	0.5	mg/kg		0.6	6.2	14.4	0.7	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		0.8	6.2	19.6	0.9	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	2.9	6.2	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		0.6	5.1	17.4	0.6	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	2.5	7.0	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	0.7	2.0	<0.5	<0.5

Page : 4 of 21
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH01 1.0-1.1	BH01 2.5-2.6	BH01 4.4-4.5	BH02 1.0-1.1	BH02 2.8-2.9
				Client sampling date / time	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811858-003	EM1811858-006	EM1811858-010	EM1811858-013	EM1811858-016
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	2.9	8.3	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	---	0.5	mg/kg		6.7	77.8	152	6.8	<0.5
^ Benzo(a)pyrene TEQ (zero)	---	0.5	mg/kg		0.8	7.7	24.4	0.8	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	---	0.5	mg/kg		1.0	7.7	24.4	1.1	0.6
^ Benzo(a)pyrene TEQ (LOR)	---	0.5	mg/kg		1.4	7.7	24.4	1.4	1.2
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	---	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	---	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	---	100	mg/kg		<100	260	700	<100	<100
C29 - C36 Fraction	---	100	mg/kg		<100	160	470	<100	<100
^ C10 - C36 Fraction (sum)	---	50	mg/kg		<50	420	1170	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	---	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	---	100	mg/kg		<100	370	1030	<100	<100
>C34 - C40 Fraction	---	100	mg/kg		<100	<100	200	<100	<100
^ >C10 - C40 Fraction (sum)	---	50	mg/kg		<50	370	1230	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	---	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	---	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	---	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		90.5	81.3	82.6	90.8	89.4
2-Chlorophenol-D4	93951-73-6	0.5	%		95.6	86.8	90.0	94.7	91.8
2.4.6-Tribromophenol	118-79-6	0.5	%		52.6	46.1	57.2	52.8	50.4

Page : 5 of 21
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH01 1.0-1.1	BH01 2.5-2.6	BH01 4.4-4.5	BH02 1.0-1.1	BH02 2.8-2.9
				Client sampling date / time	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811858-003	EM1811858-006	EM1811858-010	EM1811858-013	EM1811858-016
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		81.5	88.9	116	117	96.4
Anthracene-d10	1719-06-8	0.5	%		103	96.9	104	108	111
4-Terphenyl-d14	1718-51-0	0.5	%		104	103	99.8	104	110
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		79.1	78.1	73.2	77.3	91.7
Toluene-D8	2037-26-5	0.2	%		76.6	71.8	70.7	71.9	85.7
4-Bromofluorobenzene	460-00-4	0.2	%		96.6	90.3	90.0	93.8	112

Page : 6 of 21
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH02 4.0-4.1	BH03 0.5-0.6	BH03 2.5-2.6	BH03 3.9-4.0	BH04 1.5-1.6
				Client sampling date / time	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811858-018	EM1811858-020	EM1811858-024	EM1811858-027	EM1811858-031
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	---	1.0	%		21.6	18.0	8.6	14.7	10.3
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	5	<5	<5	<5
Barium	7440-39-3	10	mg/kg		220	140	260	70	130
Beryllium	7440-41-7	1	mg/kg		1	<1	<1	<1	<1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		22	13	3	12	14
Cobalt	7440-48-4	2	mg/kg		26	14	10	11	10
Copper	7440-50-8	5	mg/kg		54	24	28	25	35
Lead	7439-92-1	5	mg/kg		7	502	12	14	128
Manganese	7439-96-5	5	mg/kg		99	378	105	261	301
Nickel	7440-02-0	2	mg/kg		22	16	7	16	14
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		103	41	43	42	43
Zinc	7440-66-6	5	mg/kg		35	118	40	44	113
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	0.1	<0.1	<0.1	0.2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	0.6	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	2.1	3.2	2.1
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	2.3
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	1.3	3.4
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	1.3	5.7	16.7	37.0
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	2.1	4.4	10.7
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	3.4	13.5	18.8	55.9
Pyrene	129-00-0	0.5	mg/kg		<0.5	3.7	15.4	21.1	52.6
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	1.7	8.0	10.6	20.2
Chrysene	218-01-9	0.5	mg/kg		<0.5	1.4	7.5	9.8	18.8
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	1.6	8.9	9.8	28.8
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	0.7	3.2	3.5	9.6
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	1.4	7.8	8.9	25.6
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	0.8	3.7	4.0	15.6
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	1.1	1.2	3.4

Page : 7 of 21
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH02 4.0-4.1	BH03 0.5-0.6	BH03 2.5-2.6	BH03 3.9-4.0	BH04 1.5-1.6
				Client sampling date / time	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811858-018	EM1811858-020	EM1811858-024	EM1811858-027	EM1811858-031
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	1.0	4.7	5.0	20.0
^ Sum of polycyclic aromatic hydrocarbons	---	0.5	mg/kg		<0.5	17.0	83.7	119	306
^ Benzo(a)pyrene TEQ (zero)	---	0.5	mg/kg		<0.5	1.9	11.4	13.0	36.8
^ Benzo(a)pyrene TEQ (half LOR)	---	0.5	mg/kg		0.6	2.2	11.4	13.0	36.8
^ Benzo(a)pyrene TEQ (LOR)	---	0.5	mg/kg		1.2	2.4	11.4	13.0	36.8
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	---	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	---	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	---	100	mg/kg		<100	<100	340	530	810
C29 - C36 Fraction	---	100	mg/kg		<100	<100	200	250	550
^ C10 - C36 Fraction (sum)	---	50	mg/kg		<50	<50	540	780	1360
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	---	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	---	100	mg/kg		<100	<100	480	700	1190
>C34 - C40 Fraction	---	100	mg/kg		<100	<100	<100	100	300
^ >C10 - C40 Fraction (sum)	---	50	mg/kg		<50	<50	480	800	1490
^ >C10 - C16 Fraction minus Naphthalene (F2)	---	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	---	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	---	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		87.0	81.5	85.0	87.7	84.5
2-Chlorophenol-D4	93951-73-6	0.5	%		90.0	85.4	89.1	94.5	90.1
2.4.6-Tribromophenol	118-79-6	0.5	%		46.5	39.4	50.4	58.4	56.1

Page : 8 of 21
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH02 4.0-4.1	BH03 0.5-0.6	BH03 2.5-2.6	BH03 3.9-4.0	BH04 1.5-1.6
				Client sampling date / time	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811858-018	EM1811858-020	EM1811858-024	EM1811858-027	EM1811858-031
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		99.7	81.6	97.3	101	93.7
Anthracene-d10	1719-06-8	0.5	%		107	104	104	105	91.7
4-Terphenyl-d14	1718-51-0	0.5	%		108	97.8	100	104	94.3
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		75.3	73.7	78.7	69.9	78.3
Toluene-D8	2037-26-5	0.2	%		74.3	73.6	86.0	68.8	74.2
4-Bromofluorobenzene	460-00-4	0.2	%		92.0	93.0	108	85.5	87.7

Page : 9 of 21
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH04 3.0-3.1	BH04 4.5-4.6	BH05 1.0-1.1	BH05 3.0-3.1	BH05 4.5-4.6
				Client sampling date / time	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811858-034	EM1811858-037	EM1811858-040	EM1811858-044	EM1811858-047
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	---	1.0	%		6.1	10.0	19.9	11.1	15.0
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	<5
Barium	7440-39-3	10	mg/kg		170	180	60	120	100
Beryllium	7440-41-7	1	mg/kg		<1	<1	<1	<1	<1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	2	<1
Chromium	7440-47-3	2	mg/kg		14	12	8	15	8
Cobalt	7440-48-4	2	mg/kg		11	14	7	21	17
Copper	7440-50-8	5	mg/kg		35	28	7	44	32
Lead	7439-92-1	5	mg/kg		217	136	21	94	122
Manganese	7439-96-5	5	mg/kg		224	1040	78	179	199
Nickel	7440-02-0	2	mg/kg		14	27	11	22	14
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		30	14	16	23	54
Zinc	7440-66-6	5	mg/kg		127	184	244	322	102
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		0.1	0.1	<0.1	0.1	0.2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	0.6
Phenanthrene	85-01-8	0.5	mg/kg		2.2	1.1	<0.5	1.7	8.1
Anthracene	120-12-7	0.5	mg/kg		0.6	<0.5	<0.5	0.6	2.5
Fluoranthene	206-44-0	0.5	mg/kg		3.9	2.8	0.9	3.9	11.7
Pyrene	129-00-0	0.5	mg/kg		3.9	3.2	1.1	4.3	11.2
Benz(a)anthracene	56-55-3	0.5	mg/kg		1.5	1.6	0.5	2.2	4.2
Chrysene	218-01-9	0.5	mg/kg		1.4	1.4	<0.5	2.0	3.8
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		2.1	1.8	0.6	2.1	4.7
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		0.7	0.7	<0.5	1.1	1.7
Benzo(a)pyrene	50-32-8	0.5	mg/kg		1.7	1.5	<0.5	1.9	3.9
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		1.1	0.9	<0.5	1.0	2.3
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5

Page : 10 of 21
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH04 3.0-3.1	BH04 4.5-4.6	BH05 1.0-1.1	BH05 3.0-3.1	BH05 4.5-4.6
				Client sampling date / time	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811858-034	EM1811858-037	EM1811858-040	EM1811858-044	EM1811858-047
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		1.6	1.1	<0.5	1.2	3.0
^ Sum of polycyclic aromatic hydrocarbons	---	0.5	mg/kg		20.7	16.1	3.1	22.0	58.2
^ Benzo(a)pyrene TEQ (zero)	---	0.5	mg/kg		2.3	2.0	<0.5	2.6	5.2
^ Benzo(a)pyrene TEQ (half LOR)	---	0.5	mg/kg		2.5	2.3	0.7	2.8	5.5
^ Benzo(a)pyrene TEQ (LOR)	---	0.5	mg/kg		2.8	2.5	1.2	3.1	5.8
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	---	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	---	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	---	100	mg/kg		<100	<100	<100	<100	110
C29 - C36 Fraction	---	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	---	50	mg/kg		<50	<50	<50	<50	110
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	---	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	---	100	mg/kg		<100	<100	<100	120	170
>C34 - C40 Fraction	---	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	---	50	mg/kg		<50	<50	<50	120	170
^ >C10 - C16 Fraction minus Naphthalene (F2)	---	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	---	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	---	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		87.7	91.4	88.1	93.9	89.2
2-Chlorophenol-D4	93951-73-6	0.5	%		94.4	97.0	92.3	97.9	94.2
2.4.6-Tribromophenol	118-79-6	0.5	%		63.9	56.5	54.8	57.6	55.1

Page : 11 of 21
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH04 3.0-3.1	BH04 4.5-4.6	BH05 1.0-1.1	BH05 3.0-3.1	BH05 4.5-4.6
				Client sampling date / time	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811858-034	EM1811858-037	EM1811858-040	EM1811858-044	EM1811858-047
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		98.9	102	98.9	104	102
Anthracene-d10	1719-06-8	0.5	%		104	109	111	108	103
4-Terphenyl-d14	1718-51-0	0.5	%		102	111	114	104	100
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		77.3	73.8	71.7	77.6	71.8
Toluene-D8	2037-26-5	0.2	%		72.7	71.1	69.1	75.9	85.5
4-Bromofluorobenzene	460-00-4	0.2	%		87.7	89.3	89.5	96.1	111

Page : 12 of 21
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH06 0.2-0.3	BH07 1.0-1.1	BH07 2.2-2.3	Duplicate 1	Duplicate 2
				Client sampling date / time	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811858-049	EM1811858-052	EM1811858-055	EM1811858-056	EM1811858-057
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	---	1.0	%		16.9	16.6	9.1	8.8	18.6
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	<5
Barium	7440-39-3	10	mg/kg		150	230	260	140	300
Beryllium	7440-41-7	1	mg/kg		<1	<1	<1	<1	<1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		10	11	8	12	11
Cobalt	7440-48-4	2	mg/kg		10	11	9	10	10
Copper	7440-50-8	5	mg/kg		30	20	17	37	20
Lead	7439-92-1	5	mg/kg		174	80	120	116	48
Manganese	7439-96-5	5	mg/kg		253	173	309	216	134
Nickel	7440-02-0	2	mg/kg		12	13	7	13	13
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		27	25	25	42	24
Zinc	7440-66-6	5	mg/kg		168	161	70	111	262
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		0.4	0.1	0.4	0.2	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	0.8	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	2.8	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	3.3	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		2.5	<0.5	<0.5	29.6	<0.5
Anthracene	120-12-7	0.5	mg/kg		0.7	<0.5	<0.5	7.6	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		4.2	1.0	<0.5	31.6	<0.5
Pyrene	129-00-0	0.5	mg/kg		4.5	1.1	<0.5	29.3	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		1.9	0.5	<0.5	10.9	<0.5
Chrysene	218-01-9	0.5	mg/kg		1.8	<0.5	<0.5	10.1	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		2.1	0.6	<0.5	12.7	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		0.9	<0.5	<0.5	5.3	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		1.7	<0.5	<0.5	11.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		0.9	<0.5	<0.5	6.7	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	1.5	<0.5

Page : 13 of 21
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH06 0.2-0.3	BH07 1.0-1.1	BH07 2.2-2.3	Duplicate 1	Duplicate 2
				Client sampling date / time	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811858-049	EM1811858-052	EM1811858-055	EM1811858-056	EM1811858-057
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		1.2	<0.5	<0.5	8.6	<0.5
^ Sum of polycyclic aromatic hydrocarbons	---	0.5	mg/kg		22.4	3.2	<0.5	172	<0.5
^ Benzo(a)pyrene TEQ (zero)	---	0.5	mg/kg		2.3	<0.5	<0.5	16.7	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	---	0.5	mg/kg		2.6	0.7	0.6	16.7	0.6
^ Benzo(a)pyrene TEQ (LOR)	---	0.5	mg/kg		2.8	1.2	1.2	16.7	1.2
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	---	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	---	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	---	100	mg/kg		<100	<100	<100	410	<100
C29 - C36 Fraction	---	100	mg/kg		<100	<100	<100	270	<100
^ C10 - C36 Fraction (sum)	---	50	mg/kg		<50	<50	<50	680	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	---	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	---	100	mg/kg		120	<100	<100	600	<100
>C34 - C40 Fraction	---	100	mg/kg		<100	<100	<100	150	<100
^ >C10 - C40 Fraction (sum)	---	50	mg/kg		120	<50	<50	750	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	---	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	---	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	---	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		89.4	91.0	89.6	79.0	88.5
2-Chlorophenol-D4	93951-73-6	0.5	%		94.4	98.0	96.2	84.3	94.1
2.4.6-Tribromophenol	118-79-6	0.5	%		57.2	54.4	50.2	48.8	49.6

Page : 14 of 21
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH06 0.2-0.3	BH07 1.0-1.1	BH07 2.2-2.3	Duplicate 1	Duplicate 2
				Client sampling date / time	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811858-049	EM1811858-052	EM1811858-055	EM1811858-056	EM1811858-057
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		100	101	103	80.9	101
Anthracene-d10	1718-08-8	0.5	%		109	113	109	93.8	110
4-Terphenyl-d14	1718-51-0	0.5	%		102	109	112	93.0	111
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		70.6	76.9	69.3	74.5	74.1
Toluene-D8	2037-26-5	0.2	%		72.0	77.2	65.9	69.7	74.3
4-Bromofluorobenzene	460-00-4	0.2	%		89.1	86.5	87.2	87.2	88.9

Page : 15 of 21
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	Duplicate 3	----	----	----	----
				Client sampling date / time	23-Jul-2018 00:00	---	---	---	---
Compound	CAS Number	LOR	Unit	EM1811858-060	-------	-------	-------	-------	
					Result	---	---	---	---
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		23.0	----	----	----	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	----	----	----	----
Barium	7440-39-3	10	mg/kg		140	----	----	----	----
Beryllium	7440-41-7	1	mg/kg		<1	----	----	----	----
Boron	7440-42-8	50	mg/kg		<50	----	----	----	----
Cadmium	7440-43-9	1	mg/kg		<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg		20	----	----	----	----
Cobalt	7440-48-4	2	mg/kg		25	----	----	----	----
Copper	7440-50-8	5	mg/kg		40	----	----	----	----
Lead	7439-92-1	5	mg/kg		57	----	----	----	----
Manganese	7439-96-5	5	mg/kg		443	----	----	----	----
Nickel	7440-02-0	2	mg/kg		19	----	----	----	----
Selenium	7782-49-2	5	mg/kg		<5	----	----	----	----
Vanadium	7440-62-2	5	mg/kg		98	----	----	----	----
Zinc	7440-66-6	5	mg/kg		130	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	----	----	----	----

Page : 16 of 21
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	Duplicate 3	----	----	----	----
				Client sampling date / time	23-Jul-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM1811858-060	----------	----------	----------	----------	
				Result	---	---	---	---	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	----	----	----	----	
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	----	----	----	----	
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	----	----	----	----	
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	----	----	----	----	
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	----	----	----	----	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg	<10	----	----	----	----	
C10 - C14 Fraction	----	50	mg/kg	<50	----	----	----	----	
C15 - C28 Fraction	----	100	mg/kg	<100	----	----	----	----	
C29 - C36 Fraction	----	100	mg/kg	<100	----	----	----	----	
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	----	----	----	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	----	----	----	----	
>C10 - C16 Fraction	----	50	mg/kg	<50	----	----	----	----	
>C16 - C34 Fraction	----	100	mg/kg	<100	----	----	----	----	
>C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----	
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----	
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	----	----	----	----	
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----	
Toluene	108-88-3	0.5	mg/kg	<0.5	----	----	----	----	
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	----	----	----	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	----	----	----	
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	----	----	----	
^ Sum of BTEX	----	0.2	mg/kg	<0.2	----	----	----	----	
^ Total Xylenes	----	0.5	mg/kg	<0.5	----	----	----	----	
Naphthalene	91-20-3	1	mg/kg	<1	----	----	----	----	
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%	101	----	----	----	----	
2-Chlorophenol-D4	93951-73-6	0.5	%	105	----	----	----	----	
2.4.6-Tribromophenol	118-79-6	0.5	%	96.0	----	----	----	----	

Page : 17 of 21
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	Duplicate 3	----	----	----	----
				Client sampling date / time	23-Jul-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM1811858-060	--------	--------	--------	--------
					Result	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		102	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%		111	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		106	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		73.1	----	----	----	----
Toluene-D8	2037-26-5	0.2	%		65.4	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		87.3	----	----	----	----

Page : 18 of 21
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Field Blank	Rinsate Blank	----	----	----
				Client sampling date / time	23-Jul-2018 00:00	23-Jul-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM1811858-058	EM1811858-059	--------	--------	--------
					Result	Result	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	----	----	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	----	----	----	----
Barium	7440-39-3	0.001	mg/L		<0.001	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L		<0.001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	----	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	----	----	----	----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		----	<0.001	----	----	----
Boron	7440-42-8	0.05	mg/L		----	<0.05	----	----	----
Barium	7440-39-3	0.001	mg/L		----	<0.001	----	----	----
Beryllium	7440-41-7	0.001	mg/L		----	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		----	<0.0001	----	----	----
Cobalt	7440-48-4	0.001	mg/L		----	<0.001	----	----	----
Chromium	7440-47-3	0.001	mg/L		----	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L		----	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L		----	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L		----	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L		----	<0.001	----	----	----
Selenium	7782-49-2	0.01	mg/L		----	<0.01	----	----	----
Vanadium	7440-62-2	0.01	mg/L		----	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L		----	<0.005	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		----	<0.0001	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									

Page : 19 of 21
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Field Blank	Rinsate Blank	---	---	---
				Client sampling date / time	23-Jul-2018 00:00	23-Jul-2018 00:00	---	---	---
Compound	CAS Number	LOR	Unit		EM1811858-058	EM1811858-059	-------	-------	-------
					Result	Result	---	---	---
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Naphthalene	91-20-3	1.0	µg/L		<1.0	<1.0	---	---	---
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	<1.0	---	---	---
Acenaphthene	83-32-9	1.0	µg/L		<1.0	<1.0	---	---	---
Fluorene	86-73-7	1.0	µg/L		<1.0	<1.0	---	---	---
Phenanthrene	85-01-8	1.0	µg/L		<1.0	<1.0	---	---	---
Anthracene	120-12-7	1.0	µg/L		<1.0	<1.0	---	---	---
Fluoranthene	206-44-0	1.0	µg/L		<1.0	<1.0	---	---	---
Pyrene	129-00-0	1.0	µg/L		<1.0	<1.0	---	---	---
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	<1.0	---	---	---
Chrysene	218-01-9	1.0	µg/L		<1.0	<1.0	---	---	---
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	<1.0	---	---	---
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	<1.0	---	---	---
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	---	---	---
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	<1.0	---	---	---
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	<1.0	---	---	---
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	<1.0	---	---	---
^ Sum of polycyclic aromatic hydrocarbons	---	0.5	µg/L		<0.5	<0.5	---	---	---
^ Benzo(a)pyrene TEQ (zero)	---	0.5	µg/L		<0.5	<0.5	---	---	---
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	---	20	µg/L		<20	<20	---	---	---
C10 - C14 Fraction	---	50	µg/L		<50	<50	---	---	---
C15 - C28 Fraction	---	100	µg/L		<100	<100	---	---	---
C29 - C36 Fraction	---	50	µg/L		<50	<50	---	---	---
^ C10 - C36 Fraction (sum)	---	50	µg/L		<50	<50	---	---	---
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	---	---	---
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	---	---	---
>C10 - C16 Fraction	---	100	µg/L		<100	<100	---	---	---
>C16 - C34 Fraction	---	100	µg/L		<100	<100	---	---	---
>C34 - C40 Fraction	---	100	µg/L		<100	<100	---	---	---
^ >C10 - C40 Fraction (sum)	---	100	µg/L		<100	<100	---	---	---
^ >C10 - C16 Fraction minus Naphthalene (F2)	---	100	µg/L		<100	<100	---	---	---
EP080: BTEXN									

Page : 20 of 21
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Field Blank	Rinsate Blank	----	----	----
				Client sampling date / time	23-Jul-2018 00:00	23-Jul-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM1811858-058	EM1811858-059	--------	--------	--------
					Result	Result	----	----	----
EP080: BTEXN - Continued									
Benzene	71-43-2	1	µg/L		<1	<1	----	----	----
Toluene	108-88-3	2	µg/L		<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	----	----	----
^ Total Xylenes	----	2	µg/L		<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		18.2	22.9	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		33.6	55.7	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%		31.0	50.8	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		53.3	63.6	----	----	----
Anthracene-d10	1719-06-8	1.0	%		52.0	75.5	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		54.0	83.6	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		98.0	99.1	----	----	----
Toluene-D8	2037-26-5	2	%		95.7	93.8	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		102	102	----	----	----

Page : 21 of 21
Work Order : EM1811858
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	54	125
2-Chlorophenol-D4	93951-73-6	65	123
2.4.6-Tribromophenol	118-79-6	34	122
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	61	125
Anthracene-d10	1719-06-8	62	130
4-Terphenyl-d14	1718-51-0	67	133
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	51	125
Toluene-D8	2037-26-5	55	125
4-Bromofluorobenzene	460-00-4	56	124

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	46
2-Chlorophenol-D4	93951-73-6	23	104
2.4.6-Tribromophenol	118-79-6	28	130
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	36	114
Anthracene-d10	1719-06-8	51	119
4-Terphenyl-d14	1718-51-0	49	127
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1822218**	Page	: 1 of 6
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Sydney
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Project	: Newtown Rd	Date Samples Received	: 27-Jul-2018 10:00
Order number	:	Date Analysis Commenced	: 31-Jul-2018
C-O-C number	: ----	Issue Date	: 02-Aug-2018 16:06
Sampler	: ----		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 3		
No. of samples analysed	: 3		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW

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Page	: 2 of 6
Work Order	: ES1822218
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP071: Results of sample Triplicate 1 have been confirmed by re-extraction and re-analysis.
- EG005: Poor precision was obtained for Zinc on sample ES1822292 #002. Results have been confirmed by re-extraction and reanalysis.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.

Page : 3 of 6
Work Order : ES1822218
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	Triplicate 1	Triplicate 2	Triplicate 3	----	----
				Client sampling date / time	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1822218-001	ES1822218-002	ES1822218-003	--------	--------
					Result	Result	Result	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		10.1	19.4	22.0	----	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	----	----
Barium	7440-39-3	10	mg/kg		120	100	120	----	----
Beryllium	7440-41-7	1	mg/kg		<1	2	<1	----	----
Boron	7440-42-8	50	mg/kg		<50	<50	<50	----	----
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	----	----
Chromium	7440-47-3	2	mg/kg		14	8	17	----	----
Cobalt	7440-48-4	2	mg/kg		10	16	23	----	----
Copper	7440-50-8	5	mg/kg		28	18	34	----	----
Lead	7439-92-1	5	mg/kg		122	73	85	----	----
Manganese	7439-96-5	5	mg/kg		231	150	500	----	----
Nickel	7440-02-0	2	mg/kg		12	23	17	----	----
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	----	----
Vanadium	7440-62-2	5	mg/kg		39	18	93	----	----
Zinc	7440-66-6	5	mg/kg		99	346	288	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		0.2	0.3	0.1	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		2.0	<0.5	<0.5	----	----
Acenaphthene	83-32-9	0.5	mg/kg		0.9	<0.5	<0.5	----	----
Fluorene	86-73-7	0.5	mg/kg		1.4	<0.5	<0.5	----	----
Phenanthrene	85-01-8	0.5	mg/kg		13.1	0.7	<0.5	----	----
Anthracene	120-12-7	0.5	mg/kg		3.6	<0.5	<0.5	----	----
Fluoranthene	206-44-0	0.5	mg/kg		22.2	1.0	0.6	----	----
Pyrene	129-00-0	0.5	mg/kg		20.7	0.9	0.6	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		8.4	<0.5	<0.5	----	----
Chrysene	218-01-9	0.5	mg/kg		7.8	<0.5	<0.5	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		10.6	<0.5	<0.5	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		3.8	<0.5	<0.5	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		10.0	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		5.7	<0.5	<0.5	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		1.1	<0.5	<0.5	----	----

Page : 4 of 6
Work Order : ES1822218
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	Triplicate 1	Triplicate 2	Triplicate 3	----	----
				Client sampling date / time	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1822218-001	ES1822218-002	ES1822218-003	--------	--------
					Result	Result	Result	---	---
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		8.4	<0.5	<0.5	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		120	2.6	1.2	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		14.1	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		14.1	0.6	0.6	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		14.1	1.2	1.2	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	mg/kg		610	<100	<100	----	----
C29 - C36 Fraction	----	100	mg/kg		370	<100	<100	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		980	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	----	----
>C16 - C34 Fraction	----	100	mg/kg		900	<100	<100	----	----
>C34 - C40 Fraction	----	100	mg/kg		310	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		1210	<50	<50	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		83.0	87.0	81.5	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		100	81.0	82.7	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		99.6	68.5	60.7	----	----

Page : 5 of 6
Work Order : ES1822218
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	Triplicate 1	Triplicate 2	Triplicate 3	----	----
				Client sampling date / time	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1822218-001	ES1822218-002	ES1822218-003	--------	--------
					Result	Result	Result	---	---
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		87.3	86.8	81.9	----	----
Anthracene-d10	1719-06-8	0.5	%		99.2	89.2	90.0	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		94.5	82.0	81.3	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		93.9	90.4	84.1	----	----
Toluene-D8	2037-26-5	0.2	%		95.4	90.5	90.0	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		95.3	91.8	88.9	----	----

Surrogate Control Limits

Sub-Matrix: SOIL

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM1812173**	Page	: 1 of 12
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Project	: Newtown Rd	Date Samples Received	: 25-Jul-2018 09:05
Order number	:	Date Analysis Commenced	: 01-Aug-2018
C-O-C number	: ----	Issue Date	: 06-Aug-2018 16:42
Sampler	: ----		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 11		
No. of samples analysed	: 11		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

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Page	: 2 of 12
Work Order	: EM1812173
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EG005T: EM1812173_006 Poor duplicate precision for lead and zinc due to sample heterogeneity. Confirmed by re-extraction and re-analysis.
- EG005T: EM1812173_007 Poor matrix spike recovery for zinc due to sample matrix. Confirmed by re-extraction and re-analysis.
- This is a rebatch of EM1811858.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.

Page : 3 of 12
Work Order : EM1812173
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH01 1.5-1.6	BH01 3.5-3.6	BH02 0.5-0.6	BH02 2.0-2.1	BH03 1.0-1.1
				Client sampling date / time	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1812173-001	EM1812173-002	EM1812173-003	EM1812173-004	EM1812173-005
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	---	1.0	%		20.1	17.6	14.3	16.9	22.1
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		5	<5	5	<5	6
Barium	7440-39-3	10	mg/kg		40	20	1880	340	140
Beryllium	7440-41-7	1	mg/kg		<1	<1	<1	1	<1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		15	8	24	12	19
Cobalt	7440-48-4	2	mg/kg		9	14	10	16	16
Copper	7440-50-8	5	mg/kg		8	29	37	11	44
Lead	7439-92-1	5	mg/kg		28	23	349	82	93
Manganese	7439-96-5	5	mg/kg		223	277	297	125	308
Nickel	7440-02-0	2	mg/kg		12	12	12	13	17
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		25	31	40	22	63
Zinc	7440-66-6	5	mg/kg		64	60	221	62	176
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	1.2	0.2	0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	0.7	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	3.1	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	0.9	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	12.2	0.9	<0.5	0.6
Anthracene	120-12-7	0.5	mg/kg		<0.5	3.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	20.0	2.4	<0.5	1.5
Pyrene	129-00-0	0.5	mg/kg		<0.5	22.6	2.8	<0.5	1.6
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	11.9	1.7	<0.5	1.0
Chrysene	218-01-9	0.5	mg/kg		<0.5	10.2	1.2	<0.5	0.7
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	14.2	2.0	<0.5	1.1
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	4.2	0.8	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	12.7	1.8	<0.5	0.9
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	5.8	1.0	<0.5	0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	1.8	<0.5	<0.5	<0.5

Page : 4 of 12
Work Order : EM1812173
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH01 1.5-1.6	BH01 3.5-3.6	BH02 0.5-0.6	BH02 2.0-2.1	BH03 1.0-1.1
				Client sampling date / time	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1812173-001	EM1812173-002	EM1812173-003	EM1812173-004	EM1812173-005
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	7.3	1.2	<0.5	0.7
^ Sum of polycyclic aromatic hydrocarbons	---	0.5	mg/kg		<0.5	131	15.8	<0.5	8.6
^ Benzo(a)pyrene TEQ (zero)	---	0.5	mg/kg		<0.5	18.3	2.4	<0.5	1.2
^ Benzo(a)pyrene TEQ (half LOR)	---	0.5	mg/kg		0.6	18.3	2.6	0.6	1.4
^ Benzo(a)pyrene TEQ (LOR)	---	0.5	mg/kg		1.2	18.3	2.9	1.2	1.7
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	---	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	---	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	---	100	mg/kg		<100	540	<100	<100	<100
C29 - C36 Fraction	---	100	mg/kg		<100	280	<100	<100	<100
^ C10 - C36 Fraction (sum)	---	50	mg/kg		<50	820	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	---	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	---	100	mg/kg		<100	740	120	<100	<100
>C34 - C40 Fraction	---	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	---	50	mg/kg		<50	740	120	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	---	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	---	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	---	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		89.7	95.2	93.1	94.6	91.7
2-Chlorophenol-D4	93951-73-6	0.5	%		86.8	87.5	86.6	88.2	83.6
2.4.6-Tribromophenol	118-79-6	0.5	%		65.4	79.1	75.0	71.8	71.4

Page : 5 of 12
Work Order : EM1812173
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH01 1.5-1.6	BH01 3.5-3.6	BH02 0.5-0.6	BH02 2.0-2.1	BH03 1.0-1.1
				Client sampling date / time	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1812173-001	EM1812173-002	EM1812173-003	EM1812173-004	EM1812173-005
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		88.2	90.0	88.0	89.7	85.7
Anthracene-d10	1718-06-8	0.5	%		91.3	90.3	90.9	93.6	88.4
4-Terphenyl-d14	1718-51-0	0.5	%		91.0	86.4	90.7	90.0	86.8
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		66.2	77.7	73.9	74.2	72.8
Toluene-D8	2037-26-5	0.2	%		55.2	72.8	69.5	68.8	70.5
4-Bromofluorobenzene	460-00-4	0.2	%		94.8	108	105	99.6	102

Page : 6 of 12
Work Order : EM1812173
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH03 3.0-3.1	BH04 0.5-0.6	BH04 2.5-2.6	BH04 3.5-3.6	BH05 2.0-2.1
				Client sampling date / time	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1812173-006	EM1812173-007	EM1812173-008	EM1812173-009	EM1812173-010
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	---	1.0	%		7.2	13.8	14.1	10.3	12.3
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	<5
Barium	7440-39-3	10	mg/kg		80	110	320	140	140
Beryllium	7440-41-7	1	mg/kg		<1	<1	<1	<1	<1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		5	14	12	10	12
Cobalt	7440-48-4	2	mg/kg		10	18	24	17	19
Copper	7440-50-8	5	mg/kg		52	35	25	26	36
Lead	7439-92-1	5	mg/kg		218	56	37	76	120
Manganese	7439-96-5	5	mg/kg		263	276	576	441	206
Nickel	7440-02-0	2	mg/kg		9	17	50	23	14
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		59	39	52	11	43
Zinc	7440-66-6	5	mg/kg		573	236	74	130	111
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	0.1	<0.1	<0.1	0.3
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		1.3	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		6.7	1.0	<0.5	<0.5	1.0
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		1.9	0.6	<0.5	<0.5	0.5
Phenanthrene	85-01-8	0.5	mg/kg		23.3	7.4	<0.5	0.8	8.6
Anthracene	120-12-7	0.5	mg/kg		5.8	1.9	<0.5	<0.5	1.7
Fluoranthene	206-44-0	0.5	mg/kg		34.8	11.6	<0.5	1.8	11.0
Pyrene	129-00-0	0.5	mg/kg		35.6	11.4	<0.5	1.9	10.6
Benz(a)anthracene	56-55-3	0.5	mg/kg		18.1	5.1	<0.5	1.1	4.6
Chrysene	218-01-9	0.5	mg/kg		14.6	3.7	<0.5	0.7	3.1
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		19.2	5.5	<0.5	1.1	5.0
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		6.3	1.8	<0.5	<0.5	1.6
Benzo(a)pyrene	50-32-8	0.5	mg/kg		17.5	4.7	<0.5	1.0	4.3
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		7.8	2.3	<0.5	<0.5	2.2
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		2.5	0.6	<0.5	<0.5	<0.5

Page : 7 of 12
Work Order : EM1812173
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH03 3.0-3.1	BH04 0.5-0.6	BH04 2.5-2.6	BH04 3.5-3.6	BH05 2.0-2.1
				Client sampling date / time	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1812173-006	EM1812173-007	EM1812173-008	EM1812173-009	EM1812173-010
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		9.3	2.9	<0.5	0.6	3.0
^ Sum of polycyclic aromatic hydrocarbons	---	0.5	mg/kg		205	60.5	<0.5	9.0	57.2
^ Benzo(a)pyrene TEQ (zero)	---	0.5	mg/kg		25.4	6.8	<0.5	1.2	5.7
^ Benzo(a)pyrene TEQ (half LOR)	---	0.5	mg/kg		25.4	6.8	0.6	1.5	6.0
^ Benzo(a)pyrene TEQ (LOR)	---	0.5	mg/kg		25.4	6.8	1.2	1.8	6.2
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	---	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	---	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	---	100	mg/kg		820	200	<100	<100	160
C29 - C36 Fraction	---	100	mg/kg		410	110	<100	<100	110
^ C10 - C36 Fraction (sum)	---	50	mg/kg		1230	310	<50	<50	270
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	---	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	---	100	mg/kg		1110	280	<100	<100	240
>C34 - C40 Fraction	---	100	mg/kg		150	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	---	50	mg/kg		1260	280	<50	<50	240
^ >C10 - C16 Fraction minus Naphthalene (F2)	---	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	---	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	---	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		93.0	91.5	91.4	92.7	93.7
2-Chlorophenol-D4	93951-73-6	0.5	%		85.2	90.0	89.4	88.5	85.5
2.4.6-Tribromophenol	118-79-6	0.5	%		83.1	82.9	74.1	73.2	74.9

Page : 8 of 12
Work Order : EM1812173
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH03 3.0-3.1	BH04 0.5-0.6	BH04 2.5-2.6	BH04 3.5-3.6	BH05 2.0-2.1
				Client sampling date / time	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00	23-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1812173-006	EM1812173-007	EM1812173-008	EM1812173-009	EM1812173-010
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		87.8	90.5	89.6	89.5	86.2
Anthracene-d10	1719-06-8	0.5	%		86.3	91.1	93.9	93.1	86.9
4-Terphenyl-d14	1718-51-0	0.5	%		80.7	88.6	89.9	89.7	84.4
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		80.2	75.5	69.9	68.6	73.0
Toluene-D8	2037-26-5	0.2	%		76.3	89.3	66.8	60.4	65.1
4-Bromofluorobenzene	460-00-4	0.2	%		109	101	97.2	89.8	94.0

Page : 9 of 12
Work Order : EM1812173
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH05 4.0-4.1	----	----	----	----
				Client sampling date / time	23-Jul-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM1812173-011	----------	----------	----------	----------
					Result	---	---	---	---
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		11.2	----	----	----	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	----	----	----	----
Barium	7440-39-3	10	mg/kg		150	----	----	----	----
Beryllium	7440-41-7	1	mg/kg		<1	----	----	----	----
Boron	7440-42-8	50	mg/kg		<50	----	----	----	----
Cadmium	7440-43-9	1	mg/kg		<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg		9	----	----	----	----
Cobalt	7440-48-4	2	mg/kg		12	----	----	----	----
Copper	7440-50-8	5	mg/kg		40	----	----	----	----
Lead	7439-92-1	5	mg/kg		221	----	----	----	----
Manganese	7439-96-5	5	mg/kg		269	----	----	----	----
Nickel	7440-02-0	2	mg/kg		13	----	----	----	----
Selenium	7782-49-2	5	mg/kg		<5	----	----	----	----
Vanadium	7440-62-2	5	mg/kg		26	----	----	----	----
Zinc	7440-66-6	5	mg/kg		280	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		0.3	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		1.3	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg		4.9	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg		1.4	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg		9.4	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg		9.7	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		4.7	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg		4.1	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		6.1	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		1.9	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		4.9	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		2.5	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		0.6	----	----	----	----

Page : 10 of 12
Work Order : EM1812173
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH05 4.0-4.1	----	----	----	----
				Client sampling date / time	23-Jul-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM1812173-011	--------	--------	--------	--------
					Result	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		3.2	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		54.7	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		7.1	----	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		7.1	----	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		7.1	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	----	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg		280	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg		210	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		490	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	----	----	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg		440	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		540	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	----	----	----	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	----	----	----	----
^ Total Xylenes	----	0.5	mg/kg		<0.5	----	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		90.6	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		86.6	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		78.6	----	----	----	----

Page	: 11 of 12
Work Order	: EM1812173
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH05 4.0-4.1	----	----	----	----
				Client sampling date / time	23-Jul-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM1812173-011	--------	--------	--------	--------
					Result	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		87.0	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%		88.7	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		86.8	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		66.3	----	----	----	----
Toluene-D8	2037-26-5	0.2	%		56.7	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		89.1	----	----	----	----

Page	: 12 of 12
Work Order	: EM1812173
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Surrogate Control Limits

Sub-Matrix: SOIL

Compound	CAS Number	Recovery Limits (%) Low	High
EPB92(SIM)S: P[illegible] Co[illegible] Surrogate			
P[illegible]	13127-88-3	54	125
H3C[illegible]	93951-73-6	65	123
H5/63Tr[illegible]	118-79-6	34	122
EPB92(SIM)T: PA^ Surrogate			
H3F[illegible]	321-60-8	61	125
Ai [illegible]	1719-06-8	62	130
53Terf[illegible]	1718-51-0	67	133
EPB8ES: TP^(G)[illegible] TEX Surrogate			
1/H3D[illegible]	17060-07-0	51	125
To[illegible]	2037-26-5	55	125
53 [illegible]	460-00-4	56	124

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM1811913**	Page	: 1 of 18
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Project	: Newtown Rd	Date Samples Received	: 26-Jul-2018 09:05
Order number	:	Date Analysis Commenced	: 27-Jul-2018
C-O-C number	: ----	Issue Date	: 31-Jul-2018 13:07
Sampler	: SARAH JOYCE		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 53		
No. of samples analysed	: 19		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC

RIGHT SOLUTIONS | RIGHT PARTNER

Page	: 2 of 18
Work Order	: EM1811913
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP075(SIM): Poor duplicate precision for (EM1811913_003) due to sample heterogeneity. Confirmed by re-extraction and re-analysis.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Page : 3 of 18
Work Order : EM1811913
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH08_1.0-1.1	BH08_2.5-2.6	BH08_4.5-4.6	BH09_1.0-1.1	BH09_2.5-2.6
				Client sampling date / time	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811913-003	EM1811913-006	EM1811913-010	EM1811913-013	EM1811913-016
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	---	1.0	%		16.3	15.9	20.0	7.9	9.6
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	5	<5	<5
Barium	7440-39-3	10	mg/kg		50	80	90	50	50
Beryllium	7440-41-7	1	mg/kg		<1	<1	<1	<1	<1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		6	13	11	7	7
Cobalt	7440-48-4	2	mg/kg		8	13	39	8	7
Copper	7440-50-8	5	mg/kg		40	30	<5	33	20
Lead	7439-92-1	5	mg/kg		25	29	13	16	24
Manganese	7439-96-5	5	mg/kg		211	210	171	257	377
Nickel	7440-02-0	2	mg/kg		9	12	14	10	10
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		32	84	17	23	23
Zinc	7440-66-6	5	mg/kg		42	20	31	40	30
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		1.1	<0.5	<0.5	1.0	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		8.7	<0.5	<0.5	4.6	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		0.6	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		3.1	<0.5	<0.5	0.7	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		39.3	<0.5	<0.5	11.4	1.4
Anthracene	120-12-7	0.5	mg/kg		9.3	<0.5	<0.5	4.1	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		45.6	<0.5	<0.5	23.2	1.8
Pyrene	129-00-0	0.5	mg/kg		50.7	<0.5	<0.5	25.4	2.0
Benz(a)anthracene	56-55-3	0.5	mg/kg		24.8	<0.5	<0.5	15.3	1.0
Chrysene	218-01-9	0.5	mg/kg		26.6	<0.5	<0.5	14.3	1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		26.3	<0.5	<0.5	16.8	1.2
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		9.1	<0.5	<0.5	6.7	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		25.5	<0.5	<0.5	16.6	1.0
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		12.0	<0.5	<0.5	8.1	0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		3.3	<0.5	<0.5	2.3	<0.5

Page : 4 of 18
Work Order : EM1811913
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH08_1.0-1.1	BH08_2.5-2.6	BH08_4.5-4.6	BH09_1.0-1.1	BH09_2.5-2.6
				Client sampling date / time	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811913-003	EM1811913-006	EM1811913-010	EM1811913-013	EM1811913-016
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		14.9	<0.5	<0.5	10.1	0.6
^ Sum of polycyclic aromatic hydrocarbons	---	0.5	mg/kg		301	<0.5	<0.5	161	10.5
^ Benzo(a)pyrene TEQ (zero)	---	0.5	mg/kg		36.4	<0.5	<0.5	23.8	1.3
^ Benzo(a)pyrene TEQ (half LOR)	---	0.5	mg/kg		36.4	0.6	0.6	23.8	1.6
^ Benzo(a)pyrene TEQ (LOR)	---	0.5	mg/kg		36.4	1.2	1.2	23.8	1.8
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	---	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	---	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	---	100	mg/kg		1370	<100	<100	980	<100
C29 - C36 Fraction	---	100	mg/kg		710	<100	<100	630	<100
^ C10 - C36 Fraction (sum)	---	50	mg/kg		2080	<50	<50	1610	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	---	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	---	100	mg/kg		1840	<100	<100	1420	<100
>C34 - C40 Fraction	---	100	mg/kg		300	<100	<100	280	<100
^ >C10 - C40 Fraction (sum)	---	50	mg/kg		2140	<50	<50	1700	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	---	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	---	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	---	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		90.0	94.2	87.8	91.3	85.9
2-Chlorophenol-D4	93951-73-6	0.5	%		94.0	97.5	90.9	95.0	88.5
2.4.6-Tribromophenol	118-79-6	0.5	%		81.0	82.5	76.2	86.0	73.2

Page : 5 of 18
Work Order : EM1811913
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH08_1.0-1.1	BH08_2.5-2.6	BH08_4.5-4.6	BH09_1.0-1.1	BH09_2.5-2.6
				Client sampling date / time	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811913-003	EM1811913-006	EM1811913-010	EM1811913-013	EM1811913-016
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		91.8	95.6	90.5	92.2	88.1
Anthracene-d10	1718-06-8	0.5	%		100	112	105	98.2	100
4-Terphenyl-d14	1718-51-0	0.5	%		99.3	104	102	96.3	94.4
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		76.0	72.6	69.8	73.3	66.8
Toluene-D8	2037-26-5	0.2	%		77.9	76.1	75.8	82.8	72.3
4-Bromofluorobenzene	460-00-4	0.2	%		104	98.6	101	106	89.0

Page : 6 of 18
Work Order : EM1811913
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH09_4.5-4.6	BH09_6.0-6.1	Duplicate 4	BH10_1.0-1.1	BH10_3.0-3.1
				Client sampling date / time	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811913-020	EM1811913-022	EM1811913-024	EM1811913-026	EM1811913-030
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	---	1.0	%		20.9	21.1	15.3	19.4	21.2
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	6	<5	<5	<5
Barium	7440-39-3	10	mg/kg		40	120	40	140	140
Beryllium	7440-41-7	1	mg/kg		<1	<1	<1	<1	<1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		4	13	4	<2	9
Cobalt	7440-48-4	2	mg/kg		7	11	8	30	9
Copper	7440-50-8	5	mg/kg		31	29	45	56	90
Lead	7439-92-1	5	mg/kg		15	289	13	37	114
Manganese	7439-96-5	5	mg/kg		92	120	137	408	462
Nickel	7440-02-0	2	mg/kg		5	15	8	13	11
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		49	24	35	67	32
Zinc	7440-66-6	5	mg/kg		23	170	26	47	123
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	0.7	<0.1	<0.1	0.6
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		2.8	<0.5	2.8	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		7.8	<0.5	8.6	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		0.9	<0.5	0.9	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		5.9	<0.5	6.0	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		38.7	1.7	39.0	<0.5	0.6
Anthracene	120-12-7	0.5	mg/kg		11.6	0.5	11.8	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		38.6	1.6	40.7	<0.5	1.4
Pyrene	129-00-0	0.5	mg/kg		41.9	1.7	44.2	<0.5	1.6
Benz(a)anthracene	56-55-3	0.5	mg/kg		21.1	0.8	22.6	<0.5	0.9
Chrysene	218-01-9	0.5	mg/kg		19.6	0.7	21.9	<0.5	0.9
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		22.3	0.8	26.7	<0.5	1.2
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		7.4	<0.5	9.7	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		22.8	0.7	25.9	<0.5	1.0
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		10.4	<0.5	12.1	<0.5	0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		2.9	<0.5	3.3	<0.5	<0.5

Page : 7 of 18
Work Order : EM1811913
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH09_4.5-4.6	BH09_6.0-6.1	Duplicate 4	BH10_1.0-1.1	BH10_3.0-3.1
				Client sampling date / time	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811913-020	EM1811913-022	EM1811913-024	EM1811913-026	EM1811913-030
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		13.1	<0.5	15.0	<0.5	0.7
^ Sum of polycyclic aromatic hydrocarbons	---	0.5	mg/kg		268	8.5	291	<0.5	8.8
^ Benzo(a)pyrene TEQ (zero)	---	0.5	mg/kg		32.1	0.9	36.7	<0.5	1.3
^ Benzo(a)pyrene TEQ (half LOR)	---	0.5	mg/kg		32.1	1.2	36.7	0.6	1.6
^ Benzo(a)pyrene TEQ (LOR)	---	0.5	mg/kg		32.1	1.5	36.7	1.2	1.8
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	---	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	---	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	---	100	mg/kg		990	<100	1130	<100	<100
C29 - C36 Fraction	---	100	mg/kg		480	<100	580	<100	<100
^ C10 - C36 Fraction (sum)	---	50	mg/kg		1470	<50	1710	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	---	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	---	100	mg/kg		1300	<100	1500	<100	<100
>C34 - C40 Fraction	---	100	mg/kg		190	<100	270	<100	<100
^ >C10 - C40 Fraction (sum)	---	50	mg/kg		1490	<50	1770	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	---	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	---	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	---	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		89.0	90.2	90.7	88.0	82.7
2-Chlorophenol-D4	93951-73-6	0.5	%		91.1	94.3	94.7	91.2	87.1
2.4.6-Tribromophenol	118-79-6	0.5	%		81.4	75.0	83.7	73.9	72.9

Page : 8 of 18
Work Order : EM1811913
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH09_4.5-4.6	BH09_6.0-6.1	Duplicate 4	BH10_1.0-1.1	BH10_3.0-3.1
				Client sampling date / time	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811913-020	EM1811913-022	EM1811913-024	EM1811913-026	EM1811913-030
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		90.1	90.2	91.2	89.7	86.6
Anthracene-d10	1719-06-8	0.5	%		94.5	106	94.6	113	105
4-Terphenyl-d14	1718-51-0	0.5	%		92.9	99.3	93.4	100	98.4
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		74.3	74.3	77.7	70.4	73.0
Toluene-D8	2037-26-5	0.2	%		73.6	79.8	71.4	74.3	74.5
4-Bromofluorobenzene	460-00-4	0.2	%		95.9	103	98.4	97.3	94.2

Page : 9 of 18
Work Order : EM1811913
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH10_5.0-5.1	BH11_1.0-1.1	BH11_2.5-2.6	BH11_3.3-3.4	BH12_1.0-1.1
				Client sampling date / time	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811913-034	EM1811913-037	EM1811913-040	EM1811913-042	EM1811913-044
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	---	1.0	%		17.6	22.3	27.4	19.0	19.9
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	7	<5	13	<5
Barium	7440-39-3	10	mg/kg		70	120	180	160	110
Beryllium	7440-41-7	1	mg/kg		<1	<1	<1	2	<1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		8	8	11	17	9
Cobalt	7440-48-4	2	mg/kg		16	12	7	42	9
Copper	7440-50-8	5	mg/kg		7	55	84	7	26
Lead	7439-92-1	5	mg/kg		14	60	256	15	49
Manganese	7439-96-5	5	mg/kg		325	202	310	1630	116
Nickel	7440-02-0	2	mg/kg		12	11	10	47	9
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		19	39	32	30	17
Zinc	7440-66-6	5	mg/kg		34	105	321	44	125
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	0.1	0.8	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	0.7	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	2.7	0.8	<0.5	1.8
Anthracene	120-12-7	0.5	mg/kg		<0.5	0.8	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	7.0	2.4	<0.5	2.9
Pyrene	129-00-0	0.5	mg/kg		<0.5	7.4	2.7	<0.5	3.0
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	3.6	1.6	<0.5	1.2
Chrysene	218-01-9	0.5	mg/kg		<0.5	3.7	1.6	<0.5	1.3
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	4.8	2.4	<0.5	1.4
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	1.5	0.8	<0.5	0.6
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	4.0	1.9	<0.5	1.2
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	2.4	1.0	<0.5	0.6
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	0.6	<0.5	<0.5	<0.5

Environmental Site Assessment (V9) 52 New Town Road, New Town. June 2025.

Page	10 of 18
Work Order	EM1811913
Client	GEO-ENVIRONMENTAL SOLUTIONS
Project	Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH10_5.0-5.1	BH11_1.0-1.1	BH11_2.5-2.6	BH11_3.3-3.4	BH12_1.0-1.1
				Client sampling date / time	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811913-034	EM1811913-037	EM1811913-040	EM1811913-042	EM1811913-044
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	3.0	1.3	<0.5	0.7
^ Sum of polycyclic aromatic hydrocarbons	---	0.5	mg/kg		<0.5	42.2	16.5	<0.5	14.7
^ Benzo(a)pyrene TEQ (zero)	---	0.5	mg/kg		<0.5	5.9	2.5	<0.5	1.6
^ Benzo(a)pyrene TEQ (half LOR)	---	0.5	mg/kg		0.6	5.9	2.8	0.6	1.8
^ Benzo(a)pyrene TEQ (LOR)	---	0.5	mg/kg		1.2	5.9	3.0	1.2	2.1
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	---	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	---	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	---	100	mg/kg		<100	280	<100	<100	<100
C29 - C36 Fraction	---	100	mg/kg		<100	280	<100	<100	<100
^ C10 - C36 Fraction (sum)	---	50	mg/kg		<50	560	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	---	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	---	100	mg/kg		<100	480	120	<100	<100
>C34 - C40 Fraction	---	100	mg/kg		<100	150	<100	<100	<100
^ >C10 - C40 Fraction (sum)	---	50	mg/kg		<50	630	120	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	---	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	---	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	---	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		90.6	89.7	88.8	92.5	86.2
2-Chlorophenol-D4	93951-73-6	0.5	%		94.3	93.6	93.5	96.1	89.4
2.4.6-Tribromophenol	118-79-6	0.5	%		69.5	76.1	75.3	72.0	71.6

Page : 11 of 18
Work Order : EM1811913
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH10_5.0-5.1	BH11_1.0-1.1	BH11_2.5-2.6	BH11_3.3-3.4	BH12_1.0-1.1
				Client sampling date / time	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811913-034	EM1811913-037	EM1811913-040	EM1811913-042	EM1811913-044
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		90.6	90.8	90.7	92.3	87.8
Anthracene-d10	1718-08-8	0.5	%		116	102	104	116	100
4-Terphenyl-d14	1718-51-0	0.5	%		101	97.1	98.6	104	96.2
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		68.6	77.4	69.1	70.6	62.9
Toluene-D8	2037-26-5	0.2	%		71.7	78.1	73.9	73.7	65.1
4-Bromofluorobenzene	460-00-4	0.2	%		91.3	99.7	88.3	91.5	93.2

Page : 12 of 18
Work Order : EM1811913
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH12_2.5-2.6	BH12_3.5-3.6	---	---	---
				Client sampling date / time	24-Jul-2018 00:00	24-Jul-2018 00:00	---	---	---
Compound	CAS Number	LOR	Unit		EM1811913-047	EM1811913-049	---	---	---
					Result	Result	---	---	---
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	---	1.0	%		20.8	21.6	---	---	---
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	---	---	---
Barium	7440-39-3	10	mg/kg		120	90	---	---	---
Beryllium	7440-41-7	1	mg/kg		<1	<1	---	---	---
Boron	7440-42-8	50	mg/kg		<50	<50	---	---	---
Cadmium	7440-43-9	1	mg/kg		<1	<1	---	---	---
Chromium	7440-47-3	2	mg/kg		3	7	---	---	---
Cobalt	7440-48-4	2	mg/kg		43	8	---	---	---
Copper	7440-50-8	5	mg/kg		77	33	---	---	---
Lead	7439-92-1	5	mg/kg		9	72	---	---	---
Manganese	7439-96-5	5	mg/kg		281	236	---	---	---
Nickel	7440-02-0	2	mg/kg		7	9	---	---	---
Selenium	7782-49-2	5	mg/kg		<5	<5	---	---	---
Vanadium	7440-62-2	5	mg/kg		147	31	---	---	---
Zinc	7440-66-6	5	mg/kg		32	50	---	---	---
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	0.5	---	---	---
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	---	---	---
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	---	---	---
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	---	---	---
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	---	---	---
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	---	---	---
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	---	---	---
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	---	---	---
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	---	---	---
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	---	---	---
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	---	---	---
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	---	---	---
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	---	---	---
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	---	---	---
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	---	---	---
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	---	---	---

Page : 13 of 18
Work Order : EM1811913
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH12_2.5-2.6	BH12_3.5-3.6	----	----	----
				Client sampling date / time	24-Jul-2018 00:00	24-Jul-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM1811913-047	EM1811913-049	--------	--------	--------
					Result	Result	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	0.6	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	1.2	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	----	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	<100	----	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	----	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	----	----	----
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	----	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	----	----	----
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		84.6	88.0	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		86.7	92.3	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		68.7	69.9	----	----	----

Page : 14 of 18
Work Order : EM1811913
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH12_2.5-2.6	BH12_3.5-3.6	----	----	----
				Client sampling date / time	24-Jul-2018 00:00	24-Jul-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM1811913-047	EM1811913-049	--------	--------	--------
					Result	Result	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		88.7	88.6	----	----	----
Anthracene-d10	1719-06-8	0.5	%		117	108	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		102	99.7	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		66.9	64.0	----	----	----
Toluene-D8	2037-26-5	0.2	%		69.8	68.7	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		87.7	91.0	----	----	----

Page : 15 of 18
Work Order : EM1811913
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Field Blank 2	Rinsate 2	---	---	---
				Client sampling date / time	24-Jul-2018 00:00	24-Jul-2018 00:00	---	---	---
Compound	CAS Number	LOR	Unit		EM1811913-052	EM1811913-053	-------	-------	-------
					Result	Result	---	---	---
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	---	---	---
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	---	---	---
Barium	7440-39-3	0.001	mg/L		<0.001	<0.001	---	---	---
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	---	---	---
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	---	---	---
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	---	---	---
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	---	---	---
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	---	---	---
Manganese	7439-96-5	0.001	mg/L		<0.001	<0.001	---	---	---
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	---	---	---
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	---	---	---
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	---	---	---
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	---	---	---
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	---	---	---
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	---	---	---
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		<1.0	<1.0	---	---	---
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	<1.0	---	---	---
Acenaphthene	83-32-9	1.0	µg/L		<1.0	<1.0	---	---	---
Fluorene	86-73-7	1.0	µg/L		<1.0	<1.0	---	---	---
Phenanthrene	85-01-8	1.0	µg/L		<1.0	<1.0	---	---	---
Anthracene	120-12-7	1.0	µg/L		<1.0	<1.0	---	---	---
Fluoranthene	206-44-0	1.0	µg/L		<1.0	<1.0	---	---	---
Pyrene	129-00-0	1.0	µg/L		<1.0	<1.0	---	---	---
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	<1.0	---	---	---
Chrysene	218-01-9	1.0	µg/L		<1.0	<1.0	---	---	---
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	<1.0	---	---	---
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	<1.0	---	---	---
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	---	---	---
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	<1.0	---	---	---
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	<1.0	---	---	---
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	<1.0	---	---	---
^ Sum of polycyclic aromatic hydrocarbons	---	0.5	µg/L		<0.5	<0.5	---	---	---

Page : 16 of 18
Work Order : EM1811913
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Field Blank 2	Rinsate 2	----	----	----
				Client sampling date / time	24-Jul-2018 00:00	24-Jul-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM1811913-052	EM1811913-053	--------	--------	--------
					Result	Result	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	----	----	----
Toluene	108-88-3	2	µg/L		<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	----	----	----
^ Total Xylenes	----	2	µg/L		<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		30.2	35.8	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		69.6	82.1	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%		57.4	67.0	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		79.2	93.7	----	----	----
Anthracene-d10	1719-06-8	1.0	%		91.7	98.8	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		99.2	112	----	----	----

Page : 17 of 18
Work Order : EM1811913
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Field Blank 2	Rinsate 2	----	----	----
				Client sampling date / time	24-Jul-2018 00:00	24-Jul-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM1811913-052	EM1811913-053	--------	--------	--------
					Result	Result	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		100	92.9	----	----	----
Toluene-D8	2037-26-5	2	%		103	95.5	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		127	118	----	----	----

Page : 18 of 18
Work Order : EM1811913
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	54	125
2-Chlorophenol-D4	93951-73-6	65	123
2.4.6-Tribromophenol	118-79-6	34	122
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	61	125
Anthracene-d10	1719-06-8	62	130
4-Terphenyl-d14	1718-51-0	67	133
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	51	125
Toluene-D8	2037-26-5	55	125
4-Bromofluorobenzene	460-00-4	56	124

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	46
2-Chlorophenol-D4	93951-73-6	23	104
2.4.6-Tribromophenol	118-79-6	28	130
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	36	114
Anthracene-d10	1719-06-8	51	119
4-Terphenyl-d14	1718-51-0	49	127
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1822455**	Page	: 1 of 6
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Sydney
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Project	: Newtown Rd	Date Samples Received	: 31-Jul-2018 23:30
Order number	:	Date Analysis Commenced	: 01-Aug-2018
C-O-C number	: ----	Issue Date	: 06-Aug-2018 10:06
Sampler	: SARAH JOYCE		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 1		
No. of samples analysed	: 1		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

RIGHT SOLUTIONS | RIGHT PARTNER

Page	: 2 of 6
Work Order	: ES1822455
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP071: Results of sample Triplicate 4 have been confirmed by re-extraction and re-analysis.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.

Environmental Site Assessment (V9) 52 New Town Road, New Town. June 2025.

Page : 3 of 6
Work Order : ES1822455
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL ^Matrix: SOIL(			Client sample ID	TrMrMtUe B	5555	5555	5555	5555
			Client sampling date / time	24-Jul-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1822B005)) 1	5555555	5555555	5555555	5555555
				Result	----	----	----	----
EA) 00: - oMUvre Coi Uei U^DrMd @ 1) 05(1) *C(								
- oMUvre Coi Uei U	----	1.0	%	21/2	5555	5555	5555	5555
E4)) 0T: ToUtn- eUtrp sc IC65AES								
Arpei M	7440-38-2	5	mg/kg	<5	5555	5555	5555	5555
9 trMM	7440-39-3	10	mg/kg	0)	5555	5555	5555	5555
9 ercmMM	7440-41-7	1	mg/kg	<1	5555	5555	5555	5555
9 oroi	7440-42-8	50	mg/kg	<50	5555	5555	5555	5555
Ct dl MM	7440-43-9	1	mg/kg	<1	5555	5555	5555	5555
Cmrol MM	7440-47-3	2	mg/kg	3	5555	5555	5555	5555
Cost rU	7440-48-4	2	mg/kg	12	5555	5555	5555	5555
Cof f er	7440-50-8	5	mg/kg	3)	5555	5555	5555	5555
Let d	7439-92-1	5	mg/kg	13	5555	5555	5555	5555
- t i bt i epe	7439-96-5	5	mg/kg	P1	5555	5555	5555	5555
NMken	7440-02-0	2	mg/kg	P	5555	5555	5555	5555
Serei MM	7782-49-2	5	mg/kg	<5	5555	5555	5555	5555
Gt i t dMM	7440-62-2	5	mg/kg	77	5555	5555	5555	5555
ZMu	7440-66-6	5	mg/kg	. P	5555	5555	5555	5555
E4) . 0T: ToUtnReuo, ert sre - eruwrc sc FI- S								
- eruwrc	7439-97-6	0.1	mg/kg	) /1	5555	5555	5555	5555
E6) 70^SI- (9 : 6orci wuretr Arol t UM Hcdrout rsoi p								
Nt f mUrt rei e	91-20-3	0.5	mg/kg	B/1	5555	5555	5555	5555
Auei t f mUrcrei e	208-96-8	0.5	mg/kg	1) /3	5555	5555	5555	5555
Auei t f mUrei e	83-32-9	0.5	mg/kg	1/3	5555	5555	5555	5555
Frworei e	86-73-7	0.5	mg/kg	12/)	5555	5555	5555	5555
6mei t i Urrei e	85-01-8	0.5	mg/kg	3) /3	5555	5555	5555	5555
Ai Urrt uei e	120-12-7	0.5	mg/kg	17/3	5555	5555	5555	5555
Frwort i Urei e	206-44-0	0.5	mg/kg	B0/1	5555	5555	5555	5555
6 crei e	129-00-0	0.5	mg/kg	B8/8	5555	5555	5555	5555
9 ei z^t (t i Urrt uei e	56-55-3	0.5	mg/kg	2B/8	5555	5555	5555	5555
Cmrcpei e	218-01-9	0.5	mg/kg	21/8	5555	5555	5555	5555
9 ei zo^s+j(arwort i Urei e	205-99-2 205-82-3	0.5	mg/kg	2B/1	5555	5555	5555	5555
9 ei zo^k(arwort i Urei e	207-08-9	0.5	mg/kg	3/8	5555	5555	5555	5555
9 ei zo^t (f crei e	50-32-8	0.5	mg/kg	2) /3	5555	5555	5555	5555
li dei o^1/2/. /ud(f crei e	193-39-5	0.5	mg/kg	8/7	5555	5555	5555	5555
DMei z^t /m(t i Urrt uei e	53-70-3	0.5	mg/kg	2/.	5555	5555	5555	5555

Page : 4 of 6
Work Order : ES1822455
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	Triplicate 4	----	----	----	----
				Client sampling date / time	24-Jul-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1822455-001	--------	--------	--------	--------
					Result	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		11.0	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		320	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		29.7	----	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		29.7	----	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		29.7	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	----	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg		770	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg		390	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		1160	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	----	----	----	----
>C10 - C16 Fraction	----	50	mg/kg		60	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg		990	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		280	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		1330	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		50	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	----	----	----	----
^ Sum of BTEX	----	0.2	mg/kg		0.2	----	----	----	----
^ Total Xylenes	----	0.5	mg/kg		<0.5	----	----	----	----
Naphthalene	91-20-3	1	mg/kg		10	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		80.7	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		79.6	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		72.2	----	----	----	----

Page : 5 of 6
Work Order : ES1822455
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	Triplicate 4	----	----	----	----
				Client sampling date / time	24-Jul-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1822455-001	--------	--------	--------	--------
					Result	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		92.1	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%		87.9	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		79.6	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		84.7	----	----	----	----
Toluene-D8	2037-26-5	0.2	%		108	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		112	----	----	----	----

Page	: 6 of 6
Work Order	: ES1822455
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

Surrogate Control Limits

Sub-Matrix: SOIL

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM1812174**	Page	: 1 of 6
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Project	: Newtown Rd	Date Samples Received	: 26-Jul-2018 09:05
Order number	:	Date Analysis Commenced	: 01-Aug-2018
C-O-C number	: ----	Issue Date	: 06-Aug-2018 16:48
Sampler	: ----		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 3		
No. of samples analysed	: 3		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

RIGHT SOLUTIONS | RIGHT PARTNER

Page	: 2 of 6
Work Order	: EM1812174
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EG005T: EM1812173_006 Poor duplicate precision for lead and zinc due to sample heterogeneity. Confirmed by re-extraction and re-analysis.
- EG005T: EM1812173_007 Poor matrix spike recovery for zinc due to sample matrix. Confirmed by re-extraction and re-analysis.
- This is a rebatch of EM1811913.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.

Page : 3 of 6
Work Order : EM1812174
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH08_2.0-2.1	BH11_2.0-2.1	BH12_2.0-2.1	----	----
				Client sampling date / time	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		EM1812174-001	EM1812174-002	EM1812174-003	----------	----------
					Result	Result	Result	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		13.3	17.4	19.3	----	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	----	----
Barium	7440-39-3	10	mg/kg		60	100	100	----	----
Beryllium	7440-41-7	1	mg/kg		<1	2	<1	----	----
Boron	7440-42-8	50	mg/kg		<50	<50	<50	----	----
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	----	----
Chromium	7440-47-3	2	mg/kg		10	8	11	----	----
Cobalt	7440-48-4	2	mg/kg		6	27	12	----	----
Copper	7440-50-8	5	mg/kg		18	17	24	----	----
Lead	7439-92-1	5	mg/kg		7	14	24	----	----
Manganese	7439-96-5	5	mg/kg		69	294	448	----	----
Nickel	7440-02-0	2	mg/kg		7	20	13	----	----
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	----	----
Vanadium	7440-62-2	5	mg/kg		41	19	34	----	----
Zinc	7440-66-6	5	mg/kg		12	61	50	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	0.9	<0.5	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Phenanthrene	85-01-8	0.5	mg/kg		1.1	5.0	0.5	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	1.5	<0.5	----	----
Fluoranthene	206-44-0	0.5	mg/kg		2.1	11.5	1.0	----	----
Pyrene	129-00-0	0.5	mg/kg		2.5	12.3	1.0	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		1.6	5.8	0.5	----	----
Chrysene	218-01-9	0.5	mg/kg		1.1	5.0	<0.5	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		1.8	6.5	0.5	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		0.5	1.9	<0.5	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		1.5	5.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		0.7	2.4	<0.5	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	0.7	<0.5	----	----

Page : 4 of 6
Work Order : EM1812174
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH08_2.0-2.1	BH11_2.0-2.1	BH12_2.0-2.1	----	----
				Client sampling date / time	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		EM1812174-001	EM1812174-002	EM1812174-003	--------	--------
					Result	Result	Result	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		0.9	3.0	<0.5	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		13.8	62.0	3.5	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		2.0	7.9	<0.5	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		2.2	7.9	0.6	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		2.5	7.9	1.2	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	320	<100	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	200	<100	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	520	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	----	----
>C16 - C34 Fraction	----	100	mg/kg		<100	480	<100	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	480	<50	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		93.7	88.3	104	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		86.5	85.3	95.1	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		78.9	80.1	80.9	----	----

Page : 5 of 6
Work Order : EM1812174
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH08_2.0-2.1	BH11_2.0-2.1	BH12_2.0-2.1	----	----
				Client sampling date / time	24-Jul-2018 00:00	24-Jul-2018 00:00	24-Jul-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		EM1812174-001	EM1812174-002	EM1812174-003	--------	--------
					Result	Result	Result	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		86.8	85.3	98.2	----	----
Anthracene-d10	1719-06-8	0.5	%		91.9	88.5	99.4	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		89.3	85.6	97.8	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		68.4	67.8	71.0	----	----
Toluene-D8	2037-26-5	0.2	%		57.8	57.8	55.1	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		92.0	91.3	90.7	----	----

Page : 6 of 6
Work Order : EM1812174
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Surrogate Control Limits

Sub-Matrix: SOIL

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	54	125
2-Chlorophenol-D4	93951-73-6	65	123
2.4.6-Tribromophenol	118-79-6	34	122
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	61	125
Anthracene-d10	1719-06-8	62	130
4-Terphenyl-d14	1718-51-0	67	133
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	51	125
Toluene-D8	2037-26-5	55	125
4-Bromofluorobenzene	460-00-4	56	124

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM1811891**	Page	: 1 of 15
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Project	: Newtown Rd	Date Samples Received	: 26-Jul-2018 09:05
Order number	:	Date Analysis Commenced	: 26-Jul-2018
C-O-C number	: ----	Issue Date	: 31-Jul-2018 13:44
Sampler	: SARAH JOYCE		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 27		
No. of samples analysed	: 14		

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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC

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Page	: 2 of 15
Work Order	: EM1811891
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EG005T: EM1811891 #21, the results for Manganese have been confirmed by re-preparation and re-analysis. A variation in the results was noticed whereby the inital results obtained were 242 mg/L and 178 mg/L, and the subsequent results 398 mg/L and 286 mg/L.
- EG005T: EM1811891 #23, poor matrix spike recovery for Lead and Zinc due to sample matrix effects. This has been confirmed by re-preparation and re-analysis.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Page : 3 of 15
Work Order : EM1811891
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH14 0.4-0.5	BH15 0.55-0.65	BH16 0.3-0.4	BH13 1.0-1.1	BH13 1.5-1.6
				Client sampling date / time	25-Jul-2018 00:00	25-Jul-2018 00:00	25-Jul-2018 00:00	25-Jul-2018 00:00	25-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811891-002	EM1811891-004	EM1811891-005	EM1811891-007	EM1811891-008
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	---	1.0	%		13.8	9.8	11.0	8.8	12.4
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		5	6	<5	5	<5
Barium	7440-39-3	10	mg/kg		100	20	20	80	90
Beryllium	7440-41-7	1	mg/kg		<1	1	<1	<1	<1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		8	14	7	11	8
Cobalt	7440-48-4	2	mg/kg		11	28	11	10	10
Copper	7440-50-8	5	mg/kg		10	17	69	51	44
Lead	7439-92-1	5	mg/kg		16	14	7	779	128
Manganese	7439-96-5	5	mg/kg		1030	830	381	296	252
Nickel	7440-02-0	2	mg/kg		11	42	10	11	12
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		18	20	53	40	46
Zinc	7440-66-6	5	mg/kg		32	82	42	44	41
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	0.4	0.2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	4.0	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	16.8	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	2.2	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	8.6	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	<0.5	101	1.8
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	22.0	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	<0.5	80.3	1.9
Pyrene	129-00-0	0.5	mg/kg		0.5	<0.5	<0.5	83.6	2.0
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	37.5	0.9
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	34.5	0.8
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	34.8	1.0
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	10.0	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	29.8	0.8
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	12.3	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	4.3	<0.5

Page : 4 of 15
Work Order : EM1811891
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH14 0.4-0.5	BH15 0.55-0.65	BH16 0.3-0.4	BH13 1.0-1.1	BH13 1.5-1.6
				Client sampling date / time	25-Jul-2018 00:00	25-Jul-2018 00:00	25-Jul-2018 00:00	25-Jul-2018 00:00	25-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811891-002	EM1811891-004	EM1811891-005	EM1811891-007	EM1811891-008
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	14.7	<0.5
^ Sum of polycyclic aromatic hydrocarbons	---	0.5	mg/kg		0.5	<0.5	<0.5	496	9.2
^ Benzo(a)pyrene TEQ (zero)	---	0.5	mg/kg		<0.5	<0.5	<0.5	44.0	1.0
^ Benzo(a)pyrene TEQ (half LOR)	---	0.5	mg/kg		0.6	0.6	0.6	44.0	1.3
^ Benzo(a)pyrene TEQ (LOR)	---	0.5	mg/kg		1.2	1.2	1.2	44.0	1.6
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	---	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	---	50	mg/kg		120	<50	<50	60	<50
C15 - C28 Fraction	---	100	mg/kg		1420	<100	<100	2350	<100
C29 - C36 Fraction	---	100	mg/kg		1680	<100	<100	850	<100
^ C10 - C36 Fraction (sum)	---	50	mg/kg		3220	<50	<50	3260	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	---	50	mg/kg		140	<50	<50	220	<50
>C16 - C34 Fraction	---	100	mg/kg		2710	<100	<100	2760	<100
>C34 - C40 Fraction	---	100	mg/kg		760	<100	<100	410	<100
^ >C10 - C40 Fraction (sum)	---	50	mg/kg		3610	<50	<50	3390	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	---	50	mg/kg		140	<50	<50	220	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	---	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	---	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	2	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		94.9	90.6	91.9	87.6	95.1
2-Chlorophenol-D4	93951-73-6	0.5	%		98.3	94.4	96.4	91.6	99.4
2.4.6-Tribromophenol	118-79-6	0.5	%		88.4	77.5	77.9	84.0	83.1

Page : 5 of 15
Work Order : EM1811891
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH14 0.4-0.5	BH15 0.55-0.65	BH16 0.3-0.4	BH13 1.0-1.1	BH13 1.5-1.6
				Client sampling date / time	25-Jul-2018 00:00	25-Jul-2018 00:00	25-Jul-2018 00:00	25-Jul-2018 00:00	25-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811891-002	EM1811891-004	EM1811891-005	EM1811891-007	EM1811891-008
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		97.1	92.0	92.7	90.2	97.1
Anthracene-d10	1719-06-8	0.5	%		104	106	110	109	105
4-Terphenyl-d14	1718-51-0	0.5	%		102	101	104	98.4	105
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		62.1	76.4	77.9	70.1	82.6
Toluene-D8	2037-26-5	0.2	%		62.9	74.5	79.8	69.6	69.4
4-Bromofluorobenzene	460-00-4	0.2	%		68.6	79.6	83.1	72.6	92.0

Page : 6 of 15
Work Order : EM1811891
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH17 0.5-0.6	BH17 1.1-1.2	BH18 1.5-1.6	BH18 2.7-2.8	BH18 3.5-3.6
				Client sampling date / time	25-Jul-2018 00:00	25-Jul-2018 00:00	25-Jul-2018 00:00	25-Jul-2018 00:00	25-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811891-011	EM1811891-013	EM1811891-016	EM1811891-019	EM1811891-021
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	---	1.0	%		22.3	9.4	19.4	29.5	18.6
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	12	5	<5	6
Barium	7440-39-3	10	mg/kg		100	1620	170	310	130
Beryllium	7440-41-7	1	mg/kg		<1	1	<1	<1	1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		12	12	15	17	11
Cobalt	7440-48-4	2	mg/kg		9	18	18	12	18
Copper	7440-50-8	5	mg/kg		40	9	35	136	<5
Lead	7439-92-1	5	mg/kg		62	17	123	1160	11
Manganese	7439-96-5	5	mg/kg		167	111	242	199	256
Nickel	7440-02-0	2	mg/kg		14	33	22	23	19
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		37	15	36	54	24
Zinc	7440-66-6	5	mg/kg		107	57	242	593	27
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	0.4	4.5	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		1.8	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		3.4	<0.5	0.6	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		24.4	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		31.8	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		218	<0.5	2.9	0.9	<0.5
Anthracene	120-12-7	0.5	mg/kg		63.4	<0.5	0.9	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		250	<0.5	5.8	2.3	<0.5
Pyrene	129-00-0	0.5	mg/kg		216	<0.5	6.0	2.6	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		76.3	<0.5	2.6	1.3	<0.5
Chrysene	218-01-9	0.5	mg/kg		68.3	<0.5	2.5	1.2	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		100	<0.5	3.9	2.0	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		30.0	<0.5	1.1	0.7	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		89.1	<0.5	3.4	1.6	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		49.6	<0.5	2.1	1.0	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		11.4	<0.5	<0.5	<0.5	<0.5

Page : 7 of 15
Work Order : EM1811891
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH17 0.5-0.6	BH17 1.1-1.2	BH18 1.5-1.6	BH18 2.7-2.8	BH18 3.5-3.6
				Client sampling date / time	25-Jul-2018 00:00	25-Jul-2018 00:00	25-Jul-2018 00:00	25-Jul-2018 00:00	25-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811891-011	EM1811891-013	EM1811891-016	EM1811891-019	EM1811891-021
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		57.4	<0.5	2.6	1.2	<0.5
^ Sum of polycyclic aromatic hydrocarbons	---	0.5	mg/kg		1290	<0.5	34.4	14.8	<0.5
^ Benzo(a)pyrene TEQ (zero)	---	0.5	mg/kg		127	<0.5	4.4	2.1	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	---	0.5	mg/kg		127	0.6	4.7	2.4	0.6
^ Benzo(a)pyrene TEQ (LOR)	---	0.5	mg/kg		127	1.2	4.9	2.6	1.2
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	---	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	---	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	---	100	mg/kg		3000	<100	230	100	<100
C29 - C36 Fraction	---	100	mg/kg		1870	<100	230	110	<100
^ C10 - C36 Fraction (sum)	---	50	mg/kg		4870	<50	460	210	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	---	50	mg/kg		160	<50	<50	<50	<50
>C16 - C34 Fraction	---	100	mg/kg		4160	<100	400	180	<100
>C34 - C40 Fraction	---	100	mg/kg		1070	<100	120	<100	<100
^ >C10 - C40 Fraction (sum)	---	50	mg/kg		5390	<50	520	180	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	---	50	mg/kg		160	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	---	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	---	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		96.2	97.8	89.6	88.4	93.3
2-Chlorophenol-D4	93951-73-6	0.5	%		101	102	94.3	90.9	97.0
2.4.6-Tribromophenol	118-79-6	0.5	%		88.0	87.4	81.5	82.1	83.0

Page : 8 of 15
Work Order : EM1811891
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH17 0.5-0.6	BH17 1.1-1.2	BH18 1.5-1.6	BH18 2.7-2.8	BH18 3.5-3.6
				Client sampling date / time	25-Jul-2018 00:00	25-Jul-2018 00:00	25-Jul-2018 00:00	25-Jul-2018 00:00	25-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1811891-011	EM1811891-013	EM1811891-016	EM1811891-019	EM1811891-021
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		96.9	99.1	89.7	89.0	102
Anthracene-d10	1719-06-8	0.5	%		101	111	99.2	102	111
4-Terphenyl-d14	1718-51-0	0.5	%		102	105	96.2	99.0	105
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		79.0	71.8	74.8	88.2	72.8
Toluene-D8	2037-26-5	0.2	%		78.0	69.8	74.4	84.0	70.7
4-Bromofluorobenzene	460-00-4	0.2	%		78.9	84.9	77.4	109	74.8

Page : 9 of 15
Work Order : EM1811891
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH19 1.0-1.1	BH19 2.1-2.2	----	----	----
				Client sampling date / time	25-Jul-2018 00:00	25-Jul-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM1811891-023	EM1811891-025	--------	--------	--------
					Result	Result	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		20.8	17.0	----	----	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	6	----	----	----
Barium	7440-39-3	10	mg/kg		150	80	----	----	----
Beryllium	7440-41-7	1	mg/kg		<1	1	----	----	----
Boron	7440-42-8	50	mg/kg		<50	<50	----	----	----
Cadmium	7440-43-9	1	mg/kg		<1	<1	----	----	----
Chromium	7440-47-3	2	mg/kg		4	15	----	----	----
Cobalt	7440-48-4	2	mg/kg		11	14	----	----	----
Copper	7440-50-8	5	mg/kg		58	10	----	----	----
Lead	7439-92-1	5	mg/kg		56	10	----	----	----
Manganese	7439-96-5	5	mg/kg		179	109	----	----	----
Nickel	7440-02-0	2	mg/kg		5	19	----	----	----
Selenium	7782-49-2	5	mg/kg		<5	<5	----	----	----
Vanadium	7440-62-2	5	mg/kg		70	24	----	----	----
Zinc	7440-66-6	5	mg/kg		66	33	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	----	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg		0.6	<0.5	----	----	----
Pyrene	129-00-0	0.5	mg/kg		0.7	<0.5	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	----	----	----

Page : 10 of 15
Work Order : EM1811891
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH19 1.0-1.1	BH19 2.1-2.2	----	----	----
				Client sampling date / time	25-Jul-2018 00:00	25-Jul-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM1811891-023	EM1811891-025	--------	--------	--------
					Result	Result	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		1.3	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	0.6	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	1.2	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	----	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	<100	----	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	----	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	----	----	----
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	----	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	----	----	----
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		91.8	90.9	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		96.2	94.5	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		78.2	77.1	----	----	----

Page : 11 of 15
Work Order : EM1811891
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH19 1.0-1.1	BH19 2.1-2.2	----	----	----
				Client sampling date / time	25-Jul-2018 00:00	25-Jul-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM1811891-023	EM1811891-025	--------	--------	--------
					Result	Result	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		91.9	90.3	----	----	----
Anthracene-d10	1719-06-8	0.5	%		109	107	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		102	102	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		79.6	72.8	----	----	----
Toluene-D8	2037-26-5	0.2	%		78.1	72.2	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		98.7	75.6	----	----	----

Page : 12 of 15
Work Order : EM1811891
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Field Blank 3	Rinsate 3	---	---	---
				Client sampling date / time	25-Jul-2018 00:00	25-Jul-2018 00:00	---	---	---
Compound	CAS Number	LOR	Unit		EM1811891-026	EM1811891-027	-------	-------	-------
					Result	Result	---	---	---
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	---	---	---
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	---	---	---
Barium	7440-39-3	0.001	mg/L		<0.001	<0.001	---	---	---
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	---	---	---
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	---	---	---
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	---	---	---
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	---	---	---
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	---	---	---
Manganese	7439-96-5	0.001	mg/L		<0.001	<0.001	---	---	---
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	---	---	---
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	---	---	---
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	---	---	---
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	---	---	---
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	---	---	---
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	---	---	---
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		<1.0	<1.0	---	---	---
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	<1.0	---	---	---
Acenaphthene	83-32-9	1.0	µg/L		<1.0	<1.0	---	---	---
Fluorene	86-73-7	1.0	µg/L		<1.0	<1.0	---	---	---
Phenanthrene	85-01-8	1.0	µg/L		<1.0	<1.0	---	---	---
Anthracene	120-12-7	1.0	µg/L		<1.0	<1.0	---	---	---
Fluoranthene	206-44-0	1.0	µg/L		<1.0	<1.0	---	---	---
Pyrene	129-00-0	1.0	µg/L		<1.0	<1.0	---	---	---
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	<1.0	---	---	---
Chrysene	218-01-9	1.0	µg/L		<1.0	<1.0	---	---	---
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	<1.0	---	---	---
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	<1.0	---	---	---
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	---	---	---
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	<1.0	---	---	---
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	<1.0	---	---	---
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	<1.0	---	---	---
^ Sum of polycyclic aromatic hydrocarbons	---	0.5	µg/L		<0.5	<0.5	---	---	---

Page : 13 of 15
Work Order : EM1811891
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Field Blank 3	Rinsate 3	----	----	----
				Client sampling date / time	25-Jul-2018 00:00	25-Jul-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM1811891-026	EM1811891-027	--------	--------	--------
					Result	Result	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	----	----	----
Toluene	108-88-3	2	µg/L		<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	----	----	----
^ Total Xylenes	----	2	µg/L		<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		21.4	31.9	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		36.2	78.7	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%		36.8	78.9	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		55.2	83.8	----	----	----
Anthracene-d10	1719-06-8	1.0	%		56.1	94.0	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		49.2	94.3	----	----	----

Page : 14 of 15
Work Order : EM1811891
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Field Blank 3	Rinsate 3	----	----	----
				Client sampling date / time	25-Jul-2018 00:00	25-Jul-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM1811891-026	EM1811891-027	--------	--------	--------
					Result	Result	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		97.8	98.8	----	----	----
Toluene-D8	2037-26-5	2	%		95.7	92.9	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		102	98.8	----	----	----

Page : 15 of 15
Work Order : EM1811891
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	54	125
2-Chlorophenol-D4	93951-73-6	65	123
2.4.6-Tribromophenol	118-79-6	34	122
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	61	125
Anthracene-d10	1719-06-8	62	130
4-Terphenyl-d14	1718-51-0	67	133
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	51	125
Toluene-D8	2037-26-5	55	125
4-Bromofluorobenzene	460-00-4	56	124

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	46
2-Chlorophenol-D4	93951-73-6	23	104
2.4.6-Tribromophenol	118-79-6	28	130
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	36	114
Anthracene-d10	1719-06-8	51	119
4-Terphenyl-d14	1718-51-0	49	127
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM1812175**	Page	: 1 of 6
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Project	: Newtown Rd	Date Samples Received	: 26-Jul-2018 09:05
Order number	:	Date Analysis Commenced	: 01-Aug-2018
C-O-C number	: ----	Issue Date	: 06-Aug-2018 16:42
Sampler	: ----		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 4		
No. of samples analysed	: 4		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

RIGHT SOLUTIONS | RIGHT PARTNER

Page	: 2 of 6
Work Order	: EM1812175
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Newtown Rd

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EG005T: EM1812173_006 Poor duplicate precision for lead and zinc due to sample heterogeneity. Confirmed by re-extraction and re-analysis.
- EG005T: EM1812173_007 Poor matrix spike recovery for zinc due to sample matrix. Confirmed by re-extraction and re-analysis.
- This is a rebatch of EM1811891.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.

Page : 3 of 6
Work Order : EM1812175
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH13 2.0-2.1	BH18 0.5-0.6	BH18 2.5-2.6	BH18 3.1-3.2	----
				Client sampling date / time	25-Jul-2018 00:00	25-Jul-2018 00:00	25-Jul-2018 00:00	25-Jul-2018 00:00	----
Compound	CAS Number	LOR	Unit		EM1812175-001	EM1812175-002	EM1812175-003	EM1812175-004	--------
					Result	Result	Result	Result	---
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		11.8	16.6	32.9	22.7	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		11	<5	<5	5	----
Barium	7440-39-3	10	mg/kg		100	120	80	180	----
Beryllium	7440-41-7	1	mg/kg		1	<1	<1	<1	----
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	----
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	----
Chromium	7440-47-3	2	mg/kg		22	14	34	16	----
Cobalt	7440-48-4	2	mg/kg		16	13	29	10	----
Copper	7440-50-8	5	mg/kg		9	22	60	96	----
Lead	7439-92-1	5	mg/kg		30	46	7	479	----
Manganese	7439-96-5	5	mg/kg		552	239	517	194	----
Nickel	7440-02-0	2	mg/kg		13	14	28	15	----
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	----
Vanadium	7440-62-2	5	mg/kg		28	38	113	39	----
Zinc	7440-66-6	5	mg/kg		33	72	103	293	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	1.5	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Phenanthrene	85-01-8	0.5	mg/kg		2.0	<0.5	<0.5	<0.5	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Fluoranthene	206-44-0	0.5	mg/kg		2.0	0.9	<0.5	1.8	----
Pyrene	129-00-0	0.5	mg/kg		2.2	1.0	<0.5	2.0	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		1.0	0.6	<0.5	1.3	----
Chrysene	218-01-9	0.5	mg/kg		0.8	<0.5	<0.5	0.8	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		1.0	0.6	<0.5	1.6	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	0.6	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		0.8	0.5	<0.5	1.3	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	0.7	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----

Page : 4 of 6
Work Order : EM1812175
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH13 2.0-2.1	BH18 0.5-0.6	BH18 2.5-2.6	BH18 3.1-3.2	----
				Client sampling date / time	25-Jul-2018 00:00	25-Jul-2018 00:00	25-Jul-2018 00:00	25-Jul-2018 00:00	----
Compound	CAS Number	LOR	Unit		EM1812175-001	EM1812175-002	EM1812175-003	EM1812175-004	--------
					Result	Result	Result	Result	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		0.5	<0.5	<0.5	1.0	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		10.3	3.6	<0.5	11.1	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		1.0	0.6	<0.5	1.7	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		1.3	0.9	0.6	2.0	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.6	1.2	1.2	2.2	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	----
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	----
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	120	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	120	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		93.0	94.3	96.7	89.2	----
2-Chlorophenol-D4	93951-73-6	0.5	%		85.3	86.2	88.2	85.4	----
2.4.6-Tribromophenol	118-79-6	0.5	%		74.0	72.1	75.0	73.7	----

Page : 5 of 6
Work Order : EM1812175
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Newtown Rd

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH13 2.0-2.1	BH18 0.5-0.6	BH18 2.5-2.6	BH18 3.1-3.2	----
				Client sampling date / time	25-Jul-2018 00:00	25-Jul-2018 00:00	25-Jul-2018 00:00	25-Jul-2018 00:00	----
Compound	CAS Number	LOR	Unit		EM1812175-001	EM1812175-002	EM1812175-003	EM1812175-004	--------
					Result	Result	Result	Result	---
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		87.3	89.4	90.8	87.6	----
Anthracene-d10	1719-06-8	0.5	%		86.8	90.6	91.8	87.0	----
4-Terphenyl-d14	1718-51-0	0.5	%		86.4	88.7	90.5	87.6	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		73.0	78.0	65.5	68.8	----
Toluene-D8	2037-26-5	0.2	%		70.3	77.1	57.3	57.0	----
4-Bromofluorobenzene	460-00-4	0.2	%		98.2	104	91.2	90.1	----

Surrogate Control Limits

Sub-Matrix: SOIL

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	54	125
2-Chlorophenol-D4	93951-73-6	65	123
2.4.6-Tribromophenol	118-79-6	34	122
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	61	125
Anthracene-d10	1719-06-8	62	130
4-Terphenyl-d14	1718-51-0	67	133
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	51	125
Toluene-D8	2037-26-5	55	125
4-Bromofluorobenzene	460-00-4	56	124

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM1812116**	Page	: 1 of 9
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Project	: New Town Road	Date Samples Received	: 31-Jul-2018 09:25
Order number	: 30 July 2018	Date Analysis Commenced	: 31-Jul-2018
C-O-C number	: ----	Issue Date	: 03-Aug-2018 15:22
Sampler	: SJ		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 5		
No. of samples analysed	: 4		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

RIGHT SOLUTIONS | RIGHT PARTNER

Page	: 2 of 9
Work Order	: EM1812116
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: New Town Road

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Page : 3 of 9
Work Order : EM1812116
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Road

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH20 0.5-0.6	BH20 1.0-1.1	----	----	----
			Client sampling date / time	30-Jul-2018 00:00	30-Jul-2018 00:00	---	---	---
Compound	CAS Number	LOR	Unit	EM1812116-003	EM1812116-004	--------	--------	--------
				Result	Result	---	---	---
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	14.4	19.8	---	---	---
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	---	---	---
Barium	7440-39-3	10	mg/kg	40	120	---	---	---
Beryllium	7440-41-7	1	mg/kg	<1	<1	---	---	---
Boron	7440-42-8	50	mg/kg	<50	<50	---	---	---
Cadmium	7440-43-9	1	mg/kg	<1	<1	---	---	---
Chromium	7440-47-3	2	mg/kg	9	13	---	---	---
Cobalt	7440-48-4	2	mg/kg	4	9	---	---	---
Copper	7440-50-8	5	mg/kg	23	25	---	---	---
Lead	7439-92-1	5	mg/kg	18	114	---	---	---
Manganese	7439-96-5	5	mg/kg	91	212	---	---	---
Nickel	7440-02-0	2	mg/kg	7	11	---	---	---
Selenium	7782-49-2	5	mg/kg	<5	<5	---	---	---
Vanadium	7440-62-2	5	mg/kg	33	34	---	---	---
Zinc	7440-66-6	5	mg/kg	40	117	---	---	---
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	0.5	---	---	---
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	---	---	---
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	---	---	---
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	---	---	---
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	---	---	---
Phenanthrene	85-01-8	0.5	mg/kg	0.8	<0.5	---	---	---
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	---	---	---
Fluoranthene	206-44-0	0.5	mg/kg	1.8	0.8	---	---	---
Pyrene	129-00-0	0.5	mg/kg	2.0	0.8	---	---	---
Benz(a)anthracene	56-55-3	0.5	mg/kg	1.0	<0.5	---	---	---
Chrysene	218-01-9	0.5	mg/kg	1.0	<0.5	---	---	---
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	1.3	<0.5	---	---	---
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	---	---	---
Benzo(a)pyrene	50-32-8	0.5	mg/kg	1.1	<0.5	---	---	---
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	0.5	<0.5	---	---	---
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	---	---	---

Page : 4 of 9
Work Order : EM1812116
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Road

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH20 0.5-0.6	BH20 1.0-1.1	----	----	----
				Client sampling date / time	30-Jul-2018 00:00	30-Jul-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM1812116-003	EM1812116-004	--------	--------	--------
					Result	Result	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		0.7	<0.5	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		10.2	1.6	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		1.4	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		1.7	0.6	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.9	1.2	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	----	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	<100	----	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	----	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	----	----	----
>C16 - C34 Fraction	----	100	mg/kg		120	<100	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		120	<50	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	----	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	----	----	----
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		85.1	82.9	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		89.3	84.5	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		82.9	86.9	----	----	----

Page : 5 of 9
Work Order : EM1812116
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Road

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH20 0.5-0.6	BH20 1.0-1.1	----	----	----
				Client sampling date / time	30-Jul-2018 00:00	30-Jul-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM1812116-003	EM1812116-004	--------	--------	--------
					Result	Result	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		91.2	86.3	----	----	----
Anthracene-d10	1719-06-8	0.5	%		99.6	97.1	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		101	94.3	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		67.4	70.5	----	----	----
Toluene-D8	2037-26-5	0.2	%		64.5	69.4	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		92.2	97.0	----	----	----

Page : 6 of 9
Work Order : EM1812116
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Road

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Field Blank 4	Rinsate 4	----	----	----
				Client sampling date / time	30-Jul-2018 00:00	30-Jul-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM1812116-001	EM1812116-002	--------	--------	--------
					Result	Result	----	----	----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	----	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	----	----	----
Barium	7440-39-3	0.001	mg/L		<0.001	<0.001	----	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	----
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L		<0.001	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	----	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		<1.0	<1.0	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	<1.0	----	----	----
Acenaphthene	83-32-9	1.0	µg/L		<1.0	<1.0	----	----	----
Fluorene	86-73-7	1.0	µg/L		<1.0	<1.0	----	----	----
Phenanthrene	85-01-8	1.0	µg/L		<1.0	<1.0	----	----	----
Anthracene	120-12-7	1.0	µg/L		<1.0	<1.0	----	----	----
Fluoranthene	206-44-0	1.0	µg/L		<1.0	<1.0	----	----	----
Pyrene	129-00-0	1.0	µg/L		<1.0	<1.0	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	<1.0	----	----	----
Chrysene	218-01-9	1.0	µg/L		<1.0	<1.0	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	<1.0	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	<1.0	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	<1.0	----	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	<1.0	----	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	<1.0	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		<0.5	<0.5	----	----	----

Page : 7 of 9
Work Order : EM1812116
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Road

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Field Blank 4	Rinsate 4	----	----	----
				Client sampling date / time	30-Jul-2018 00:00	30-Jul-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM1812116-001	EM1812116-002	--------	--------	--------
					Result	Result	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	----	----	----
Toluene	108-88-3	2	µg/L		<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	----	----	----
^ Total Xylenes	----	2	µg/L		<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		22.7	20.8	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		54.5	48.1	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%		54.1	47.4	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		65.7	59.8	----	----	----
Anthracene-d10	1719-06-8	1.0	%		70.8	68.8	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		70.8	67.9	----	----	----

Page : 8 of 9
Work Order : EM1812116
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Road

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Field Blank 4	Rinsate 4	----	----	----
				Client sampling date / time	30-Jul-2018 00:00	30-Jul-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM1812116-001	EM1812116-002	--------	--------	--------
					Result	Result	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		98.1	99.7	----	----	----
Toluene-D8	2037-26-5	2	%		95.4	96.3	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		102	105	----	----	----

Surrogate Control Limits

Sub-Matrix: SOIL

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	54	125
2-Chlorophenol-D4	93951-73-6	65	123
2.4.6-Tribromophenol	118-79-6	34	122
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	61	125
Anthracene-d10	1719-06-8	62	130
4-Terphenyl-d14	1718-51-0	67	133
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	51	125
Toluene-D8	2037-26-5	56	125
4-Bromofluorobenzene	460-00-4	56	124

Sub-Matrix: WATER

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	46
2-Chlorophenol-D4	93951-73-6	23	104
2.4.6-Tribromophenol	118-79-6	28	130
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	36	114
Anthracene-d10	1719-06-8	51	119
4-Terphenyl-d14	1718-51-0	49	127
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM1816786**	Page	: 1 of 6
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Project	: New Town Road	Date Samples Received	: 18-Oct-2018 09:10
Order number	:	Date Analysis Commenced	: 19-Oct-2018
C-O-C number	: ----	Issue Date	: 24-Oct-2018 17:11
Sampler	: SJ		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 3		
No. of samples analysed	: 3		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC

RIGHT SOLUTIONS | RIGHT PARTNER

Page	: 2 of 6
Work Order	: EM1816786
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: New Town Road

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP075(SIM): Sample EM1816786-002 required dilution prior to analysis due to matrix interferences. LOR values have been adjusted accordingly.
- EP075(SIM): Matrix spike recovery not determined for sample EM1816786-002 due to the presence of high level contaminants.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Page	: 3 of 6
Work Order	: EM1816786
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: New Town Road

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GT02	GT01	GT03	----	----
				Client sampling date / time	17-Oct-2018 00:00	17-Oct-2018 00:00	17-Oct-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		EM1816786-001	EM1816786-002	EM1816786-003	--------	--------
					Result	Result	Result	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		8.2	15.4	10.1	----	----
EN33: TCLP Leach									
Initial pH	----	0.1	pH Unit		8.2	9.0	9.4	----	----
After HCl pH	----	0.1	pH Unit		1.1	1.2	1.2	----	----
Extraction Fluid Number	----	1	-		1	1	1	----	----
Final pH	----	0.1	pH Unit		5.0	5.1	5.1	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	0.8	1.8	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.6	0.5	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	0.9	1.3	----	----
Phenanthrene	85-01-8	0.5	mg/kg		1.1	15.9	17.4	----	----
Anthracene	120-12-7	0.5	mg/kg		1.1	2.9	4.2	----	----
Fluoranthene	206-44-0	0.5	mg/kg		2.3	20.1	22.8	----	----
Pyrene	129-00-0	0.5	mg/kg		2.3	19.3	22.0	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		0.9	7.0	8.9	----	----
Chrysene	218-01-9	0.5	mg/kg		0.9	6.9	8.2	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		1.1	7.9	13.7	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		0.5	2.4	14.6	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		1.0	6.7	9.1	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		0.5	4.1	5.2	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	0.9	<0.5	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		0.8	5.6	6.4	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		12.5	101	136	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		1.3	9.9	13.5	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		1.6	9.9	13.7	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.8	9.9	14.0	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		81.6	93.2	95.3	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		80.9	93.1	96.4	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		60.9	76.2	87.7	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		85.8	87.8	102	----	----
Anthracene-d10	1719-06-8	0.5	%		97.0	106	112	----	----

Page	: 4 of 6
Work Order	: EM1816786
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: New Town Road

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GT02	GT01	GT03	----	----
				Client sampling date / time	17-Oct-2018 00:00	17-Oct-2018 00:00	17-Oct-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		EM1816786-001	EM1816786-002	EM1816786-003	--------	--------
					Result	Result	Result	----	----
EP075(SIM)T: PAH Surrogates - Continued									
4-Terphenyl-d14	1718-51-0	0.5	%		96.7	96.7	107	----	----

Page : 5 of 6
Work Order : EM1816786
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Road

Analytical Results

Sub-Matrix: TCLP LEACHATE (Matrix: WATER)				Client sample ID	GT02	GT01	GT03	----	----
				Client sampling date / time	17-Oct-2018 00:00	17-Oct-2018 00:00	17-Oct-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		EM1816786-001	EM1816786-002	EM1816786-003	--------	--------
					Result	Result	Result	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Acenaphthene	83-32-9	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Fluorene	86-73-7	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Phenanthrene	85-01-8	1.0	µg/L		<1.0	2.5	3.5	----	----
Anthracene	120-12-7	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Fluoranthene	206-44-0	1.0	µg/L		<1.0	<1.0	1.3	----	----
Pyrene	129-00-0	1.0	µg/L		<1.0	<1.0	1.0	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Chrysene	218-01-9	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	<1.0	<1.0	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		<0.5	2.5	5.8	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	<0.5	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		29.4	26.6	28.3	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		65.1	55.1	61.0	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%		73.6	70.0	72.8	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		73.8	65.0	69.9	----	----
Anthracene-d10	1719-06-8	1.0	%		76.6	71.5	75.8	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		76.9	74.1	77.1	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	54	125
2-Chlorophenol-D4	93951-73-6	65	123
2.4.6-Tribromophenol	118-79-6	34	122
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	61	125
Anthracene-d10	1719-06-8	62	130
4-Terphenyl-d14	1718-51-0	67	133

Sub-Matrix: **TCLP LEACHATE**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	46
2-Chlorophenol-D4	93951-73-6	23	104
2.4.6-Tribromophenol	118-79-6	28	130
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	36	114
Anthracene-d10	1719-06-8	51	119
4-Terphenyl-d14	1718-51-0	49	127

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM1817421**	Page	: 1 of 24
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Project	: 48-52	Date Samples Received	: 30-Oct-2018 09:40
Order number	:	Date Analysis Commenced	: 30-Oct-2018
C-O-C number	: ----	Issue Date	: 05-Nov-2018 16:53
Sampler	: GM		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 28		
No. of samples analysed	: 28		

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- Analytical Results
- Surrogate Control Limits

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Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Andrew Lu	VOC Section Supervisor	Melbourne Organics, Springvale, VIC
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC
Steven McGrath	Technical Manager	Melbourne Organics, Springvale, VIC

RIGHT SOLUTIONS | RIGHT PARTNER

Page	: 2 of 24
Work Order	: EM1817421
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

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Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP075(SIM): Poor duplicate precision for samples EM1817421-001 & -011 due to sample heterogeneity. Confirmed by re-extraction and re-analysis.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Page : 3 of 24
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SALT (Matrix: SOIL)				Client sample ID	BH21 0.5-0.6	BH21 1.5-1.6	BH21 2.5-2.6	BH21 3.5-3.6	BH21 4.5-4.6
				Client sampling date / time	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817421-001	EM1817421-002	EM1817421-003	EM1817421-004	EM1817421-005
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		15.2	18.4	9.7	15.3	21.8
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	<5
Barium	7440-39-3	10	mg/kg		50	70	50	40	70
Beryllium	7440-41-7	1	mg/kg		<1	<1	<1	<1	<1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		15	8	<2	4	9
Cobalt	7440-48-4	2	mg/kg		11	6	19	19	26
Copper	7440-50-8	5	mg/kg		172	11	94	78	82
Lead	7439-92-1	5	mg/kg		27	77	11	5	17
Manganese	7439-96-5	5	mg/kg		168	128	465	436	478
Nickel	7440-02-0	2	mg/kg		16	7	6	12	15
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		47	18	69	128	115
Zinc	7440-66-6	5	mg/kg		41	57	42	32	46
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		1.5	<0.5	<0.5	<0.5	0.9
Acenaphthene	83-32-9	0.5	mg/kg		0.7	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		0.9	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		12.8	<0.5	0.6	<0.5	0.7
Anthracene	120-12-7	0.5	mg/kg		3.6	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		26.9	1.2	2.0	0.6	5.2
Pyrene	129-00-0	0.5	mg/kg		25.2	1.4	2.6	0.9	7.0
Benz(a)anthracene	56-55-3	0.5	mg/kg		10.6	0.6	1.5	<0.5	3.9
Chrysene	218-01-9	0.5	mg/kg		10.1	0.6	1.4	<0.5	3.9
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		16.3	0.9	2.1	0.6	6.0
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		5.8	<0.5	0.7	<0.5	2.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		14.3	0.8	1.9	0.6	6.1
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		8.6	<0.5	0.9	<0.5	2.8
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		1.7	<0.5	<0.5	<0.5	0.9

Page : 4 of 24
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SALT (Matrix: SOIL)				Client sample ID	BH21 0.5-0.6	BH21 1.5-1.6	BH21 2.5-2.6	BH21 3.5-3.6	BH21 4.5-4.6
				Client sampling date / time	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817421-001	EM1817421-002	EM1817421-003	EM1817421-004	EM1817421-005
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		11.5	0.6	1.2	<0.5	3.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		150	6.1	14.9	2.7	43.4
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		20.3	1.0	2.4	0.7	8.6
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		20.3	1.3	2.7	1.0	8.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		20.3	1.6	2.9	1.3	8.6
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		480	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		400	190	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		880	190	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		760	230	<100	<100	170
>C34 - C40 Fraction	----	100	mg/kg		230	130	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		990	360	<50	<50	170
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		74.3	91.0	94.1	91.3	91.3
2-Chlorophenol-D4	93951-73-6	0.5	%		86.2	104	106	105	104
2.4.6-Tribromophenol	118-79-6	0.5	%		75.2	95.9	88.9	87.7	86.8

Page : 5 of 24
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SALT (Matrix: SOIL)				Client sample ID	BH21 0.5-0.6	BH21 1.5-1.6	BH21 2.5-2.6	BH21 3.5-3.6	BH21 4.5-4.6
				Client sampling date / time	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817421-001	EM1817421-002	EM1817421-003	EM1817421-004	EM1817421-005
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		99.3	124	123	120	122
Anthracene-d10	1719-06-8	0.5	%		99.4	116	120	117	116
4-Terphenyl-d14	1718-51-0	0.5	%		93.3	122	123	124	113
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		86.2	74.3	83.7	75.9	74.5
Toluene-D8	2037-26-5	0.2	%		89.4	78.8	83.5	80.6	81.0
4-Bromofluorobenzene	460-00-4	0.2	%		110	98.9	106	105	103

Page : 6 of 24
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SALT (Matrix: SOIL)				Client sample ID	BH21 5.5-5.6	BH22 0.5-0.6	BH22 1.5-1.6	BH22 2.5-2.6	BH22 3.4-3.5
				Client sampling date / time	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817421-006	EM1817421-007	EM1817421-008	EM1817421-009	EM1817421-010
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		14.8	10.6	19.9	17.4	13.0
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	<5
Barium	7440-39-3	10	mg/kg		60	150	90	90	80
Beryllium	7440-41-7	1	mg/kg		<1	<1	<1	<1	<1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		6	12	14	25	24
Cobalt	7440-48-4	2	mg/kg		17	20	24	23	18
Copper	7440-50-8	5	mg/kg		70	30	48	58	57
Lead	7439-92-1	5	mg/kg		32	90	32	<5	12
Manganese	7439-96-5	5	mg/kg		355	243	256	358	428
Nickel	7440-02-0	2	mg/kg		10	20	16	24	25
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		71	44	89	119	87
Zinc	7440-66-6	5	mg/kg		81	122	48	37	44
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	0.2	0.2	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		0.8	0.7	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		2.7	3.9	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		0.9	1.0	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		6.4	7.9	<0.5	<0.5	0.9
Pyrene	129-00-0	0.5	mg/kg		7.4	8.0	0.5	<0.5	1.0
Benz(a)anthracene	56-55-3	0.5	mg/kg		3.7	3.4	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg		3.7	3.1	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		5.1	4.7	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		2.1	1.8	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		4.6	4.1	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		2.1	2.3	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		0.7	0.6	<0.5	<0.5	<0.5

Page : 7 of 24
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SALT (Matrix: SOIL)				Client sample ID	BH21 5.5-5.6	BH22 0.5-0.6	BH22 1.5-1.6	BH22 2.5-2.6	BH22 3.4-3.5
				Client sampling date / time	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817421-006	EM1817421-007	EM1817421-008	EM1817421-009	EM1817421-010
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		2.7	3.0	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		42.9	44.5	0.5	<0.5	1.9
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		6.7	6.0	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		6.7	6.0	0.6	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		6.7	6.0	1.2	1.2	1.2
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	120	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	120	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		160	180	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		160	180	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		91.4	89.4	92.2	86.4	90.1
2-Chlorophenol-D4	93951-73-6	0.5	%		104	100.0	103	97.6	102
2.4.6-Tribromophenol	118-79-6	0.5	%		92.5	75.9	75.7	64.2	67.6

Environmental Site Assessment (V9) 52 New Town Road, New Town. June 2025.

Page : 8 of 24
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SALT (Matrix: SOIL)				Client sample ID	BH21 5.5-5.6	BH22 0.5-0.6	BH22 1.5-1.6	BH22 2.5-2.6	BH22 3.4-3.5
				Client sampling date / time	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817421-006	EM1817421-007	EM1817421-008	EM1817421-009	EM1817421-010
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		121	123	124	120	124
Anthracene-d10	1719-06-8	0.5	%		114	108	119	113	119
4-Terphenyl-d14	1718-51-0	0.5	%		114	113	135	125	127
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		79.5	74.2	77.6	76.4	81.9
Toluene-D8	2037-26-5	0.2	%		79.4	80.3	81.0	79.6	81.9
4-Bromofluorobenzene	460-00-4	0.2	%		103	103	106	97.1	109

Page : 9 of 24
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SALT (Matrix: SOIL)				Client sample ID	BH23 0.5-0.6	BH23 1.5-1.6	BH23 2.5-2.6	BH23 3.5-3.6	BH23 4.5-4.6
				Client sampling date / time	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817421-011	EM1817421-012	EM1817421-013	EM1817421-014	EM1817421-015
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		14.6	11.7	10.8	26.1	12.6
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		6	<5	<5	<5	5
Barium	7440-39-3	10	mg/kg		130	150	100	3730	140
Beryllium	7440-41-7	1	mg/kg		<1	<1	<1	<1	1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		16	17	10	10	11
Cobalt	7440-48-4	2	mg/kg		12	12	10	21	18
Copper	7440-50-8	5	mg/kg		56	41	39	2410	18
Lead	7439-92-1	5	mg/kg		141	175	220	186	16
Manganese	7439-96-5	5	mg/kg		298	310	180	405	1090
Nickel	7440-02-0	2	mg/kg		24	22	11	13	21
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		41	27	34	92	22
Zinc	7440-66-6	5	mg/kg		116	302	123	208	63
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		0.2	0.2	0.1	0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<2.4	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		1.2	<0.5	9.1	0.6	0.6
Acenaphthene	83-32-9	0.5	mg/kg		0.6	0.6	32.2	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		0.9	0.6	29.0	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		8.7	6.0	295	2.4	1.4
Anthracene	120-12-7	0.5	mg/kg		2.2	1.6	132	0.6	0.5
Fluoranthene	206-44-0	0.5	mg/kg		13.0	7.7	360	4.8	3.6
Pyrene	129-00-0	0.5	mg/kg		12.9	7.5	334	4.8	4.2
Benz(a)anthracene	56-55-3	0.5	mg/kg		5.1	3.1	133	1.9	2.1
Chrysene	218-01-9	0.5	mg/kg		5.0	2.8	127	2.0	2.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		8.0	4.4	186	3.0	2.4
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		2.9	1.5	75.2	1.2	1.0
Benzo(a)pyrene	50-32-8	0.5	mg/kg		6.7	3.8	166	2.5	2.2
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		4.1	2.1	81.9	1.4	1.0
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		1.0	0.6	19.3	<0.5	<0.5

Page : 10 of 24
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SALT (Matrix: SOIL)				Client sample ID	BH23 0.5-0.6	BH23 1.5-1.6	BH23 2.5-2.6	BH23 3.5-3.6	BH23 4.5-4.6
				Client sampling date / time	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817421-011	EM1817421-012	EM1817421-013	EM1817421-014	EM1817421-015
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		5.4	2.7	100	1.8	1.2
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		77.7	45.0	2080	27.0	22.2
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		9.8	5.6	235	3.3	2.9
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		9.8	5.6	235	3.5	3.1
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		9.8	5.6	235	3.8	3.4
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		330	<100	4010	370	<100
C29 - C36 Fraction	----	100	mg/kg		300	<100	1780	160	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		630	<50	5790	530	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	190	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		540	150	5070	470	<100
>C34 - C40 Fraction	----	100	mg/kg		180	<100	760	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		720	150	6020	470	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	190	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		72.8	88.8	84.3	89.3	91.3
2-Chlorophenol-D4	93951-73-6	0.5	%		82.7	101	93.1	103	103
2.4.6-Tribromophenol	118-79-6	0.5	%		68.6	80.3	67.6	85.3	87.1

Page : 11 of 24
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SALT (Matrix: SOIL)				Client sample ID	BH23 0.5-0.6	BH23 1.5-1.6	BH23 2.5-2.6	BH23 3.5-3.6	BH23 4.5-4.6
				Client sampling date / time	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817421-011	EM1817421-012	EM1817421-013	EM1817421-014	EM1817421-015
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		101	123	116	123	124
Anthracene-d10	1719-06-8	0.5	%		101	110	105	115	118
4-Terphenyl-d14	1718-51-0	0.5	%		94.1	114	122	113	119
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		71.3	78.1	74.4	68.4	81.9
Toluene-D8	2037-26-5	0.2	%		73.7	77.4	76.2	72.2	86.4
4-Bromofluorobenzene	460-00-4	0.2	%		96.1	102	94.8	91.0	110

Page : 12 of 24
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SALT (Matrix: SOIL)				Client sample ID	BH23 5.5-5.6	BH24 0.5-0.6	BH24 1.5-1.6	BH24 2.5-2.6	BH24 3.3-3.4
				Client sampling date / time	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817421-016	EM1817421-017	EM1817421-018	EM1817421-019	EM1817421-020
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		14.4	8.9	10.7	12.6	11.8
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		9	<5	<5	<5	<5
Barium	7440-39-3	10	mg/kg		80	100	160	170	200
Beryllium	7440-41-7	1	mg/kg		<1	<1	<1	<1	1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		11	12	19	24	17
Cobalt	7440-48-4	2	mg/kg		13	11	9	14	19
Copper	7440-50-8	5	mg/kg		39	21	15	16	42
Lead	7439-92-1	5	mg/kg		42	70	31	22	212
Manganese	7439-96-5	5	mg/kg		630	227	222	455	518
Nickel	7440-02-0	2	mg/kg		16	16	13	20	22
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		35	28	47	56	29
Zinc	7440-66-6	5	mg/kg		134	120	51	56	220
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		0.1	0.1	<0.1	<0.1	0.6
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		2.6	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		10.5	1.0	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		2.2	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		5.3	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		58.0	6.0	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		20.3	1.6	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		70.6	9.2	<0.5	<0.5	1.2
Pyrene	129-00-0	0.5	mg/kg		73.8	9.1	0.6	<0.5	1.3
Benz(a)anthracene	56-55-3	0.5	mg/kg		34.6	4.2	<0.5	<0.5	0.6
Chrysene	218-01-9	0.5	mg/kg		36.4	3.9	<0.5	<0.5	0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		49.5	5.2	<0.5	<0.5	0.8
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		17.1	2.2	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		45.2	4.8	<0.5	<0.5	0.7
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		17.6	2.3	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		6.2	0.6	<0.5	<0.5	<0.5

Page : 13 of 24
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SALT (Matrix: SOIL)				Client sample ID	BH23 5.5-5.6	BH24 0.5-0.6	BH24 1.5-1.6	BH24 2.5-2.6	BH24 3.3-3.4
				Client sampling date / time	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817421-016	EM1817421-017	EM1817421-018	EM1817421-019	EM1817421-020
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		22.3	2.8	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		472	52.9	0.6	<0.5	5.1
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		63.9	6.8	<0.5	<0.5	0.8
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		63.9	6.8	0.6	0.6	1.1
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		63.9	6.8	1.2	1.2	1.4
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		1640	150	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		870	110	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		2510	260	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		60	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		2170	220	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		410	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		2640	220	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		60	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		90.1	93.3	80.3	92.0	90.9
2-Chlorophenol-D4	93951-73-6	0.5	%		102	106	89.7	104	102
2.4.6-Tribromophenol	118-79-6	0.5	%		83.8	92.5	73.0	76.8	77.1

Page : 14 of 24
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SALT (Matrix: SOIL)				Client sample ID	BH23 5.5-5.6	BH24 0.5-0.6	BH24 1.5-1.6	BH24 2.5-2.6	BH24 3.3-3.4
				Client sampling date / time	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817421-016	EM1817421-017	EM1817421-018	EM1817421-019	EM1817421-020
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		123	123	110	124	123
Anthracene-d10	1719-06-8	0.5	%		108	114	108	119	120
4-Terphenyl-d14	1718-51-0	0.5	%		114	115	115	131	129
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		75.6	78.2	75.4	77.8	83.8
Toluene-D8	2037-26-5	0.2	%		77.6	80.3	74.4	77.8	85.2
4-Bromofluorobenzene	460-00-4	0.2	%		96.6	104	98.3	99.7	108

Page : 15 of 24
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SALT (Matrix: SOIL)				Client sample ID	BH25 0.5-0.6	BH25 1.5-1.6	BH25 2.5-2.6	BH25 3.5-3.6	BH25 4.5-4.6
				Client sampling date / time	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817421-021	EM1817421-022	EM1817421-023	EM1817421-024	EM1817421-025
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		15.3	17.2	15.0	12.7	15.2
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	<5
Barium	7440-39-3	10	mg/kg		210	80	160	160	170
Beryllium	7440-41-7	1	mg/kg		<1	<1	2	<1	<1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		8	16	8	12	12
Cobalt	7440-48-4	2	mg/kg		16	25	57	20	17
Copper	7440-50-8	5	mg/kg		25	40	29	26	43
Lead	7439-92-1	5	mg/kg		49	8	50	138	460
Manganese	7439-96-5	5	mg/kg		305	142	165	210	372
Nickel	7440-02-0	2	mg/kg		15	20	12	18	19
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		33	82	61	22	33
Zinc	7440-66-6	5	mg/kg		114	33	38	134	215
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	0.1	0.4	0.3
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	0.6	2.7
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	1.0
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	1.6
Phenanthrene	85-01-8	0.5	mg/kg		3.4	<0.5	<0.5	2.4	14.4
Anthracene	120-12-7	0.5	mg/kg		0.8	<0.5	<0.5	0.7	4.1
Fluoranthene	206-44-0	0.5	mg/kg		3.1	<0.5	<0.5	4.1	26.2
Pyrene	129-00-0	0.5	mg/kg		3.0	<0.5	<0.5	4.6	27.4
Benz(a)anthracene	56-55-3	0.5	mg/kg		0.9	<0.5	<0.5	2.2	12.9
Chrysene	218-01-9	0.5	mg/kg		1.0	<0.5	<0.5	2.0	11.4
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		1.1	<0.5	<0.5	2.6	16.0
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		0.5	<0.5	<0.5	1.2	5.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		0.9	<0.5	<0.5	2.2	14.9
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	1.0	5.9
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	1.2

Page : 16 of 24
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SALT (Matrix: SOIL)				Client sample ID	BH25 0.5-0.6	BH25 1.5-1.6	BH25 2.5-2.6	BH25 3.5-3.6	BH25 4.5-4.6
				Client sampling date / time	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817421-021	EM1817421-022	EM1817421-023	EM1817421-024	EM1817421-025
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		0.6	<0.5	<0.5	1.2	7.4
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		15.3	<0.5	<0.5	24.8	153
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		1.2	<0.5	<0.5	2.9	20.3
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		1.4	0.6	0.6	3.2	20.3
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.7	1.2	1.2	3.4	20.3
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	140	480
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	140	290
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	280	770
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	250	690
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	130
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	250	820
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		94.2	94.3	93.1	95.0	93.1
2-Chlorophenol-D4	93951-73-6	0.5	%		88.0	87.5	86.8	88.5	87.5
2.4.6-Tribromophenol	118-79-6	0.5	%		65.9	61.5	65.6	69.5	80.0

Page : 17 of 24
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SALT (Matrix: SOIL)				Client sample ID	BH25 0.5-0.6	BH25 1.5-1.6	BH25 2.5-2.6	BH25 3.5-3.6	BH25 4.5-4.6
				Client sampling date / time	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817421-021	EM1817421-022	EM1817421-023	EM1817421-024	EM1817421-025
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		94.4	93.6	101	103	96.0
Anthracene-d10	1719-06-8	0.5	%		102	107	106	102	96.4
4-Terphenyl-d14	1718-51-0	0.5	%		99.8	100	102	99.4	95.4
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		75.8	84.4	88.8	76.0	81.1
Toluene-D8	2037-26-5	0.2	%		70.4	76.5	79.6	68.9	67.6
4-Bromofluorobenzene	460-00-4	0.2	%		80.2	88.9	96.1	79.2	83.0

Page : 18 of 24
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SALT (Matrix: SOIL)				Client sample ID	BH25 5.5-5.6	DUPLICATE 1	----	----	----
				Client sampling date / time	24-Oct-2018 00:00	24-Oct-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM1817421-026	EM1817421-027	--------	--------	--------
					Result	Result	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		16.7	17.2	----	----	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	----	----	----
Barium	7440-39-3	10	mg/kg		20	90	----	----	----
Beryllium	7440-41-7	1	mg/kg		<1	<1	----	----	----
Boron	7440-42-8	50	mg/kg		<50	<50	----	----	----
Cadmium	7440-43-9	1	mg/kg		<1	<1	----	----	----
Chromium	7440-47-3	2	mg/kg		4	29	----	----	----
Cobalt	7440-48-4	2	mg/kg		<2	21	----	----	----
Copper	7440-50-8	5	mg/kg		<5	60	----	----	----
Lead	7439-92-1	5	mg/kg		6	<5	----	----	----
Manganese	7439-96-5	5	mg/kg		28	364	----	----	----
Nickel	7440-02-0	2	mg/kg		<2	25	----	----	----
Selenium	7782-49-2	5	mg/kg		<5	<5	----	----	----
Vanadium	7440-62-2	5	mg/kg		<5	127	----	----	----
Zinc	7440-66-6	5	mg/kg		<5	40	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	----	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	----	----	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	----	----	----

Page : 19 of 24
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SALT (Matrix: SOIL)				Client sample ID	BH25 5.5-5.6	DUPLICATE 1	----	----	----
				Client sampling date / time	24-Oct-2018 00:00	24-Oct-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM1817421-026	EM1817421-027	--------	--------	--------
					Result	Result	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	0.6	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	1.2	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	----	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	<100	----	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	----	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	----	----	----
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	----	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	----	----	----
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		96.0	93.6	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		90.5	88.1	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		79.4	72.2	----	----	----

Page : 20 of 24
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SALT (Matrix: SOIL)				Client sample ID	BH25 5.5-5.6	DUPLICATE 1	----	----	----
				Client sampling date / time	24-Oct-2018 00:00	24-Oct-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM1817421-026	EM1817421-027	--------	--------	--------
					Result	Result	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		106	94.9	----	----	----
Anthracene-d10	1719-06-8	0.5	%		107	105	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		100	97.5	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		85.8	83.8	----	----	----
Toluene-D8	2037-26-5	0.2	%		72.6	69.3	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		90.9	88.0	----	----	----

Page : 21 of 24
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Rinsate Blank	----	----	----	----
				Client sampling date / time	24-Oct-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM1817421-028	--------	--------	--------	--------
					Result	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	----	----	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	----	----	----	----
Barium	7440-39-3	0.001	mg/L		<0.001	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L		<0.001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	----	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	----	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		<1.0	----	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	----	----	----	----
Acenaphthene	83-32-9	1.0	µg/L		<1.0	----	----	----	----
Fluorene	86-73-7	1.0	µg/L		<1.0	----	----	----	----
Phenanthrene	85-01-8	1.0	µg/L		<1.0	----	----	----	----
Anthracene	120-12-7	1.0	µg/L		<1.0	----	----	----	----
Fluoranthene	206-44-0	1.0	µg/L		<1.0	----	----	----	----
Pyrene	129-00-0	1.0	µg/L		<1.0	----	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	----	----	----	----
Chrysene	218-01-9	1.0	µg/L		<1.0	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		<0.5	----	----	----	----

Page : 22 of 24
Work Order : EM1817421
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Rinsate Blank	----	----	----	----
				Client sampling date / time	24-Oct-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM1817421-028	--------	--------	--------	--------
					Result	---	---	---	---
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	----	----	----	----
Toluene	108-88-3	2	µg/L		<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ Total Xylenes	----	2	µg/L		<2	----	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		29.9	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		72.2	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%		60.5	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		84.4	----	----	----	----
Anthracene-d10	1719-06-8	1.0	%		88.1	----	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		90.5	----	----	----	----

Page	: 23 of 24
Work Order	: EM1817421
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Rinsate Blank	----	----	----	----
				Client sampling date / time	24-Oct-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM1817421-028	--------	--------	--------	--------
					Result	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		97.9	----	----	----	----
Toluene-D8	2037-26-5	2	%		91.8	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		109	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SALT**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	54	125
2-Chlorophenol-D4	93951-73-6	65	123
2.4.6-Tribromophenol	118-79-6	34	122
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	61	125
Anthracene-d10	1719-06-8	62	130
4-Terphenyl-d14	1718-51-0	67	133
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	51	125
Toluene-D8	2037-26-5	55	125
4-Bromofluorobenzene	460-00-4	56	124

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	46
2-Chlorophenol-D4	93951-73-6	23	104
2.4.6-Tribromophenol	118-79-6	28	130
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	36	114
Anthracene-d10	1719-06-8	51	119
4-Terphenyl-d14	1718-51-0	49	127
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM1817821**	Page	: 1 of 9
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Project	: 48-52	Date Samples Received	: 30-Oct-2018 09:40
Order number	:	Date Analysis Commenced	: 07-Nov-2018
C-O-C number	: ----	Issue Date	: 09-Nov-2018 15:18
Sampler	: ----		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 13		
No. of samples analysed	: 13		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Eric Chau	Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

RIGHT SOLUTIONS | RIGHT PARTNER

Page	: 2 of 9
Work Order	: EM1817821
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- This is a rebatch of EM1817421
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Page : 3 of 9
Work Order : EM1817821
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH21 0.5-0.6	BH21 4.5-4.6	BH21 5.5-5.6	BH22 0.5-0.6	BH23 0.5-0.6
				Client sampling date / time	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817821-001	EM1817821-002	EM1817821-003	EM1817821-004	EM1817821-005
					Result	Result	Result	Result	Result
EN33: TCLP Leach									
Initial pH	----	0.1	pH Unit		9.2	8.3	8.9	9.2	9.6
After HCl pH	----	0.1	pH Unit		1.5	1.4	1.5	1.5	1.6
Extraction Fluid Number	----	1	-		1	1	1	1	1
Final pH	----	0.1	pH Unit		5.4	5.0	5.3	5.4	5.5

Page	: 4 of 9
Work Order	: EM1817821
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH23 1.5-1.6	BH23 2.5-2.6	BH23 3.5-3.6	BH23 4.5-4.6	BH23 5.5-5.6
			Client sampling date / time	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00
Compound	CAS Number	LOR	Unit	EM1817821-006	EM1817821-007	EM1817821-008	EM1817821-009	EM1817821-010
				Result	Result	Result	Result	Result
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	9.6	9.5	8.2	8.4	8.8
After HCl pH	----	0.1	pH Unit	1.6	1.8	1.5	1.6	1.5
Extraction Fluid Number	----	1	-	1	1	1	1	1
Final pH	----	0.1	pH Unit	5.9	6.6	7.0	5.3	5.1

Page : 5 of 9
Work Order : EM1817821
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH24 0.5-0.6	BH25 3.5-3.6	BH25 4.5-4.6	----	----
				Client sampling date / time	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		EM1817821-011	EM1817821-012	EM1817821-013	--------	--------
					Result	Result	Result	----	----
EN33: TCLP Leach									
Initial pH	----	0.1	pH Unit		9.3	9.2	9.2	----	----
After HCl pH	----	0.1	pH Unit		1.5	1.6	1.6	----	----
Extraction Fluid Number	----	1	-		1	1	1	----	----
Final pH	----	0.1	pH Unit		5.2	5.3	5.6	----	----

Page : 6 of 9
Work Order : EM1817821
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: TCLP LEACHATE (Matrix: WATER)				Client sample ID	BH21 0.5-0.6	BH21 4.5-4.6	BH21 5.5-5.6	BH22 0.5-0.6	BH23 0.5-0.6
				Client sampling date / time	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817821-001	EM1817821-002	EM1817821-003	EM1817821-004	EM1817821-005
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		1.1	<1.0	<1.0	<1.0	1.7
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	2.5
Fluorene	86-73-7	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	2.1
Phenanthrene	85-01-8	1.0	µg/L		2.0	3.0	1.2	<1.0	9.3
Anthracene	120-12-7	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	1.7
Fluoranthene	206-44-0	1.0	µg/L		<1.0	1.1	<1.0	<1.0	2.4
Pyrene	129-00-0	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	1.8
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		3.1	4.1	1.2	<0.5	21.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		24.2	26.8	23.6	27.9	30.7
2-Chlorophenol-D4	93951-73-6	1.0	%		53.3	64.8	56.4	65.9	70.7
2.4.6-Tribromophenol	118-79-6	1.0	%		58.0	73.0	63.4	77.8	85.4
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		69.2	83.8	73.4	87.2	95.6
Anthracene-d10	1719-06-8	1.0	%		66.0	79.4	70.2	82.2	88.9
4-Terphenyl-d14	1718-51-0	1.0	%		64.4	80.4	68.0	82.9	89.3

Page : 7 of 9
Work Order : EM1817821
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: TCLP LEACHATE (Matrix: WATER)				Client sample ID	BH23 1.5-1.6	BH23 2.5-2.6	BH23 3.5-3.6	BH23 4.5-4.6	BH23 5.5-5.6
				Client sampling date / time	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817821-006	EM1817821-007	EM1817821-008	EM1817821-009	EM1817821-010
					Result	Result	Result	Result	Result
EG005C: Leachable Metals by ICPAES									
Barium	7440-39-3	0.1	mg/L		----	----	0.8	----	----
Copper	7440-50-8	0.1	mg/L		----	----	2.9	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		<1.0	3.0	<1.0	<1.0	3.4
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	1.7	<1.0	<1.0	9.1
Acenaphthene	83-32-9	1.0	µg/L		<1.0	25.7	<1.0	<1.0	7.2
Fluorene	86-73-7	1.0	µg/L		<1.0	15.0	<1.0	<1.0	9.2
Phenanthrene	85-01-8	1.0	µg/L		1.4	58.6	1.7	1.8	43.2
Anthracene	120-12-7	1.0	µg/L		<1.0	12.6	<1.0	<1.0	6.0
Fluoranthene	206-44-0	1.0	µg/L		<1.0	14.8	<1.0	<1.0	6.6
Pyrene	129-00-0	1.0	µg/L		<1.0	11.0	<1.0	<1.0	5.4
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		1.4	142	1.7	1.8	90.1
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		28.0	25.4	32.1	28.4	28.3
2-Chlorophenol-D4	93951-73-6	1.0	%		68.3	60.2	76.8	63.1	66.7
2.4.6-Tribromophenol	118-79-6	1.0	%		76.9	65.2	86.4	74.9	82.3
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		85.6	76.4	101	80.9	83.4
Anthracene-d10	1719-06-8	1.0	%		81.5	64.8	96.3	79.7	73.1
4-Terphenyl-d14	1718-51-0	1.0	%		82.4	64.6	99.1	78.0	72.9

Page : 8 of 9
Work Order : EM1817821
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: TCLP LEACHATE (Matrix: WATER)				Client sample ID	BH24 0.5-0.6	BH25 3.5-3.6	BH25 4.5-4.6	----	----
				Client sampling date / time	24-Oct-2018 00:00	24-Oct-2018 00:00	24-Oct-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		EM1817821-011	EM1817821-012	EM1817821-013	--------	--------
					Result	Result	Result	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		<1.0	<1.0	1.1	----	----
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	1.2	<1.0	----	----
Acenaphthene	83-32-9	1.0	µg/L		<1.0	<1.0	2.5	----	----
Fluorene	86-73-7	1.0	µg/L		<1.0	1.0	1.8	----	----
Phenanthrene	85-01-8	1.0	µg/L		<1.0	4.8	4.4	----	----
Anthracene	120-12-7	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Fluoranthene	206-44-0	1.0	µg/L		<1.0	1.3	1.0	----	----
Pyrene	129-00-0	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Chrysene	218-01-9	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	<1.0	<1.0	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		<0.5	8.3	10.8	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	<0.5	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		29.0	30.7	26.5	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		66.5	71.2	61.7	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%		80.0	83.3	73.5	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		82.7	86.4	79.1	----	----
Anthracene-d10	1719-06-8	1.0	%		78.0	82.1	76.4	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		70.3	78.7	74.8	----	----

Surrogate Control Limits

Sub-Matrix: **TCLP LEACHATE**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	46
2-Chlorophenol-D4	93951-73-6	23	104
2.4.6-Tribromophenol	118-79-6	28	130
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	36	114
Anthracene-d10	1719-06-8	51	119
4-Terphenyl-d14	1718-51-0	49	127

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM1817564**	Page	: 1 of 30
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Project	: 48-52	Date Samples Received	: 01-Nov-2018 09:40
Order number	:	Date Analysis Commenced	: 01-Nov-2018
C-O-C number	: ----	Issue Date	: 09-Nov-2018 16:39
Sampler	: AARON PLUMMER		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 43		
No. of samples analysed	: 43		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Eric Chau	Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

RIGHT SOLUTIONS | RIGHT PARTNER

Page	: 2 of 30
Work Order	: EM1817564
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP080: Particular sample EM1817564_29 shows positive hit for Napthalene. Confirmed by re-analysis.
- EG005T:EM1817564_023 and 042 have been confirmed for metals by re-preparation and re-analysis.
- EP075SIM: Sample EM1817564_11 Poor duplicate precision due to sample heterogeneity. Confirmed by visual inspection.
- EG005T: EM1817564_022 Poor matrix spike recovery for Copper due to sample matrix. Confirmed by re-extraction and re-analysis.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Page : 3 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH26 0.1-0.2	BH26 0.5-0.6	BH27 0.1-0.2	BH27 0.5-0.6	BH27 1.0-1.1
				Client sampling date / time	29-Oct-2018 00:00	29-Oct-2018 00:00	29-Oct-2018 00:00	29-Oct-2018 00:00	29-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817564-001	EM1817564-002	EM1817564-003	EM1817564-004	EM1817564-005
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		13.3	10.8	14.0	19.9	19.4
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	16	<5	21	<5
Barium	7440-39-3	10	mg/kg		30	310	90	100	120
Beryllium	7440-41-7	1	mg/kg		<1	2	<1	1	<1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		6	16	6	17	9
Cobalt	7440-48-4	2	mg/kg		4	31	10	16	16
Copper	7440-50-8	5	mg/kg		23	11	46	21	38
Lead	7439-92-1	5	mg/kg		14	17	28	43	278
Manganese	7439-96-5	5	mg/kg		56	221	255	194	215
Nickel	7440-02-0	2	mg/kg		4	42	6	15	18
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		33	30	42	32	25
Zinc	7440-66-6	5	mg/kg		30	52	59	80	75
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	0.2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	2.2	<0.5	1.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	0.6
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	2.5	<0.5	2.9
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	2.8	<0.5	3.7
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	1.2	<0.5	3.0
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	1.1	<0.5	2.7
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	1.2	<0.5	5.6
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	1.9
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	1.1	<0.5	5.6
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	3.0
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	0.8

Page : 4 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH26 0.1-0.2	BH26 0.5-0.6	BH27 0.1-0.2	BH27 0.5-0.6	BH27 1.0-1.1
				Client sampling date / time	29-Oct-2018 00:00	29-Oct-2018 00:00	29-Oct-2018 00:00	29-Oct-2018 00:00	29-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817564-001	EM1817564-002	EM1817564-003	EM1817564-004	EM1817564-005
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	0.6	<0.5	4.1
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	12.7	<0.5	35.4
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	1.4	<0.5	7.8
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	0.6	1.6	0.6	7.8
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	1.2	2.0	1.2	7.8
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	150
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	170
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	320
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	280
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	280
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		86.2	83.7	88.6	87.7	86.4
2-Chlorophenol-D4	93951-73-6	0.5	%		87.6	85.5	90.9	90.4	89.4
2.4.6-Tribromophenol	118-79-6	0.5	%		68.4	65.9	73.6	69.0	73.9

Page : 5 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH26 0.1-0.2	BH26 0.5-0.6	BH27 0.1-0.2	BH27 0.5-0.6	BH27 1.0-1.1
				Client sampling date / time	29-Oct-2018 00:00	29-Oct-2018 00:00	29-Oct-2018 00:00	29-Oct-2018 00:00	29-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817564-001	EM1817564-002	EM1817564-003	EM1817564-004	EM1817564-005
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		94.4	98.3	103	102	103
Anthracene-d10	1719-06-8	0.5	%		100	100	98.7	104	99.0
4-Terphenyl-d14	1718-51-0	0.5	%		93.1	91.6	94.8	96.6	94.5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		70.8	73.3	75.0	70.9	71.8
Toluene-D8	2037-26-5	0.2	%		62.4	70.4	68.2	67.1	68.4
4-Bromofluorobenzene	460-00-4	0.2	%		72.9	78.1	80.0	75.9	78.3

Page : 6 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH27 1.5-1.6	BH27 1.9-2.0	BH28 0.1-0.2	BH28 0.5-0.6	BH28 1.0-1.1
				Client sampling date / time	29-Oct-2018 00:00	29-Oct-2018 00:00	29-Oct-2018 00:00	29-Oct-2018 00:00	29-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817564-006	EM1817564-007	EM1817564-008	EM1817564-009	EM1817564-010
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		11.6	9.7	13.9	15.6	17.0
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		14	14	<5	<5	<5
Barium	7440-39-3	10	mg/kg		30	40	30	80	30
Beryllium	7440-41-7	1	mg/kg		2	<1	<1	<1	<1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		14	20	8	18	12
Cobalt	7440-48-4	2	mg/kg		23	22	<2	16	2
Copper	7440-50-8	5	mg/kg		6	7	<5	21	<5
Lead	7439-92-1	5	mg/kg		10	12	6	34	12
Manganese	7439-96-5	5	mg/kg		422	1500	30	314	124
Nickel	7440-02-0	2	mg/kg		34	38	3	20	6
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		18	26	21	36	28
Zinc	7440-66-6	5	mg/kg		32	53	12	72	43
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	<0.5	1.1	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	<0.5	2.2	<0.5
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	<0.5	2.3	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	0.9	<0.5
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	0.8	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	1.3	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	1.2	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	0.6	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5

Page : 7 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH27 1.5-1.6	BH27 1.9-2.0	BH28 0.1-0.2	BH28 0.5-0.6	BH28 1.0-1.1
				Client sampling date / time	29-Oct-2018 00:00	29-Oct-2018 00:00	29-Oct-2018 00:00	29-Oct-2018 00:00	29-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817564-006	EM1817564-007	EM1817564-008	EM1817564-009	EM1817564-010
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	0.8	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	<0.5	11.2	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	1.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	0.6	0.6	1.8	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	1.2	1.2	2.0	1.2
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		88.4	85.6	88.4	86.5	85.0
2-Chlorophenol-D4	93951-73-6	0.5	%		89.4	87.0	91.0	88.5	87.6
2.4.6-Tribromophenol	118-79-6	0.5	%		71.6	67.3	69.4	73.3	66.1

Page : 8 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH27 1.5-1.6	BH27 1.9-2.0	BH28 0.1-0.2	BH28 0.5-0.6	BH28 1.0-1.1
				Client sampling date / time	29-Oct-2018 00:00	29-Oct-2018 00:00	29-Oct-2018 00:00	29-Oct-2018 00:00	29-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817564-006	EM1817564-007	EM1817564-008	EM1817564-009	EM1817564-010
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		102	98.4	102	96.1	93.4
Anthracene-d10	1719-06-8	0.5	%		103	102	106	99.6	101
4-Terphenyl-d14	1718-51-0	0.5	%		95.1	92.5	96.3	94.1	93.6
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		67.6	72.9	73.1	73.0	72.7
Toluene-D8	2037-26-5	0.2	%		62.2	71.0	68.2	75.2	70.7
4-Bromofluorobenzene	460-00-4	0.2	%		75.8	78.2	79.7	84.0	79.4

Page : 9 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH28 1.2-1.3	BH29 0.5-0.6	BH29 1.5-1.6	BH29 2.1-2.2	BH30 0.3-0.4
				Client sampling date / time	29-Oct-2018 00:00	30-Oct-2018 00:00	30-Oct-2018 00:00	30-Oct-2018 00:00	30-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817564-011	EM1817564-012	EM1817564-013	EM1817564-014	EM1817564-015
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		24.9	13.5	14.2	15.3	14.3
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	<5
Barium	7440-39-3	10	mg/kg		80	100	110	70	100
Beryllium	7440-41-7	1	mg/kg		<1	<1	<1	<1	<1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		8	8	11	10	12
Cobalt	7440-48-4	2	mg/kg		11	13	9	12	12
Copper	7440-50-8	5	mg/kg		18	43	25	6	23
Lead	7439-92-1	5	mg/kg		81	70	78	10	53
Manganese	7439-96-5	5	mg/kg		190	345	249	150	316
Nickel	7440-02-0	2	mg/kg		9	14	10	11	16
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		25	42	36	22	28
Zinc	7440-66-6	5	mg/kg		456	112	86	23	100
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		0.4	<0.1	0.3	<0.1	0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		1.1	1.1	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		1.1	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		8.7	5.8	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		3.4	1.4	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		15.6	8.7	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg		17.0	9.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		8.0	4.1	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg		7.2	3.6	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		7.6	5.0	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		3.0	1.6	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		7.3	4.6	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		3.3	2.3	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		0.9	0.6	<0.5	<0.5	<0.5

Page : 10 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH28 1.2-1.3	BH29 0.5-0.6	BH29 1.5-1.6	BH29 2.1-2.2	BH30 0.3-0.4
				Client sampling date / time	29-Oct-2018 00:00	30-Oct-2018 00:00	30-Oct-2018 00:00	30-Oct-2018 00:00	30-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817564-011	EM1817564-012	EM1817564-013	EM1817564-014	EM1817564-015
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		4.2	3.0	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		88.4	51.3	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		10.5	6.6	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		10.5	6.6	0.6	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		10.5	6.6	1.2	1.2	1.2
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		350	260	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		200	180	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		550	440	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		480	390	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		480	390	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		87.2	84.4	84.3	87.3	88.3
2-Chlorophenol-D4	93951-73-6	0.5	%		91.0	86.4	86.3	89.2	87.2
2.4.6-Tribromophenol	118-79-6	0.5	%		73.1	71.9	71.6	71.4	70.3

Page : 11 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH28 1.2-1.3	BH29 0.5-0.6	BH29 1.5-1.6	BH29 2.1-2.2	BH30 0.3-0.4
				Client sampling date / time	29-Oct-2018 00:00	30-Oct-2018 00:00	30-Oct-2018 00:00	30-Oct-2018 00:00	30-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817564-011	EM1817564-012	EM1817564-013	EM1817564-014	EM1817564-015
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		93.1	87.8	92.7	94.6	93.7
Anthracene-d10	1719-06-8	0.5	%		104	99.6	98.4	102	99.4
4-Terphenyl-d14	1718-51-0	0.5	%		95.6	89.2	92.5	94.9	93.4
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		70.4	75.5	74.5	72.8	73.2
Toluene-D8	2037-26-5	0.2	%		71.3	71.7	72.7	67.5	72.8
4-Bromofluorobenzene	460-00-4	0.2	%		76.5	79.8	80.5	79.0	81.2

Page : 12 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH31 0.5-0.6	BH31 1.5-1.6	BH32 0.5-0.6	BH33 0.5-0.6	BH34 0.5-0.6
				Client sampling date / time	30-Oct-2018 00:00	30-Oct-2018 00:00	30-Oct-2018 00:00	30-Oct-2018 00:00	30-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817564-016	EM1817564-017	EM1817564-018	EM1817564-019	EM1817564-020
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		16.8	10.5	15.6	16.8	13.5
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		7	6	<5	<5	<5
Barium	7440-39-3	10	mg/kg		70	100	90	80	380
Beryllium	7440-41-7	1	mg/kg		<1	<1	<1	<1	<1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		12	13	14	9	15
Cobalt	7440-48-4	2	mg/kg		12	17	6	4	8
Copper	7440-50-8	5	mg/kg		9	7	13	6	6
Lead	7439-92-1	5	mg/kg		19	12	21	15	10
Manganese	7439-96-5	5	mg/kg		134	584	136	80	45
Nickel	7440-02-0	2	mg/kg		13	28	13	6	10
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		25	18	25	21	31
Zinc	7440-66-6	5	mg/kg		61	58	36	20	16
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	1.4	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	1.7	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	1.0	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	1.0	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	1.2	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	1.1	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5

Page : 13 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH31 0.5-0.6	BH31 1.5-1.6	BH32 0.5-0.6	BH33 0.5-0.6	BH34 0.5-0.6
				Client sampling date / time	30-Oct-2018 00:00	30-Oct-2018 00:00	30-Oct-2018 00:00	30-Oct-2018 00:00	30-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817564-016	EM1817564-017	EM1817564-018	EM1817564-019	EM1817564-020
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	0.6	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	8.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	1.4	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	0.6	1.7	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	1.2	1.9	1.2	1.2
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		83.6	91.0	84.3	97.0	90.8
2-Chlorophenol-D4	93951-73-6	0.5	%		86.0	93.1	86.5	98.9	92.0
2.4.6-Tribromophenol	118-79-6	0.5	%		68.1	72.6	75.0	81.0	75.0

Page : 14 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH31 0.5-0.6	BH31 1.5-1.6	BH32 0.5-0.6	BH33 0.5-0.6	BH34 0.5-0.6
				Client sampling date / time	30-Oct-2018 00:00	30-Oct-2018 00:00	30-Oct-2018 00:00	30-Oct-2018 00:00	30-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817564-016	EM1817564-017	EM1817564-018	EM1817564-019	EM1817564-020
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		92.4	94.0	87.3	104	98.2
Anthracene-d10	1719-06-8	0.5	%		100	107	97.9	116	109
4-Terphenyl-d14	1718-51-0	0.5	%		91.8	98.9	90.4	106	99.5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		75.9	69.9	70.1	69.8	77.7
Toluene-D8	2037-26-5	0.2	%		75.0	71.0	68.0	69.8	76.6
4-Bromofluorobenzene	460-00-4	0.2	%		82.7	77.7	79.8	77.5	83.7

Page : 15 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH35 0.5-0.6	BH35 1.5-1.6	Duplicate 2	BH36 0.5-0.6	BH37 0.5-0.6
				Client sampling date / time	30-Oct-2018 00:00	30-Oct-2018 00:00	30-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817564-021	EM1817564-022	EM1817564-023	EM1817564-027	EM1817564-028
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		11.8	15.0	11.4	22.7	11.5
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	13
Barium	7440-39-3	10	mg/kg		140	180	90	100	160
Beryllium	7440-41-7	1	mg/kg		<1	<1	<1	<1	<1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		12	11	9	17	13
Cobalt	7440-48-4	2	mg/kg		11	15	14	19	12
Copper	7440-50-8	5	mg/kg		32	44	51	40	67
Lead	7439-92-1	5	mg/kg		152	82	88	10	231
Manganese	7439-96-5	5	mg/kg		267	346	322	624	295
Nickel	7440-02-0	2	mg/kg		12	17	13	17	14
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		40	37	50	68	30
Zinc	7440-66-6	5	mg/kg		163	130	104	40	367
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		0.2	0.2	<0.1	<0.1	1.0
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	0.7	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		0.5	<0.5	3.3	<0.5	1.2
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	1.8	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	4.9	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		2.8	2.3	49.2	<0.5	5.4
Anthracene	120-12-7	0.5	mg/kg		0.8	0.5	9.8	<0.5	1.3
Fluoranthene	206-44-0	0.5	mg/kg		5.0	3.6	57.9	<0.5	10.1
Pyrene	129-00-0	0.5	mg/kg		5.1	3.6	51.0	<0.5	10.3
Benz(a)anthracene	56-55-3	0.5	mg/kg		2.3	1.5	17.2	<0.5	5.0
Chrysene	218-01-9	0.5	mg/kg		2.1	1.3	15.1	<0.5	4.4
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		3.1	1.9	23.1	<0.5	7.4
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		1.0	0.6	8.0	<0.5	2.2
Benzo(a)pyrene	50-32-8	0.5	mg/kg		2.7	1.6	21.6	<0.5	6.8
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		1.6	0.9	11.7	<0.5	3.8
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	2.5	<0.5	1.0

Page : 16 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH35 0.5-0.6	BH35 1.5-1.6	Duplicate 2	BH36 0.5-0.6	BH37 0.5-0.6
				Client sampling date / time	30-Oct-2018 00:00	30-Oct-2018 00:00	30-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817564-021	EM1817564-022	EM1817564-023	EM1817564-027	EM1817564-028
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		2.1	1.2	14.6	<0.5	4.9
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		29.1	19.0	292	<0.5	63.8
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		3.5	2.1	30.4	<0.5	9.7
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		3.8	2.4	30.4	0.6	9.7
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		4.0	2.6	30.4	1.2	9.7
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		130	<100	600	<100	260
C29 - C36 Fraction	----	100	mg/kg		140	<100	370	<100	210
^ C10 - C36 Fraction (sum)	----	50	mg/kg		270	<50	970	<50	470
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		230	130	820	<100	400
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	190	<100	100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		230	130	1010	<50	500
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		96.0	87.8	87.9	84.3	87.3
2-Chlorophenol-D4	93951-73-6	0.5	%		97.1	92.7	92.4	88.7	91.5
2.4.6-Tribromophenol	118-79-6	0.5	%		88.6	81.0	86.2	76.7	82.8

Environmental Site Assessment (V9) 52 New Town Road, New Town. June 2025.

Page	: 17 of 30
Work Order	: EM1817564
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH35 0.5-0.6	BH35 1.5-1.6	Duplicate 2	BH36 0.5-0.6	BH37 0.5-0.6
				Client sampling date / time	30-Oct-2018 00:00	30-Oct-2018 00:00	30-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817564-021	EM1817564-022	EM1817564-023	EM1817564-027	EM1817564-028
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		99.0	96.6	96.0	93.8	93.4
Anthracene-d10	1719-06-8	0.5	%		101	108	90.4	116	99.0
4-Terphenyl-d14	1718-51-0	0.5	%		95.7	96.1	83.4	98.3	90.5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		68.8	72.1	71.3	63.4	79.5
Toluene-D8	2037-26-5	0.2	%		61.3	65.2	67.8	59.0	76.6
4-Bromofluorobenzene	460-00-4	0.2	%		74.2	75.1	76.3	76.8	84.0

Page : 18 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH37 1.5-1.6	BH37 2.5-2.6	BH37 3.5-3.6	BH38 0.5-0.6	BH38 1.5-1.6
				Client sampling date / time	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817564-029	EM1817564-030	EM1817564-031	EM1817564-032	EM1817564-033
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		11.8	14.4	15.3	16.6	20.1
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	9	<5	<5	<5
Barium	7440-39-3	10	mg/kg		40	240	20	70	170
Beryllium	7440-41-7	1	mg/kg		<1	1	<1	<1	<1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		14	25	15	14	9
Cobalt	7440-48-4	2	mg/kg		12	11	12	15	17
Copper	7440-50-8	5	mg/kg		30	9	11	13	14
Lead	7439-92-1	5	mg/kg		42	53	18	57	89
Manganese	7439-96-5	5	mg/kg		112	350	238	356	174
Nickel	7440-02-0	2	mg/kg		11	16	15	13	13
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		46	61	29	30	17
Zinc	7440-66-6	5	mg/kg		73	40	44	45	108
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	0.2	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		0.6	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		0.9	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		0.6	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		1.7	0.6	0.7	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		18.6	5.4	7.4	0.7	<0.5
Anthracene	120-12-7	0.5	mg/kg		3.6	1.0	1.4	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		20.8	6.1	8.7	1.9	1.2
Pyrene	129-00-0	0.5	mg/kg		18.7	5.6	8.0	2.2	1.3
Benz(a)anthracene	56-55-3	0.5	mg/kg		5.8	1.8	2.5	1.2	0.6
Chrysene	218-01-9	0.5	mg/kg		5.2	1.5	2.2	1.1	0.6
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		8.3	2.2	3.3	1.5	0.8
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		2.3	0.8	1.2	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		7.4	2.0	3.0	1.3	0.7
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		4.2	1.1	1.7	0.6	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		0.9	<0.5	<0.5	<0.5	<0.5

Page : 19 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH37 1.5-1.6	BH37 2.5-2.6	BH37 3.5-3.6	BH38 0.5-0.6	BH38 1.5-1.6
				Client sampling date / time	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817564-029	EM1817564-030	EM1817564-031	EM1817564-032	EM1817564-033
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		5.6	1.4	2.2	0.8	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		105	29.5	42.3	11.3	5.2
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		10.5	2.6	3.9	1.6	0.8
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		10.5	2.9	4.2	1.9	1.1
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		10.5	3.1	4.4	2.2	1.4
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		260	110	120	<100	<100
C29 - C36 Fraction	----	100	mg/kg		170	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		430	110	120	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		370	160	160	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		370	160	160	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		2	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		86.7	85.4	90.0	84.4	74.3
2-Chlorophenol-D4	93951-73-6	0.5	%		91.1	89.2	94.5	89.3	78.4
2.4.6-Tribromophenol	118-79-6	0.5	%		84.3	80.5	82.2	76.0	68.6

Page : 20 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH37 1.5-1.6	BH37 2.5-2.6	BH37 3.5-3.6	BH38 0.5-0.6	BH38 1.5-1.6
				Client sampling date / time	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817564-029	EM1817564-030	EM1817564-031	EM1817564-032	EM1817564-033
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		95.2	93.3	98.1	92.2	80.0
Anthracene-d10	1719-06-8	0.5	%		96.3	102	105	107	94.6
4-Terphenyl-d14	1718-51-0	0.5	%		90.1	92.1	95.6	93.4	83.0
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		74.5	72.2	75.7	68.7	69.4
Toluene-D8	2037-26-5	0.2	%		78.3	70.4	70.5	64.3	63.8
4-Bromofluorobenzene	460-00-4	0.2	%		87.6	79.6	78.6	76.8	73.8

Page : 21 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH38 2.5-2.6	BH39 0.5-0.6	BH39 1.5-1.6	BH39 2.5-2.6	BH40 0.5-0.6
				Client sampling date / time	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817564-034	EM1817564-035	EM1817564-036	EM1817564-037	EM1817564-038
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		18.2	17.8	17.8	7.4	5.7
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	<5
Barium	7440-39-3	10	mg/kg		70	60	80	50	30
Beryllium	7440-41-7	1	mg/kg		<1	<1	<1	<1	<1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	1	<1
Chromium	7440-47-3	2	mg/kg		14	13	15	8	6
Cobalt	7440-48-4	2	mg/kg		11	10	7	8	10
Copper	7440-50-8	5	mg/kg		14	18	24	198	60
Lead	7439-92-1	5	mg/kg		14	42	36	359	12
Manganese	7439-96-5	5	mg/kg		165	301	146	176	267
Nickel	7440-02-0	2	mg/kg		14	16	9	10	12
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		28	24	38	39	44
Zinc	7440-66-6	5	mg/kg		40	47	71	227	34
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	0.1	<0.1	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	1.4	4.2
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	2.5	24.2
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	1.1	1.2
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	2.6	3.2
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	3.8	30.2	50.7
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	0.9	6.0	18.6
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	5.6	43.6	179
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	5.4	39.0	200
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	2.1	14.3	93.0
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	2.0	13.6	83.4
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	2.5	21.2	158
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	1.1	7.3	29.0
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	2.2	19.0	76.6
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	1.1	10.8	54.7
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	2.4	18.5

Page : 22 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH38 2.5-2.6	BH39 0.5-0.6	BH39 1.5-1.6	BH39 2.5-2.6	BH40 0.5-0.6
				Client sampling date / time	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817564-034	EM1817564-035	EM1817564-036	EM1817564-037	EM1817564-038
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	1.5	14.2	63.6
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	28.2	229	1060
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	2.9	27.0	130
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	0.6	3.2	27.0	130
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	1.2	3.4	27.0	130
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	90
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	660	4390
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	460	2890
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	1120	7370
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	270
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	110	960	6330
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	220	1050
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	110	1180	7650
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	270
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		89.0	87.9	85.2	82.8	82.6
2-Chlorophenol-D4	93951-73-6	0.5	%		91.8	91.1	89.4	87.2	87.2
2.4.6-Tribromophenol	118-79-6	0.5	%		80.2	76.8	77.0	79.4	84.2

Page : 23 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH38 2.5-2.6	BH39 0.5-0.6	BH39 1.5-1.6	BH39 2.5-2.6	BH40 0.5-0.6
				Client sampling date / time	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817564-034	EM1817564-035	EM1817564-036	EM1817564-037	EM1817564-038
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		96.5	94.5	91.6	90.5	90.2
Anthracene-d10	1719-06-8	0.5	%		114	116	103	97.4	92.0
4-Terphenyl-d14	1718-51-0	0.5	%		102	99.5	91.8	85.2	83.4
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		74.2	72.0	70.6	73.2	80.9
Toluene-D8	2037-26-5	0.2	%		69.2	69.5	68.8	68.2	74.0
4-Bromofluorobenzene	460-00-4	0.2	%		81.0	78.8	83.4	80.3	84.4

Page : 24 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH40 1.5-1.6	BH40 2.5-2.6	BH40 3.5-3.6	Duplicate 3	Duplicate 4
				Client sampling date / time	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817564-039	EM1817564-040	EM1817564-041	EM1817564-042	EM1817564-043
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		8.0	10.6	8.6	17.8	7.4
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	10	<5
Barium	7440-39-3	10	mg/kg		50	60	40	80	40
Beryllium	7440-41-7	1	mg/kg		<1	<1	<1	<1	<1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		6	9	9	17	9
Cobalt	7440-48-4	2	mg/kg		18	13	14	18	17
Copper	7440-50-8	5	mg/kg		70	14	51	50	55
Lead	7439-92-1	5	mg/kg		46	15	22	69	28
Manganese	7439-96-5	5	mg/kg		353	183	272	481	270
Nickel	7440-02-0	2	mg/kg		14	17	14	16	16
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		60	12	40	91	42
Zinc	7440-66-6	5	mg/kg		62	60	51	175	60
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		1.4	<0.5	2.4	<0.5	2.2
Acenaphthylene	208-96-8	0.5	mg/kg		8.2	<0.5	14.0	0.8	11.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	1.7	0.5	1.2
Fluorene	86-73-7	0.5	mg/kg		1.2	<0.5	5.1	0.7	4.0
Phenanthrene	85-01-8	0.5	mg/kg		27.4	1.0	66.7	11.2	50.0
Anthracene	120-12-7	0.5	mg/kg		9.2	<0.5	18.9	2.4	14.3
Fluoranthene	206-44-0	0.5	mg/kg		59.3	2.3	99.5	12.5	79.7
Pyrene	129-00-0	0.5	mg/kg		61.1	2.6	94.7	12.0	78.4
Benz(a)anthracene	56-55-3	0.5	mg/kg		32.7	1.4	50.7	4.8	42.4
Chrysene	218-01-9	0.5	mg/kg		28.9	1.2	44.4	4.5	38.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		43.9	1.8	68.2	5.6	58.6
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		12.6	0.6	22.0	1.6	15.8
Benzo(a)pyrene	50-32-8	0.5	mg/kg		37.4	1.6	59.6	4.7	49.0
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		18.9	0.8	29.1	2.3	24.0
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		6.1	<0.5	9.6	0.7	8.0

Page : 25 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH40 1.5-1.6	BH40 2.5-2.6	BH40 3.5-3.6	Duplicate 3	Duplicate 4
				Client sampling date / time	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817564-039	EM1817564-040	EM1817564-041	EM1817564-042	EM1817564-043
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		22.8	1.0	34.7	2.8	27.8
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		371	14.3	621	67.1	505
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		54.8	2.1	87.0	6.9	71.7
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		54.8	2.3	87.0	6.9	71.7
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		54.8	2.6	87.0	6.9	71.7
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	50	<50	50
C15 - C28 Fraction	----	100	mg/kg		1510	<100	2620	280	2510
C29 - C36 Fraction	----	100	mg/kg		960	<100	1610	200	1520
^ C10 - C36 Fraction (sum)	----	50	mg/kg		2470	<50	4280	480	4080
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		100	<50	180	<50	180
>C16 - C34 Fraction	----	100	mg/kg		2120	140	3640	400	3470
>C34 - C40 Fraction	----	100	mg/kg		400	<100	640	110	590
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		2620	140	4460	510	4240
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		100	<50	180	<50	180
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		93.1	92.0	87.5	89.9	75.0
2-Chlorophenol-D4	93951-73-6	0.5	%		96.5	95.7	90.8	93.7	77.6
2.4.6-Tribromophenol	118-79-6	0.5	%		85.4	78.6	79.8	82.9	69.8

Page : 26 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH40 1.5-1.6	BH40 2.5-2.6	BH40 3.5-3.6	Duplicate 3	Duplicate 4
				Client sampling date / time	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817564-039	EM1817564-040	EM1817564-041	EM1817564-042	EM1817564-043
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		96.4	95.2	89.8	93.7	76.1
Anthracene-d10	1719-06-8	0.5	%		102	106	88.8	98.2	78.2
4-Terphenyl-d14	1718-51-0	0.5	%		91.6	95.3	81.6	94.5	70.9
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		72.5	80.3	74.7	68.9	71.5
Toluene-D8	2037-26-5	0.2	%		63.0	78.4	69.7	61.7	66.8
4-Bromofluorobenzene	460-00-4	0.2	%		77.8	85.3	79.5	75.7	75.5

Page : 27 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Rinsate 2	Rinsate 3	Rinsate 4	----	----
				Client sampling date / time	29-Oct-2018 00:00	30-Oct-2018 00:00	31-Oct-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		EM1817564-024	EM1817564-025	EM1817564-026	--------	--------
					Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	----	----
Barium	7440-39-3	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Acenaphthene	83-32-9	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Fluorene	86-73-7	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Phenanthrene	85-01-8	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Anthracene	120-12-7	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Fluoranthene	206-44-0	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Pyrene	129-00-0	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Chrysene	218-01-9	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	<1.0	<1.0	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		<0.5	<0.5	<0.5	----	----

Page : 28 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Rinsate 2	Rinsate 3	Rinsate 4	----	----
				Client sampling date / time	29-Oct-2018 00:00	30-Oct-2018 00:00	31-Oct-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		EM1817564-024	EM1817564-025	EM1817564-026	--------	--------
					Result	Result	Result	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	<0.5	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ Total Xylenes	----	2	µg/L		<2	<2	<2	----	----
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		31.0	13.6	28.2	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		70.1	29.6	62.7	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%		58.4	43.1	56.1	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		89.2	37.9	79.0	----	----
Anthracene-d10	1719-06-8	1.0	%		87.7	70.0	80.5	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		87.1	82.1	80.5	----	----

Page : 29 of 30
Work Order : EM1817564
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Rinsate 2	Rinsate 3	Rinsate 4	----	----
				Client sampling date / time	29-Oct-2018 00:00	30-Oct-2018 00:00	31-Oct-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		EM1817564-024	EM1817564-025	EM1817564-026	--------	--------
					Result	Result	Result	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		98.0	99.5	94.2	----	----
Toluene-D8	2037-26-5	2	%		89.7	87.4	83.6	----	----
4-Bromofluorobenzene	460-00-4	2	%		104	102	101	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	54	125
2-Chlorophenol-D4	93951-73-6	65	123
2.4.6-Tribromophenol	118-79-6	34	122
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	61	125
Anthracene-d10	1719-06-8	62	130
4-Terphenyl-d14	1718-51-0	67	133
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	51	125
Toluene-D8	2037-26-5	55	125
4-Bromofluorobenzene	460-00-4	56	124

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	46
2-Chlorophenol-D4	93951-73-6	23	104
2.4.6-Tribromophenol	118-79-6	28	130
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	36	114
Anthracene-d10	1719-06-8	51	119
4-Terphenyl-d14	1718-51-0	49	127
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM1818156**	Page	: 1 of 9
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Project	: 48-52	Date Samples Received	: 01-Nov-2018 09:40
Order number	:	Date Analysis Commenced	: 13-Nov-2018
C-O-C number	: ----	Issue Date	: 15-Nov-2018 12:13
Sampler	: ----		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 13		
No. of samples analysed	: 13		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Eric Chau	Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

RIGHT SOLUTIONS | RIGHT PARTNER

Page	: 2 of 9
Work Order	: EM1818156
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- This is a rebatch of EM1817564
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Page : 3 of 9
Work Order : EM1818156
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: TCLP LEACHATE (Matrix: WATER)				Client sample ID	BH27 1.0-1.1	BH28 1.2-1.3	BH29 0.5-0.6	BH35 0.5-0.6	BH37 0.5-0.6
				Client sampling date / time	29-Oct-2018 00:00	29-Oct-2018 00:00	30-Oct-2018 00:00	30-Oct-2018 00:00	31-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1818156-001	EM1818156-002	EM1818156-003	EM1818156-004	EM1818156-005
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	7.3
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L		<1.0	1.5	1.1	<1.0	2.4
Fluorene	86-73-7	1.0	µg/L		<1.0	2.1	1.4	<1.0	5.8
Phenanthrene	85-01-8	1.0	µg/L		<1.0	4.3	6.8	<1.0	13.8
Anthracene	120-12-7	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	1.8
Fluoranthene	206-44-0	1.0	µg/L		<1.0	<1.0	1.7	<1.0	1.8
Pyrene	129-00-0	1.0	µg/L		<1.0	<1.0	1.2	<1.0	1.2
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		<0.5	7.9	12.2	<0.5	34.1
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		34.5	32.6	32.4	34.0	31.6
2-Chlorophenol-D4	93951-73-6	1.0	%		83.0	79.1	75.5	74.6	77.5
2.4.6-Tribromophenol	118-79-6	1.0	%		100	98.8	89.3	91.8	91.4
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		100	97.0	91.0	91.8	93.9
Anthracene-d10	1719-06-8	1.0	%		92.5	87.9	82.9	85.9	84.8
4-Terphenyl-d14	1718-51-0	1.0	%		88.3	83.5	81.4	80.3	80.9

Page : 4 of 9
Work Order : EM1818156
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: TCLP LEACHATE (Matrix: WATER)				Client sample ID	BH37 1.5-1.6	BH37 2.5-2.6	BH37 3.5-3.6	BH39 1.5-1.6	BH39 2.5-2.6
				Client sampling date / time	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1818156-006	EM1818156-007	EM1818156-008	EM1818156-009	EM1818156-010
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		8.6	3.8	<1.0	<1.0	4.7
Acenaphthylene	208-96-8	1.0	µg/L		1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L		4.4	2.6	<1.0	<1.0	1.6
Fluorene	86-73-7	1.0	µg/L		8.1	4.2	1.4	<1.0	2.5
Phenanthrene	85-01-8	1.0	µg/L		24.0	16.0	9.6	3.8	8.6
Anthracene	120-12-7	1.0	µg/L		3.1	2.4	1.4	<1.0	1.2
Fluoranthene	206-44-0	1.0	µg/L		3.9	3.8	3.9	<1.0	1.8
Pyrene	129-00-0	1.0	µg/L		2.7	2.7	3.0	<1.0	1.3
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		55.8	35.5	19.3	3.8	21.7
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		33.0	30.0	22.0	23.4	20.0
2-Chlorophenol-D4	93951-73-6	1.0	%		77.0	71.0	54.2	56.9	48.6
2.4.6-Tribromophenol	118-79-6	1.0	%		91.1	87.7	64.7	69.2	53.8
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		91.6	86.4	71.8	74.4	58.4
Anthracene-d10	1719-06-8	1.0	%		81.0	78.1	63.6	69.9	51.7
4-Terphenyl-d14	1718-51-0	1.0	%		77.1	74.2	64.2	72.0	50.5

Page : 5 of 9
Work Order : EM1818156
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: TCLP LEACHATE (Matrix: WATER)				Client sample ID	BH40 0.5-0.6	BH40 1.5-1.6	BH40 3.5-3.6	----	----
				Client sampling date / time	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		EM1818156-011	EM1818156-012	EM1818156-013	--------	--------
					Result	Result	Result	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		3.1	<1.0	3.4	----	----
Acenaphthylene	208-96-8	1.0	µg/L		4.8	1.8	5.0	----	----
Acenaphthene	83-32-9	1.0	µg/L		2.1	<1.0	2.8	----	----
Fluorene	86-73-7	1.0	µg/L		3.0	1.3	4.8	----	----
Phenanthrene	85-01-8	1.0	µg/L		21.5	11.8	22.2	----	----
Anthracene	120-12-7	1.0	µg/L		3.6	2.0	3.6	----	----
Fluoranthene	206-44-0	1.0	µg/L		6.8	3.9	5.3	----	----
Pyrene	129-00-0	1.0	µg/L		5.9	3.1	4.1	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Chrysene	218-01-9	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	<1.0	<1.0	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		50.8	23.9	51.2	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	<0.5	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		25.2	25.2	20.5	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		60.8	61.6	51.8	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%		73.3	74.6	61.9	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		79.5	79.3	67.2	----	----
Anthracene-d10	1719-06-8	1.0	%		69.3	70.4	58.5	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		67.9	69.1	57.7	----	----

Page : 6 of 9
Work Order : EM1818156
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: TCLP (Matrix: SOIL)				Client sample ID	BH27 1.0-1.1	BH28 1.2-1.3	BH29 0.5-0.6	BH35 0.5-0.6	BH37 0.5-0.6
				Client sampling date / time	29-Oct-2018 00:00	29-Oct-2018 00:00	30-Oct-2018 00:00	30-Oct-2018 00:00	31-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1818156-001	EM1818156-002	EM1818156-003	EM1818156-004	EM1818156-005
					Result	Result	Result	Result	Result
EN33: TCLP Leach									
Initial pH	----	0.1	pH Unit		9.5	9.2	9.0	9.2	8.9
After HCl pH	----	0.1	pH Unit		1.2	1.1	1.2	1.1	1.1
Extraction Fluid Number	----	1	-		5	5	5	5	5
Final pH	----	0.1	pH Unit		5.7	5.3	6.1	5.3	5.3

Page	: 7 of 9
Work Order	: EM1818156
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Analytical Results

Sub-Matrix: **TCLP** (Matrix: **SOIL**)				Client sample ID	BH37 1.5-1.6	BH37 2.5-2.6	BH37 3.5-3.6	BH39 1.5-1.6	BH39 2.5-2.6
				Client sampling date / time	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00
Compound	CAS Number	LOR	Unit		EM1818156-006	EM1818156-007	EM1818156-008	EM1818156-009	EM1818156-010
					Result	Result	Result	Result	Result
EN33: TCLP Leach									
Initial pH	----	0.1	pH Unit		8.6	8.8	9.9	8.4	8.3
After HCl pH	----	0.1	pH Unit		1.0	1.3	1.1	1.1	1.1
Extraction Fluid Number	----	1	-		5	5	5	5	5
Final pH	----	0.1	pH Unit		5.1	5.1	5.1	5.5	5.2

Page : 8 of 9
Work Order : EM1818156
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: TCLP (Matrix: SOIL)			Client sample ID	BH40 0.5-0.6	BH40 1.5-1.6	BH40 3.5-3.6	----	----
			Client sampling date / time	31-Oct-2018 00:00	31-Oct-2018 00:00	31-Oct-2018 00:00	----	----
Compound	CAS Number	LOR	Unit	EM1818156-011	EM1818156-012	EM1818156-013	--------	--------
				Result	Result	Result	----	----
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	8.9	8.7	9.0	----	----
After HCl pH	----	0.1	pH Unit	1.1	1.0	1.0	----	----
Extraction Fluid Number	----	1	-	5	5	5	----	----
Final pH	----	0.1	pH Unit	5.1	5.1	5.1	----	----

Page	: 9 of 9
Work Order	: EM1818156
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Surrogate Control Limits

Sub-Matrix: **TCLP LEACHATE**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	46
2-Chlorophenol-D4	93951-73-6	23	104
2.4.6-Tribromophenol	118-79-6	28	130
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	36	114
Anthracene-d10	1719-06-8	51	119
4-Terphenyl-d14	1718-51-0	49	127

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM1817824**	Page	: 1 of 24
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Project	: 48-52	Date Samples Received	: 07-Nov-2018 09:15
Order number	:	Date Analysis Commenced	: 07-Nov-2018
C-O-C number	: ----	Issue Date	: 12-Nov-2018 15:52
Sampler	: AP		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 29		
No. of samples analysed	: 29		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

RIGHT SOLUTIONS | RIGHT PARTNER

Page	: 2 of 24
Work Order	: EM1817824
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP080: Particular sample EM-1817824-007 shows minor BTEX hits. Confirmed by re-analysis.
- EP075SIM: Particular sample EM1817824_2 required dilution prior to analysis due to matrix interferences. LOR values have been adjusted accordingly.
- EP075(SIM): Poor duplicate precision for sample EM1817824-011 due to sample heterogeneity. Confirmed by re-extraction and re-analysis.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Page : 3 of 24
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH41 0.5-0.6	BH42 0.5-0.6	BH42 1.5-1.6	BH42 2.5-2.6	BH43 0.5-0.6
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817824-001	EM1817824-002	EM1817824-003	EM1817824-004	EM1817824-005
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		14.8	9.3	8.7	30.4	14.7
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	<5
Barium	7440-39-3	10	mg/kg		30	50	30	120	90
Beryllium	7440-41-7	1	mg/kg		<1	<1	<1	<1	<1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		6	7	6	8	6
Cobalt	7440-48-4	2	mg/kg		20	11	25	6	10
Copper	7440-50-8	5	mg/kg		75	38	45	30	35
Lead	7439-92-1	5	mg/kg		9	17	13	84	67
Manganese	7439-96-5	5	mg/kg		319	188	354	379	196
Nickel	7440-02-0	2	mg/kg		15	13	18	12	7
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		43	34	31	17	62
Zinc	7440-66-6	5	mg/kg		32	39	62	45	95
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	1.0	0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<1.1	2.9	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	5.4	19.5	<0.5	0.9
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<1.1	1.3	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	1.1	5.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	16.3	65.9	<0.5	5.3
Anthracene	120-12-7	0.5	mg/kg		<0.5	4.9	18.5	<0.5	1.1
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	27.7	95.8	<0.5	7.1
Pyrene	129-00-0	0.5	mg/kg		<0.5	32.7	109	<0.5	7.6
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	16.0	53.4	<0.5	3.6
Chrysene	218-01-9	0.5	mg/kg		<0.5	14.4	49.0	<0.5	3.2
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	21.3	75.1	<0.5	4.4
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	6.5	18.7	<0.5	1.4
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	18.9	66.4	<0.5	3.8
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	8.0	27.2	<0.5	1.7
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	2.4	8.2	<0.5	<0.5

Page : 4 of 24
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH41 0.5-0.6	BH42 0.5-0.6	BH42 1.5-1.6	BH42 2.5-2.6	BH43 0.5-0.6
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817824-001	EM1817824-002	EM1817824-003	EM1817824-004	EM1817824-005
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	9.6	32.1	<0.5	2.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	185	648	<0.5	42.1
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	26.7	92.8	<0.5	5.0
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	26.7	92.8	0.6	5.2
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	26.7	92.8	1.2	5.5
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	830	2250	<100	110
C29 - C36 Fraction	----	100	mg/kg		<100	470	1180	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	1300	3430	<50	110
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	60	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	1150	3020	<100	170
>C34 - C40 Fraction	----	100	mg/kg		<100	220	570	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	1370	3650	<50	170
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	60	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		96.2	94.5	93.4	94.0	96.0
2-Chlorophenol-D4	93951-73-6	0.5	%		96.3	94.8	93.5	93.7	95.5
2.4.6-Tribromophenol	118-79-6	0.5	%		83.1	81.8	83.3	83.0	87.5

Page : 5 of 24
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH41 0.5-0.6	BH42 0.5-0.6	BH42 1.5-1.6	BH42 2.5-2.6	BH43 0.5-0.6
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817824-001	EM1817824-002	EM1817824-003	EM1817824-004	EM1817824-005
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		106	106	104	105	106
Anthracene-d10	1719-06-8	0.5	%		99.2	112	103	98.1	97.7
4-Terphenyl-d14	1718-51-0	0.5	%		96.1	94.8	92.0	95.2	91.5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		91.4	85.4	80.8	70.9	82.5
Toluene-D8	2037-26-5	0.2	%		96.2	89.7	81.1	72.2	85.2
4-Bromofluorobenzene	460-00-4	0.2	%		106	103	95.9	77.2	96.7

Page : 6 of 24
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH43 1.5-1.6	BH43 2.5-2.6	BH43 3.5-3.6	BH44 0.5-0.6	BH44 1.5-1.6
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817824-006	EM1817824-007	EM1817824-008	EM1817824-009	EM1817824-010
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		10.4	14.6	12.3	17.7	7.2
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	<5
Barium	7440-39-3	10	mg/kg		110	90	50	80	40
Beryllium	7440-41-7	1	mg/kg		<1	<1	<1	<1	<1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		9	9	4	12	5
Cobalt	7440-48-4	2	mg/kg		11	12	15	10	12
Copper	7440-50-8	5	mg/kg		21	21	78	6	68
Lead	7439-92-1	5	mg/kg		11	110	23	16	18
Manganese	7439-96-5	5	mg/kg		291	239	351	62	263
Nickel	7440-02-0	2	mg/kg		13	12	10	12	11
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		38	35	76	17	49
Zinc	7440-66-6	5	mg/kg		36	37	53	41	39
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	1.4
Acenaphthylene	208-96-8	0.5	mg/kg		2.4	1.0	2.2	<0.5	7.3
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	1.0	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	0.7	0.7	0.9	1.6
Phenanthrene	85-01-8	0.5	mg/kg		8.5	6.3	8.8	8.1	23.3
Anthracene	120-12-7	0.5	mg/kg		2.5	1.3	2.5	2.7	6.7
Fluoranthene	206-44-0	0.5	mg/kg		15.8	7.4	17.4	12.0	38.4
Pyrene	129-00-0	0.5	mg/kg		18.5	8.1	19.3	11.1	43.4
Benz(a)anthracene	56-55-3	0.5	mg/kg		9.6	3.6	10.0	4.6	23.6
Chrysene	218-01-9	0.5	mg/kg		8.8	3.2	9.2	4.3	21.6
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		14.1	4.3	13.5	5.9	36.4
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		5.3	1.6	4.3	1.8	10.2
Benzo(a)pyrene	50-32-8	0.5	mg/kg		13.4	4.1	12.0	5.1	33.0
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		6.2	1.6	5.1	2.3	14.8
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		1.6	<0.5	1.4	0.5	4.1

Page : 7 of 24
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH43 1.5-1.6	BH43 2.5-2.6	BH43 3.5-3.6	BH44 0.5-0.6	BH44 1.5-1.6
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817824-006	EM1817824-007	EM1817824-008	EM1817824-009	EM1817824-010
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		7.8	2.0	5.9	2.8	18.3
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		114	45.2	112	63.1	284
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		18.7	5.3	16.8	7.1	46.0
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		18.7	5.5	16.8	7.1	46.0
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		18.7	5.8	16.8	7.1	46.0
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		390	140	330	230	1050
C29 - C36 Fraction	----	100	mg/kg		260	<100	190	140	660
^ C10 - C36 Fraction (sum)	----	50	mg/kg		650	140	520	370	1710
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		580	190	470	330	1500
>C34 - C40 Fraction	----	100	mg/kg		120	<100	<100	<100	320
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		700	190	470	330	1820
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	3	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		90.7	85.1	94.8	93.8	93.7
2-Chlorophenol-D4	93951-73-6	0.5	%		90.3	85.8	94.9	93.0	93.8
2.4.6-Tribromophenol	118-79-6	0.5	%		81.1	73.8	84.2	83.3	84.3

Page : 8 of 24
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH43 1.5-1.6	BH43 2.5-2.6	BH43 3.5-3.6	BH44 0.5-0.6	BH44 1.5-1.6
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817824-006	EM1817824-007	EM1817824-008	EM1817824-009	EM1817824-010
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		101	96.0	105	104	104
Anthracene-d10	1719-06-8	0.5	%		94.7	93.2	100	101	97.1
4-Terphenyl-d14	1718-51-0	0.5	%		86.6	85.2	90.9	92.9	88.2
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		81.1	79.2	82.2	85.4	78.4
Toluene-D8	2037-26-5	0.2	%		84.3	89.5	80.6	81.0	77.5
4-Bromofluorobenzene	460-00-4	0.2	%		94.8	113	97.3	98.1	93.7

Page : 9 of 24
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH44 2.5-2.6	BH44 3.5-3.6	BH45 0.5-0.6	BH46 0.5-0.6	BH47 0.5-0.6
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817824-011	EM1817824-012	EM1817824-013	EM1817824-014	EM1817824-015
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		13.2	10.0	15.0	13.0	13.5
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	7	<5
Barium	7440-39-3	10	mg/kg		40	50	100	170	200
Beryllium	7440-41-7	1	mg/kg		<1	<1	<1	<1	<1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		5	6	11	17	9
Cobalt	7440-48-4	2	mg/kg		11	12	9	13	35
Copper	7440-50-8	5	mg/kg		61	52	66	187	41
Lead	7439-92-1	5	mg/kg		29	34	83	223	179
Manganese	7439-96-5	5	mg/kg		218	230	216	294	242
Nickel	7440-02-0	2	mg/kg		10	10	13	20	18
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		48	46	32	38	34
Zinc	7440-66-6	5	mg/kg		33	43	134	221	373
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	0.2	0.3	0.5
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		0.7	3.1	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		4.2	14.8	2.5	0.7	1.2
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	1.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		0.8	5.1	1.0	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		9.8	80.1	15.2	3.8	3.2
Anthracene	120-12-7	0.5	mg/kg		3.3	19.3	4.8	0.8	0.9
Fluoranthene	206-44-0	0.5	mg/kg		22.8	105	16.9	7.0	8.1
Pyrene	129-00-0	0.5	mg/kg		26.8	107	15.9	6.9	8.6
Benz(a)anthracene	56-55-3	0.5	mg/kg		14.5	49.6	6.9	2.6	3.8
Chrysene	218-01-9	0.5	mg/kg		13.4	43.9	6.0	2.4	3.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		23.0	66.5	9.2	4.2	6.4
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		7.3	20.9	3.1	1.4	2.3
Benzo(a)pyrene	50-32-8	0.5	mg/kg		21.6	60.3	8.2	3.7	6.0
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		9.8	25.7	3.7	1.9	3.1
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		2.5	7.0	0.9	<0.5	0.7

Page : 10 of 24
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH44 2.5-2.6	BH44 3.5-3.6	BH45 0.5-0.6	BH46 0.5-0.6	BH47 0.5-0.6
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817824-011	EM1817824-012	EM1817824-013	EM1817824-014	EM1817824-015
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		12.1	29.6	4.3	2.4	3.8
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		173	639	98.6	37.8	51.6
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		29.8	84.3	11.5	4.8	8.3
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		29.8	84.3	11.5	5.0	8.3
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		29.8	84.3	11.5	5.2	8.3
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		1000	2280	250	120	200
C29 - C36 Fraction	----	100	mg/kg		680	1120	150	120	200
^ C10 - C36 Fraction (sum)	----	50	mg/kg		1680	3400	400	240	400
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	60	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		1480	2990	350	220	350
>C34 - C40 Fraction	----	100	mg/kg		320	530	<100	<100	110
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		1800	3580	350	220	460
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	60	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		84.2	94.2	96.4	98.8	89.1
2-Chlorophenol-D4	93951-73-6	0.5	%		84.3	95.1	95.7	98.3	88.5
2.4.6-Tribromophenol	118-79-6	0.5	%		76.9	85.4	88.9	89.6	77.9

Page : 11 of 24
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH44 2.5-2.6	BH44 3.5-3.6	BH45 0.5-0.6	BH46 0.5-0.6	BH47 0.5-0.6
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817824-011	EM1817824-012	EM1817824-013	EM1817824-014	EM1817824-015
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		93.8	105	105	109	99.2
Anthracene-d10	1719-06-8	0.5	%		89.6	105	96.2	101	95.9
4-Terphenyl-d14	1718-51-0	0.5	%		80.8	91.1	90.1	94.8	87.5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		78.0	82.6	75.4	85.2	80.3
Toluene-D8	2037-26-5	0.2	%		80.6	82.1	72.1	82.1	75.9
4-Bromofluorobenzene	460-00-4	0.2	%		94.1	97.7	88.2	97.1	93.6

Page : 12 of 24
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH47 1.5-1.6	BH48 0.5-0.6	BH48 1.5-1.6	BH49 0.5-0.6	BH49 1.5-1.6
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817824-016	EM1817824-017	EM1817824-018	EM1817824-019	EM1817824-020
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		20.1	19.9	18.2	19.2	20.8
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	8	<5
Barium	7440-39-3	10	mg/kg		80	140	130	60	220
Beryllium	7440-41-7	1	mg/kg		<1	<1	<1	<1	1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		16	7	10	38	12
Cobalt	7440-48-4	2	mg/kg		16	26	9	13	28
Copper	7440-50-8	5	mg/kg		50	95	59	39	11
Lead	7439-92-1	5	mg/kg		24	154	180	26	22
Manganese	7439-96-5	5	mg/kg		540	344	232	923	1070
Nickel	7440-02-0	2	mg/kg		20	17	12	23	25
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		67	113	36	78	20
Zinc	7440-66-6	5	mg/kg		77	265	254	65	77
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	0.2	0.4	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		1.3	1.6	3.1	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		0.8	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		1.1	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		12.4	3.8	4.8	<0.5	0.5
Anthracene	120-12-7	0.5	mg/kg		3.4	1.2	1.8	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		16.7	10.0	13.2	0.7	1.1
Pyrene	129-00-0	0.5	mg/kg		17.1	10.6	15.0	0.8	1.3
Benz(a)anthracene	56-55-3	0.5	mg/kg		7.1	5.0	8.2	<0.5	0.7
Chrysene	218-01-9	0.5	mg/kg		6.3	4.6	7.7	<0.5	0.7
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		9.1	8.2	14.7	1.1	1.1
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		3.5	3.2	5.4	0.6	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		8.3	7.7	14.3	1.1	0.9
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		4.0	4.3	7.4	0.7	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		0.9	0.9	1.7	<0.5	<0.5

Page : 13 of 24
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH47 1.5-1.6	BH48 0.5-0.6	BH48 1.5-1.6	BH49 0.5-0.6	BH49 1.5-1.6
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817824-016	EM1817824-017	EM1817824-018	EM1817824-019	EM1817824-020
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		5.2	5.5	9.6	0.9	0.6
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		97.2	66.6	107	5.9	6.9
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		11.7	10.8	19.7	1.3	1.1
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		11.7	10.8	19.7	1.6	1.4
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		11.7	10.8	19.7	1.9	1.7
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		430	260	640	<100	<100
C29 - C36 Fraction	----	100	mg/kg		250	260	730	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		680	520	1370	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		610	450	1150	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		120	150	450	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		730	600	1600	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		90.0	93.4	90.5	107	97.5
2-Chlorophenol-D4	93951-73-6	0.5	%		91.1	94.7	91.6	109	98.5
2.4.6-Tribromophenol	118-79-6	0.5	%		80.6	83.0	79.7	99.0	86.4

Page : 14 of 24
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH47 1.5-1.6	BH48 0.5-0.6	BH48 1.5-1.6	BH49 0.5-0.6	BH49 1.5-1.6
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817824-016	EM1817824-017	EM1817824-018	EM1817824-019	EM1817824-020
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		102	106	102	121	110
Anthracene-d10	1719-06-8	0.5	%		96.3	102	97.2	113	102
4-Terphenyl-d14	1718-51-0	0.5	%		90.0	93.6	89.8	109	97.9
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		76.8	80.2	75.6	77.6	72.5
Toluene-D8	2037-26-5	0.2	%		76.7	77.7	75.4	74.4	71.1
4-Bromofluorobenzene	460-00-4	0.2	%		90.4	90.2	88.8	88.8	85.9

Page : 15 of 24
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH50 0.5-0.6	BH50 1.5-1.6	BH51 0.5-0.6	BH51 1.5-1.6	BH52 0.5-0.6
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817824-021	EM1817824-022	EM1817824-023	EM1817824-024	EM1817824-025
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		16.6	17.0	18.4	15.6	16.9
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	5	<5	<5	6
Barium	7440-39-3	10	mg/kg		60	80	640	100	140
Beryllium	7440-41-7	1	mg/kg		<1	<1	1	<1	<1
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		19	10	12	9	32
Cobalt	7440-48-4	2	mg/kg		23	13	19	9	12
Copper	7440-50-8	5	mg/kg		20	13	10	20	21
Lead	7439-92-1	5	mg/kg		25	17	31	101	18
Manganese	7439-96-5	5	mg/kg		591	350	112	167	868
Nickel	7440-02-0	2	mg/kg		22	16	15	11	26
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg		35	22	24	20	29
Zinc	7440-66-6	5	mg/kg		67	47	51	76	61
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	0.4	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	1.3	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	1.6	2.9	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	1.2	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	2.8	11.5	<0.5
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	2.8	13.1	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	1.0	7.9	<0.5
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	1.0	7.9	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	1.5	11.4	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	0.5	3.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	1.3	9.4	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	0.6	4.3	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	1.2	<0.5

Page : 16 of 24
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH50 0.5-0.6	BH50 1.5-1.6	BH51 0.5-0.6	BH51 1.5-1.6	BH52 0.5-0.6
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817824-021	EM1817824-022	EM1817824-023	EM1817824-024	EM1817824-025
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	0.9	5.3	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	14.0	80.9	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	1.7	13.4	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	0.6	1.9	13.4	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	1.2	2.2	13.4	1.2
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	230	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	180	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	410	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	370	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	370	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		92.2	97.6	94.7	86.0	91.6
2-Chlorophenol-D4	93951-73-6	0.5	%		92.4	94.9	94.8	86.5	92.5
2.4.6-Tribromophenol	118-79-6	0.5	%		77.6	78.1	77.8	67.3	73.7

Page	: 17 of 24
Work Order	: EM1817824
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH50 0.5-0.6	BH50 1.5-1.6	BH51 0.5-0.6	BH51 1.5-1.6	BH52 0.5-0.6
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00
Compound	CAS Number	LOR	Unit		EM1817824-021	EM1817824-022	EM1817824-023	EM1817824-024	EM1817824-025
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		102	107	105	97.4	99.8
Anthracene-d10	1719-06-8	0.5	%		108	111	106	102	104
4-Terphenyl-d14	1718-51-0	0.5	%		104	106	103	95.0	101
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		78.9	71.1	82.3	66.8	66.4
Toluene-D8	2037-26-5	0.2	%		83.3	75.0	86.9	69.9	68.1
4-Bromofluorobenzene	460-00-4	0.2	%		118	108	124	104	103

Page : 18 of 24
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH52 1.5-1.6	BH53 0.5-0.6	BH53 1.5-1.6	----	----
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		EM1817824-026	EM1817824-027	EM1817824-028	--------	--------
					Result	Result	Result	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		16.4	20.0	14.6	----	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		6	<5	<5	----	----
Barium	7440-39-3	10	mg/kg		120	200	30	----	----
Beryllium	7440-41-7	1	mg/kg		<1	2	<1	----	----
Boron	7440-42-8	50	mg/kg		<50	<50	<50	----	----
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	----	----
Chromium	7440-47-3	2	mg/kg		15	16	12	----	----
Cobalt	7440-48-4	2	mg/kg		11	24	5	----	----
Copper	7440-50-8	5	mg/kg		17	28	16	----	----
Lead	7439-92-1	5	mg/kg		18	25	49	----	----
Manganese	7439-96-5	5	mg/kg		406	510	122	----	----
Nickel	7440-02-0	2	mg/kg		17	32	7	----	----
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	----	----
Vanadium	7440-62-2	5	mg/kg		29	28	56	----	----
Zinc	7440-66-6	5	mg/kg		57	70	30	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	0.8	0.8	----	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	0.8	0.9	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	0.5	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----

Page : 19 of 24
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH52 1.5-1.6	BH53 0.5-0.6	BH53 1.5-1.6	----	----
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		EM1817824-026	EM1817824-027	EM1817824-028	--------	--------
					Result	Result	Result	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	1.6	2.2	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	0.6	0.6	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	1.2	1.2	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	----	----
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		90.1	69.0	82.0	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		87.7	67.5	83.6	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		61.3	46.1	58.9	----	----

Page : 20 of 24
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH52 1.5-1.6	BH53 0.5-0.6	BH53 1.5-1.6	----	----
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		EM1817824-026	EM1817824-027	EM1817824-028	--------	--------
					Result	Result	Result	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		105	74.4	92.7	----	----
Anthracene-d10	1719-06-8	0.5	%		107	89.1	104	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		96.9	75.4	92.2	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		67.8	71.3	74.4	----	----
Toluene-D8	2037-26-5	0.2	%		69.0	74.2	71.9	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		104	109	112	----	----

Page : 21 of 24
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Rinsate 5	----	----	----	----
				Client sampling date / time	05-Nov-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM1817824-029	--------	--------	--------	--------
					Result	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	----	----	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	----	----	----	----
Barium	7440-39-3	0.001	mg/L		<0.001	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L		<0.001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	----	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	----	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		<1.0	----	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	----	----	----	----
Acenaphthene	83-32-9	1.0	µg/L		<1.0	----	----	----	----
Fluorene	86-73-7	1.0	µg/L		<1.0	----	----	----	----
Phenanthrene	85-01-8	1.0	µg/L		<1.0	----	----	----	----
Anthracene	120-12-7	1.0	µg/L		<1.0	----	----	----	----
Fluoranthene	206-44-0	1.0	µg/L		<1.0	----	----	----	----
Pyrene	129-00-0	1.0	µg/L		<1.0	----	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	----	----	----	----
Chrysene	218-01-9	1.0	µg/L		<1.0	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		<0.5	----	----	----	----

Page : 22 of 24
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Rinsate 5	----	----	----	----
				Client sampling date / time	05-Nov-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM1817824-029	--------	--------	--------	--------
					Result	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	----	----	----	----
Toluene	108-88-3	2	µg/L		<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ Total Xylenes	----	2	µg/L		<2	----	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		23.0	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		53.5	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%		56.2	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		63.8	----	----	----	----
Anthracene-d10	1719-06-8	1.0	%		66.9	----	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		67.0	----	----	----	----

Page : 23 of 24
Work Order : EM1817824
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Rinsate 5	----	----	----	----
				Client sampling date / time	05-Nov-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM1817824-029	--------	--------	--------	--------
					Result	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		88.6	----	----	----	----
Toluene-D8	2037-26-5	2	%		79.1	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		105	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	54	125
2-Chlorophenol-D4	93951-73-6	65	123
2.4.6-Tribromophenol	118-79-6	34	122
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	61	125
Anthracene-d10	1719-06-8	62	130
4-Terphenyl-d14	1718-51-0	67	133
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	51	125
Toluene-D8	2037-26-5	55	125
4-Bromofluorobenzene	460-00-4	56	124

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	46
2-Chlorophenol-D4	93951-73-6	23	104
2.4.6-Tribromophenol	118-79-6	28	130
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	36	114
Anthracene-d10	1719-06-8	51	119
4-Terphenyl-d14	1718-51-0	49	127
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM1818266**	Page	: 1 of 11
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Project	: 48-52	Date Samples Received	: 07-Nov-2018 09:15
Order number	: ----	Date Analysis Commenced	: 16-Nov-2018
C-O-C number	: ----	Issue Date	: 19-Nov-2018 17:44
Sampler	: ----		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 17		
No. of samples analysed	: 17		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC

RIGHT SOLUTIONS | RIGHT PARTNER

Page	: 2 of 11
Work Order	: EM1818266
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- This is a rebatch of EM1817824.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Page : 3 of 11
Work Order : EM1818266
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH42 0.5-0.6	BH42 1.5-1.6	BH43 0.5-0.6	BH43 1.5-1.6	BH43 2.5-2.6
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00
Compound	CAS Number	LOR	Unit		EM1818266-001	EM1818266-002	EM1818266-003	EM1818266-004	EM1818266-005
					Result	Result	Result	Result	Result
EN33: TCLP Leach									
Initial pH	----	0.1	pH Unit		8.4	9.0	8.0	9.0	9.6
After HCl pH	----	0.1	pH Unit		1.3	1.3	1.2	1.3	1.3
Extraction Fluid Number	----	1	-		1	1	1	1	1
Final pH	----	0.1	pH Unit		5.1	5.1	5.1	5.1	6.1

Page : 4 of 11
Work Order : EM1818266
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH43 3.5-3.6	BH44 0.5-0.6	BH44 1.5-1.6	BH44 2.5-2.6	BH44 3.5-3.6
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00
Compound	CAS Number	LOR	Unit		EM1818266-006	EM1818266-007	EM1818266-008	EM1818266-009	EM1818266-010
					Result	Result	Result	Result	Result
EN33: TCLP Leach									
Initial pH	----	0.1	pH Unit		9.4	8.6	9.2	9.5	9.0
After HCl pH	----	0.1	pH Unit		1.3	1.3	1.3	1.4	1.4
Extraction Fluid Number	----	1	-		1	1	1	1	1
Final pH	----	0.1	pH Unit		5.2	5.1	5.1	5.3	5.1

Page : 5 of 11
Work Order : EM1818266
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH45 0.5-0.6	BH46 0.5-0.6	BH47 0.5-0.6	BH47 1.5-1.6	BH48 0.5-0.6
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00
Compound	CAS Number	LOR	Unit		EM1818266-011	EM1818266-012	EM1818266-013	EM1818266-014	EM1818266-015
					Result	Result	Result	Result	Result
EN33: TCLP Leach									
Initial pH	----	0.1	pH Unit		7.7	8.8	8.9	8.3	8.9
After HCl pH	----	0.1	pH Unit		1.3	1.4	1.4	1.3	1.4
Extraction Fluid Number	----	1	-		1	1	1	1	1
Final pH	----	0.1	pH Unit		5.1	5.2	5.4	5.3	5.4

Page : 6 of 11
Work Order : EM1818266
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH48 1.5-1.6	BH51 1.5-1.6	----	----	----
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM1818266-016	EM1818266-017	--------	--------	--------
					Result	Result	----	----	----
EN33: TCLP Leach									
Initial pH	----	0.1	pH Unit		9.3	8.6	----	----	----
After HCl pH	----	0.1	pH Unit		1.6	1.4	----	----	----
Extraction Fluid Number	----	1	-		1	1	----	----	----
Final pH	----	0.1	pH Unit		6.4	5.2	----	----	----

Page : 7 of 11
Work Order : EM1818266
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: TCLP LEACHATE (Matrix: WATER)				Client sample ID	BH42 0.5-0.6	BH42 1.5-1.6	BH43 0.5-0.6	BH43 1.5-1.6	BH43 2.5-2.6
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00
Compound	CAS Number	LOR	Unit		EM1818266-001	EM1818266-002	EM1818266-003	EM1818266-004	EM1818266-005
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		1.6	2.9	<1.0	<1.0	1.8
Acenaphthylene	208-96-8	1.0	µg/L		3.0	9.1	<1.0	<1.0	1.4
Acenaphthene	83-32-9	1.0	µg/L		<1.0	2.2	<1.0	<1.0	1.0
Fluorene	86-73-7	1.0	µg/L		2.6	5.3	<1.0	<1.0	2.1
Phenanthrene	85-01-8	1.0	µg/L		17.2	28.8	<1.0	<1.0	9.5
Anthracene	120-12-7	1.0	µg/L		2.5	4.0	<1.0	<1.0	1.2
Fluoranthene	206-44-0	1.0	µg/L		3.1	6.2	<1.0	<1.0	1.8
Pyrene	129-00-0	1.0	µg/L		2.6	5.2	<1.0	<1.0	1.5
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		32.6	63.7	<0.5	<0.5	20.3
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		18.6	19.1	30.1	23.0	25.2
2-Chlorophenol-D4	93951-73-6	1.0	%		41.4	48.2	67.9	48.1	62.2
2.4.6-Tribromophenol	118-79-6	1.0	%		59.0	62.6	73.4	60.7	69.6
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		59.8	63.9	87.9	65.2	82.5
Anthracene-d10	1719-06-8	1.0	%		55.0	55.4	72.2	63.1	66.4
4-Terphenyl-d14	1718-51-0	1.0	%		52.2	62.8	72.8	64.6	68.9

Page : 8 of 11
Work Order : EM1818266
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: TCLP LEACHATE (Matrix: WATER)				Client sample ID	BH43 3.5-3.6	BH44 0.5-0.6	BH44 1.5-1.6	BH44 2.5-2.6	BH44 3.5-3.6
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00
Compound	CAS Number	LOR	Unit		EM1818266-006	EM1818266-007	EM1818266-008	EM1818266-009	EM1818266-010
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		<1.0	<1.0	3.5	1.9	3.2
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	<1.0	6.8	9.7	7.8
Acenaphthene	83-32-9	1.0	µg/L		<1.0	3.0	<1.0	2.1	1.5
Fluorene	86-73-7	1.0	µg/L		<1.0	1.9	3.2	6.1	5.1
Phenanthrene	85-01-8	1.0	µg/L		2.1	6.8	16.4	21.2	21.0
Anthracene	120-12-7	1.0	µg/L		<1.0	1.4	2.4	3.5	3.4
Fluoranthene	206-44-0	1.0	µg/L		<1.0	1.3	3.2	4.5	5.2
Pyrene	129-00-0	1.0	µg/L		<1.0	<1.0	2.8	3.9	4.4
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		2.1	14.4	38.3	52.9	51.6
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		11.8	28.9	23.4	20.6	22.4
2-Chlorophenol-D4	93951-73-6	1.0	%		26.7	51.6	49.2	46.8	49.3
2.4.6-Tribromophenol	118-79-6	1.0	%		59.4	67.9	65.2	72.2	79.4
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		43.1	74.7	73.2	64.4	65.9
Anthracene-d10	1719-06-8	1.0	%		60.1	62.0	59.4	56.4	61.5
4-Terphenyl-d14	1718-51-0	1.0	%		67.4	63.5	63.7	56.0	62.7

Page : 9 of 11
Work Order : EM1818266
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: TCLP LEACHATE (Matrix: WATER)				Client sample ID	BH45 0.5-0.6	BH46 0.5-0.6	BH47 0.5-0.6	BH47 1.5-1.6	BH48 0.5-0.6
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00	05-Nov-2018 00:00
Compound	CAS Number	LOR	Unit		EM1818266-011	EM1818266-012	EM1818266-013	EM1818266-014	EM1818266-015
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		<1.0	<1.0	<1.0	3.8	<1.0
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L		<1.0	<1.0	<1.0	4.2	<1.0
Fluorene	86-73-7	1.0	µg/L		<1.0	<1.0	<1.0	4.1	<1.0
Phenanthrene	85-01-8	1.0	µg/L		<1.0	1.5	1.5	12.4	3.5
Anthracene	120-12-7	1.0	µg/L		<1.0	<1.0	<1.0	1.9	<1.0
Fluoranthene	206-44-0	1.0	µg/L		<1.0	<1.0	<1.0	2.2	1.2
Pyrene	129-00-0	1.0	µg/L		<1.0	<1.0	<1.0	1.5	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		<0.5	1.5	1.5	30.1	4.7
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		28.3	28.1	27.8	30.0	31.7
2-Chlorophenol-D4	93951-73-6	1.0	%		68.9	67.9	66.6	71.8	77.1
2.4.6-Tribromophenol	118-79-6	1.0	%		97.6	103	99.8	102	110
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		89.7	91.3	89.2	92.2	101
Anthracene-d10	1719-06-8	1.0	%		81.0	86.7	83.8	81.6	89.3
4-Terphenyl-d14	1718-51-0	1.0	%		77.9	85.6	81.7	79.2	85.5

Page : 10 of 11
Work Order : EM1818266
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: TCLP LEACHATE (Matrix: WATER)				Client sample ID	BH48 1.5-1.6	BH51 1.5-1.6	----	----	----
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM1818266-016	EM1818266-017	--------	--------	--------
					Result	Result	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		<1.0	<1.0	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	<1.0	----	----	----
Acenaphthene	83-32-9	1.0	µg/L		<1.0	<1.0	----	----	----
Fluorene	86-73-7	1.0	µg/L		<1.0	<1.0	----	----	----
Phenanthrene	85-01-8	1.0	µg/L		<1.0	<1.0	----	----	----
Anthracene	120-12-7	1.0	µg/L		<1.0	<1.0	----	----	----
Fluoranthene	206-44-0	1.0	µg/L		<1.0	<1.0	----	----	----
Pyrene	129-00-0	1.0	µg/L		<1.0	<1.0	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	<1.0	----	----	----
Chrysene	218-01-9	1.0	µg/L		<1.0	<1.0	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	<1.0	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	<1.0	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	<1.0	----	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	<1.0	----	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	<1.0	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		32.4	34.0	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		74.0	80.6	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%		97.9	108	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		92.6	106	----	----	----
Anthracene-d10	1719-06-8	1.0	%		83.0	95.6	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		83.4	90.5	----	----	----

Page	: 11 of 11
Work Order	: EM1818266
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Surrogate Control Limits

Sub-Matrix: **TCLP LEACHATE**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	46
2-Chlorophenol-D4	93951-73-6	23	104
2.4.6-Tribromophenol	118-79-6	28	130
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	36	114
Anthracene-d10	1719-06-8	51	119
4-Terphenyl-d14	1718-51-0	49	127

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1833261**	Page	: 1 of 6
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Sydney
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Project	: 48 - 52	Date Samples Received	: 08-Nov-2018 09:00
Order number	:	Date Analysis Commenced	: 09-Nov-2018
C-O-C number	: ----	Issue Date	: 12-Nov-2018 18:14
Sampler	: AP		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 2		
No. of samples analysed	: 2		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

RIGHT SOLUTIONS | RIGHT PARTNER

Page	: 2 of 6
Work Order	: ES1833261
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48 - 52

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EG005: Poor precision was obtained for Lead on sample ES1833261-2. Results have been confirmed by re-extraction and reanalysis.
- EG005: Poor precision was obtained for Manganese on sample ES1833261-2. Results have been confirmed by re-extraction and reanalysis.
- EP071: Results of samples Triplicate 1 0.5-0.6 and Triplicate 2 1.5-1.6 have been confirmed by re-extraction and re-analysis.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.

Page : 3 of 6
Work Order : ES1833261
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48 - 52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	Triplicate 1 0.5-0.6	Triplicate 2 1.5-1.6	----	----	----
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1833261-001	ES1833261-002	--------	--------	--------
					Result	Result	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		18.2	17.3	----	----	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	----	----	----
Barium	7440-39-3	10	mg/kg		140	130	----	----	----
Beryllium	7440-41-7	1	mg/kg		<1	<1	----	----	----
Boron	7440-42-8	50	mg/kg		<50	<50	----	----	----
Cadmium	7440-43-9	1	mg/kg		<1	<1	----	----	----
Chromium	7440-47-3	2	mg/kg		15	10	----	----	----
Cobalt	7440-48-4	2	mg/kg		19	16	----	----	----
Copper	7440-50-8	5	mg/kg		34	15	----	----	----
Lead	7439-92-1	5	mg/kg		109	102	----	----	----
Manganese	7439-96-5	5	mg/kg		264	161	----	----	----
Nickel	7440-02-0	2	mg/kg		19	14	----	----	----
Selenium	7782-49-2	5	mg/kg		<5	<5	----	----	----
Vanadium	7440-62-2	5	mg/kg		40	26	----	----	----
Zinc	7440-66-6	5	mg/kg		143	70	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	0.2	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	0.6	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	----	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg		1.8	1.9	----	----	----
Anthracene	120-12-7	0.5	mg/kg		0.6	0.6	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg		4.7	5.8	----	----	----
Pyrene	129-00-0	0.5	mg/kg		4.7	6.8	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		1.8	3.8	----	----	----
Chrysene	218-01-9	0.5	mg/kg		1.8	3.7	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		2.4	5.0	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		1.2	1.8	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		2.7	4.8	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		1.6	2.1	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	0.6	----	----	----

Page : 4 of 6
Work Order : ES1833261
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48 - 52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	Triplicate 1 0.5-0.6	Triplicate 2 1.5-1.6	----	----	----
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1833261-001	ES1833261-002	--------	--------	--------
					Result	Result	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		2.4	2.6	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		25.7	40.1	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		3.4	6.7	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		3.7	6.7	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		3.9	6.7	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	----	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	110	----	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	100	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	210	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	----	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	----	----	----
>C16 - C34 Fraction	----	100	mg/kg		150	180	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		150	180	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	----	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	----	----	----
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		80.4	74.6	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		83.8	78.8	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		46.4	61.7	----	----	----

Page : 5 of 6
Work Order : ES1833261
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48 - 52

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	Triplicate 1 0.5-0.6	Triplicate 2 1.5-1.6	----	----	----
				Client sampling date / time	05-Nov-2018 00:00	05-Nov-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1833261-001	ES1833261-002	--------	--------	--------
					Result	Result	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		81.1	81.1	----	----	----
Anthracene-d10	1719-06-8	0.5	%		95.4	83.8	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		87.6	75.4	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		96.8	82.7	----	----	----
Toluene-D8	2037-26-5	0.2	%		90.8	89.8	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		94.2	89.0	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

Appendix 15 Groundwater Analytical Results - Certificate of Analysis

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: EM1814666	Page	: 1 of 6
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Project	: New Town Rd	Date Samples Received	: 13-Sep-2018 09:25
Order number	:	Date Analysis Commenced	: 13-Sep-2018
C-O-C number	: ----	Issue Date	: 17-Sep-2018 15:55
Sampler	: AARON PLUMMER		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 3		
No. of samples analysed	: 3		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

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Page	: 2 of 6
Work Order	: EM1814666
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: New Town Rd

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP080: Particular samples EM1814666_[01, 02] shows positive hits. Confirmed by re-analysis.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Page : 3 of 6
Work Order : EM1814666
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Rd

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW1	DUPLICATE	FIELD BLANK	---	---
				Client sampling date / time	11-Sep-2018 00:00	11-Sep-2018 00:00	11-Sep-2018 00:00	---	---
Compound	CAS Number	LOR	Unit		EM1814666-001	EM1814666-002	EM1814666-004	---------	---------
					Result	Result	Result	---	---
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.002	0.002	---	---	---
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	---	---	---
Barium	7440-39-3	0.001	mg/L		0.068	0.076	---	---	---
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	---	---	---
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	---	---	---
Cobalt	7440-48-4	0.001	mg/L		0.001	0.001	---	---	---
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	---	---	---
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	---	---	---
Manganese	7439-96-5	0.001	mg/L		0.476	0.512	---	---	---
Nickel	7440-02-0	0.001	mg/L		0.003	0.003	---	---	---
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	---	---	---
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	---	---	---
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	---	---	---
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	---	---	---
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	---	---	---
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		112	104	<1.0	---	---
Acenaphthylene	208-96-8	1.0	µg/L		339	315	<1.0	---	---
Acenaphthene	83-32-9	1.0	µg/L		43.0	34.4	<1.0	---	---
Fluorene	86-73-7	1.0	µg/L		157	121	<1.0	---	---
Phenanthrene	85-01-8	1.0	µg/L		1070	983	<1.0	---	---
Anthracene	120-12-7	1.0	µg/L		464	426	<1.0	---	---
Fluoranthene	206-44-0	1.0	µg/L		1390	1260	<1.0	---	---
Pyrene	129-00-0	1.0	µg/L		1540	1390	<1.0	---	---
Benz(a)anthracene	56-55-3	1.0	µg/L		678	593	<1.0	---	---
Chrysene	218-01-9	1.0	µg/L		571	556	<1.0	---	---
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		910	872	<1.0	---	---
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		264	241	<1.0	---	---
Benzo(a)pyrene	50-32-8	0.5	µg/L		875	779	<0.5	---	---
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		393	352	<1.0	---	---
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		145	118	<1.0	---	---
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		464	408	<1.0	---	---
^ Sum of polycyclic aromatic hydrocarbons	---	0.5	µg/L		9420	8550	<0.5	---	---

Page : 4 of 6
Work Order : EM1814666
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Rd

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW1	DUPLICATE	FIELD BLANK	----	----
				Client sampling date / time	11-Sep-2018 00:00	11-Sep-2018 00:00	11-Sep-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		EM1814666-001	EM1814666-002	EM1814666-004	--------	--------
					Result	Result	Result	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		1250	1110	<0.5	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
C10 - C14 Fraction	----	50	µg/L		1400	1050	<50	----	----
C15 - C28 Fraction	----	100	µg/L		43200	31800	<100	----	----
C29 - C36 Fraction	----	50	µg/L		26700	20200	<50	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		71300	53000	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
>C10 - C16 Fraction	----	100	µg/L		2540	1890	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		62300	46200	<100	----	----
>C34 - C40 Fraction	----	100	µg/L		13200	10400	<100	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		78000	58500	<100	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		2530	1880	<100	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ Total Xylenes	----	2	µg/L		<2	<2	<2	----	----
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		6	7	<5	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		26.6	28.9	25.7	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		68.4	77.7	59.3	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%		90.4	94.2	59.2	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		99.3	93.5	69.7	----	----
Anthracene-d10	1719-06-8	1.0	%		96.5	90.7	75.5	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		109	101	65.9	----	----

Page : 5 of 6
Work Order : EM1814666
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Rd

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW1	DUPLICATE	FIELD BLANK	----	----
				Client sampling date / time	11-Sep-2018 00:00	11-Sep-2018 00:00	11-Sep-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		EM1814666-001	EM1814666-002	EM1814666-004	--------	--------
					Result	Result	Result	---	---
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		87.0	74.9	89.2	----	----
Toluene-D8	2037-26-5	2	%		77.5	71.0	79.3	----	----
4-Bromofluorobenzene	460-00-4	2	%		95.7	79.7	104	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	46
2-Chlorophenol-D4	93951-73-6	23	104
2.4.6-Tribromophenol	118-79-6	28	130
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	36	114
Anthracene-d10	1719-06-8	51	119
4-Terphenyl-d14	1718-51-0	49	127
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129

Environmental Site Assessment (V9) 52 New Town Road, New Town. June 2025.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: ES1827248	Page	: 1 of 6
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Sydney
Contact	: SARAH JOYCE	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Project	: New Town Rd	Date Samples Received	: 14-Sep-2018 09:00
Order number	:	Date Analysis Commenced	: 14-Sep-2018
C-O-C number	: ----	Issue Date	: 18-Sep-2018 20:26
Sampler	: A. Plummer		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 1		
No. of samples analysed	: 1		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW

RIGHT SOLUTIONS | RIGHT PARTNER

Page	: 2 of 6
Work Order	: ES1827248
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: New Town Rd

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP075(SIM):Particular sample required dilution due to sample matrix interferences. LOR values have been adjusted accordingly.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Page : 3 of 6
Work Order : ES1827248
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Rd

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	TRIPLICATE	----	----	----	----
				Client sampling date / time	11-Sep-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1827248-001	--------	--------	--------	--------
					Result	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.001	----	----	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	----	----	----	----
Barium	7440-39-3	0.001	mg/L		0.059	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L		<0.001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		0.407	----	----	----	----
Nickel	7440-02-0	0.001	mg/L		0.003	----	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	----	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	----	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		39.3	----	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L		101	----	----	----	----
Acenaphthene	83-32-9	1.0	µg/L		<19.2	----	----	----	----
Fluorene	86-73-7	1.0	µg/L		35.5	----	----	----	----
Phenanthrene	85-01-8	1.0	µg/L		292	----	----	----	----
Anthracene	120-12-7	1.0	µg/L		132	----	----	----	----
Fluoranthene	206-44-0	1.0	µg/L		349	----	----	----	----
Pyrene	129-00-0	1.0	µg/L		399	----	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L		120	----	----	----	----
Chrysene	218-01-9	1.0	µg/L		105	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		96.7	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		48.1	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L		136	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		65.9	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		20.7	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		80.2	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		2020	----	----	----	----

Page : 4 of 6
Work Order : ES1827248
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : New Town Rd

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	TRIPLICATE	----	----	----	----
				Client sampling date / time	11-Sep-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1827248-001	--------	--------	--------	--------
					Result	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		192	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L		80	----	----	----	----
C15 - C28 Fraction	----	100	µg/L		8440	----	----	----	----
C29 - C36 Fraction	----	50	µg/L		5350	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		13900	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L		320	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L		11800	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L		3200	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		15300	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		320	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	----	----	----	----
Toluene	108-88-3	2	µg/L		<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ Total Xylenes	----	2	µg/L		<2	----	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		29.2	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		50.3	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%		48.1	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		82.6	----	----	----	----
Anthracene-d10	1719-06-8	1.0	%		73.8	----	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		86.0	----	----	----	----

Page	: 5 of 6
Work Order	: ES1827248
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: New Town Rd

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	TRIPLICATE	----	----	----	----
				Client sampling date / time	11-Sep-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1827248-001	--------	--------	--------	--------
					Result	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		116	----	----	----	----
Toluene-D8	2037-26-5	2	%		106	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		106	----	----	----	----

Page	: 6 of 6
Work Order	: ES1827248
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: New Town Rd

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2.4.6-Tribromophenol	118-79-6	17	125
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

Environmental Site Assessment (V9) 52 New Town Road, New Town. June 2025.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM1819122**	Page	: 1 of 5
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +6138549 9630
Project	: 48-52	Date Samples Received	: 28-Nov-2018 09:50
Order number	:	Date Analysis Commenced	: 28-Nov-2018
C-O-C number	: ----	Issue Date	: 30-Nov-2018 17:17
Sampler	: MD		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 5		
No. of samples analysed	: 5		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

RIGHT SOLUTIONS | RIGHT PARTNER

Page	: 2 of 5
Work Order	: EM1819122
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP080: Particular sample EM1819122_01 shows positive hit of C6-C9/C6-C10 bands due to 2-Butanone (MEK). Confirmed by re-analysis.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Page : 3 of 5
Work Order : EM1819122
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW1	MW2	MW3	Duplicate	Rinsate
				Client sampling date / time	26-Nov-2018 00:00	26-Nov-2018 00:00	26-Nov-2018 00:00	26-Nov-2018 00:00	26-Nov-2018 00:00
Compound	CAS Number	LOR	Unit		EM1819122-001	EM1819122-002	EM1819122-003	EM1819122-004	EM1819122-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		**0.002**	**0.002**	<0.001	**0.002**	<0.001
Boron	7440-42-8	0.05	mg/L		**0.07**	**0.07**	<0.05	**0.07**	<0.05
Barium	7440-39-3	0.001	mg/L		**0.125**	**0.037**	**0.039**	**0.040**	<0.001
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		**0.002**	<0.001	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L		<0.001	**0.002**	<0.001	**0.002**	<0.001
Copper	7440-50-8	0.001	mg/L		**0.001**	**0.003**	<0.001	**0.003**	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.883**	**0.165**	**0.167**	**0.167**	<0.001
Nickel	7440-02-0	0.001	mg/L		**0.002**	**0.001**	<0.001	**0.002**	<0.001
Lead	7439-92-1	0.001	mg/L		**0.002**	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		**27.5**	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1.0	µg/L		**56.3**	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L		**8.4**	<1.0	<1.0	<1.0	<1.0
Fluorene	86-73-7	1.0	µg/L		**32.3**	<1.0	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1.0	µg/L		**265**	<1.0	<1.0	<1.0	<1.0
Anthracene	120-12-7	1.0	µg/L		**105**	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1.0	µg/L		**386**	<1.0	<1.0	<1.0	<1.0
Pyrene	129-00-0	1.0	µg/L		**459**	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L		**197**	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L		**176**	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		**205**	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		**66.6**	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L		**186**	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		**77.6**	<1.0	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		**23.7**	<1.0	<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		**96.8**	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	---	0.5	µg/L		**2370**	<0.5	<0.5	<0.5	<0.5

Page : 4 of 5
Work Order : EM1819122
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 48-52

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW1	MW2	MW3	Duplicate	Rinsate
				Client sampling date / time	26-Nov-2018 00:00	26-Nov-2018 00:00	26-Nov-2018 00:00	26-Nov-2018 00:00	26-Nov-2018 00:00
Compound	CAS Number	LOR	Unit		EM1819122-001	EM1819122-002	EM1819122-003	EM1819122-004	EM1819122-005
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		267	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		30	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		150	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		7920	<100	2390	<100	<100
C29 - C36 Fraction	----	50	µg/L		4710	<50	500	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		12800	<50	2890	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		470	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		11100	<100	2730	<100	<100
>C34 - C40 Fraction	----	100	µg/L		2450	<100	230	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		14000	<100	2960	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		470	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		76.2	89.5	74.9	89.8	79.3
Anthracene-d10	1719-06-8	1.0	%		83.0	77.0	73.4	82.3	73.0
4-Terphenyl-d14	1718-51-0	1.0	%		93.3	113	76.2	102	89.4
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		104	94.4	100	93.9	103
Toluene-D8	2037-26-5	2	%		104	89.4	94.2	91.6	98.8
4-Bromofluorobenzene	460-00-4	2	%		109	93.3	99.8	97.2	105

Page	: 5 of 5
Work Order	: EM1819122
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 48-52

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	36	114
Anthracene-d10	1719-06-8	51	119
4-Terphenyl-d14	1718-51-0	49	127
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129

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CERTIFICATE OF ANALYSIS 15481

Client Details	
Client	Geo-Environmental Solutions Pty Ltd
Attention	S Joyce
Address	29 Kirksway place, BATTERY POINT, TAS, 7004

Sample Details	
Your Reference	**48-52 New Town Road**
Number of Samples	
Date samples received	28/11/2018
Date completed instructions received	28/11/2018

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details	
Date results requested by	03/12/2018
Date of issue	03/12/2018

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Client Reference: 48-52 New Town Road

vTRH(C6-C10)/BTEXN in Water		
Our Reference		15481-1
Your Reference	UNITS	Triplicate
Date Sampled		28/11/2018
Type of sample		Water
Date extracted		28/11/2018
Date analysed	-	28/11/2018
TRH C_6 - C_9	ug/L	<10
TRH C_6 - C_{10}	ug/L	<10
TRH C_6 - C_{10} less BTEX (F1)	ug/L	<10
Benzene	ug/L	<1
Toluene	ug/L	<1
Ethylbenzene	ug/L	<1
m+p-xylene	ug/L	<2
o-xylene	ug/L	<1
Naphthalene	ug/L	<1
Surrogate Dibromofluoromethane	%	100
Surrogate toluene-d8	%	99
Surrogate 4-BFB	%	108

Results Approved By
Chris De Luca, Senior Chemist

Authorised By
P.Adams.
Pamela Adams, Laboratory Manager

NATA

Envirolab Reference: 15481
Revision No: R00

Environmental Site Assessment (V9) 52 New Town Road, New Town. June 2025.

Client Reference: 48-52 New Town Road

TRH Water(C10-C40) NEPM		
Our Reference	UNITS	15481-1
Your Reference		Triplicate
Date Sampled		26/11/2018
Type of sample		Water
Date extracted	-	29/11/2018
Date analysed	-	30/11/2018
TRH C_{10} - C_{14}	ug/L	<50
TRH C_{15} - C_{28}	ug/L	<100
TRH C_{29} - C_{36}	ug/L	<100
TRH >C_{10} - C_{16}	ug/L	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	ug/L	<50
TRH >C_{16} - C_{34}	ug/L	<100
TRH >C_{34} - C_{40}	ug/L	<100
Surrogate o-Terphenyl	%	67

Surrogate Reference 15481
Analysed for R00

Page 3 of 15

Client Reference: 48-52 New Town Road

PAHs in Water		
Our Reference	UNITS	15481-1
Your Reference		Triplicate
Date Sampled		26/11/2018
Type of sample		Water
Date extracted	-	29/11/2018
Date analysed	-	02/12/2018
Naphthalene	ug/L	<1
Acenaphthylene	ug/L	<1
Acenaphthene	ug/L	<1
Fluorene	ug/L	<1
Phenanthrene	ug/L	<1
Anthracene	ug/L	<1
Fluoranthene	ug/L	1
Pyrene	ug/L	1
Benzo(a)anthracene	ug/L	<1
Chrysene	ug/L	<1
Benzo(b,j&k)fluoranthene	ug/L	<2
Benzo(a)pyrene	ug/L	<1
Indeno(1,2,3-c,d)pyrene	ug/L	<1
Dibenzo(a,h)anthracene	ug/L	<1
Benzo(g,h,i)perylene	ug/L	<1
Total +ve PAH's	ug/L	2
Benzo(a)pyrene TEQ	ug/L	<5
Surrogate p-Terphenyl-d_{14}	%	74

Surrogate Reference 15481
Analysed for R00

Page 4 of 15

Environmental Site Assessment (V9) 52 New Town Road, New Town. June 2025.

Client Reference: 48-52 New Town Road

HM in water - dissolved		
Our Reference	UNITS	15481-1
Your Reference		Tripblank
Date Sampled		26/11/2018
Type of sample		Water
Date prepared	-	30/11/2018
Date analysed	-	30/11/2018
Arsenic-Dissolved	µg/L	2
Boron-Dissolved	µg/L	80
Barium-Dissolved	µg/L	38
Beryllium-Dissolved	µg/L	<0.5
Cadmium-Dissolved	µg/L	<0.1
Chromium-Dissolved	µg/L	1
Cobalt-Dissolved	µg/L	<1
Copper-Dissolved	µg/L	3
Manganese-Dissolved	µg/L	170
Nickel-Dissolved	µg/L	2
Lead-Dissolved	µg/L	<1
Selenium-Dissolved	µg/L	1
Vanadium-Dissolved	µg/L	5
Zinc-Dissolved	µg/L	3
Mercury-Dissolved	µg/L	<0.05

Client Reference: 48-52 New Town Road

Method ID	Methodology Summary
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Metals-022 ICP-MS	Determination of various metals by ICP-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSL-e Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater 2013.
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

Client Reference: 48-52 New Town Road

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			28/11/2018					28/11/2018	
Date analysed	-			28/11/2018					28/11/2018	
TRH C_6 - C_9	µg/L	10	Org-016	<10					115	
TRH C_6 - C_{10}	µg/L	10	Org-016	<10					115	
Benzene	µg/L	1	Org-016	<1					111	
Toluene	µg/L	1	Org-016	<1					114	
Ethylbenzene	µg/L	1	Org-016	<1					115	
m+p-xylene	µg/L	2	Org-016	<2					118	
o-xylene	µg/L	1	Org-016	<1					118	
Naphthalene	µg/L	1	Org-013	<1					104	
Surrogate Dibromofluoromethane	%		Org-016	100					97	
Surrogate toluene-d8	%		Org-016	99					98	
Surrogate 4-BFB	%		Org-016	105					104	

Envirolab Reference: 15481
Revision No: R00

Page 7 of 12

Client Reference: 48-52 New Town Road

QUALITY CONTROL: TRH Water(C10-C40) NEPM					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			29/11/2018					29/11/2018	
Date analysed	-			29/11/2018					29/11/2018	
TRH C_{10} - C_{14}	µg/L	50	Org-003	<50					84	
TRH C_{15} - C_{28}	µg/L	100	Org-003	<100					105	
TRH C_{29} - C_{36}	µg/L	100	Org-003	<100					107	
TRH >C_{10} - C_{16}	µg/L	50	Org-003	<50					84	
TRH >C_{16} - C_{34}	µg/L	100	Org-003	<100					105	
TRH >C_{34} - C_{40}	µg/L	100	Org-003	<100					107	
Surrogate o-Terphenyl	%		Org-003	81					75	

Envirolab Reference: 15481
Revision No: R00

Page 8 of 12

Client Reference: 48-52 New Town Road

QUALITY CONTROL: PAHs in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			29/11/2018					29/11/2018	
Date analysed	-			02/12/2018					02/12/2018	
Naphthalene	µg/L	1	Org-012	<1					68	
Acenaphthylene	µg/L	1	Org-012	<1					96	
Acenaphthene	µg/L	1	Org-012	<1						
Fluorene	µg/L	1	Org-012	<1					78	
Phenanthrene	µg/L	1	Org-012	<1					96	
Anthracene	µg/L	1	Org-012	<1						
Fluoranthene	µg/L	1	Org-012	<1					92	
Pyrene	µg/L	1	Org-012	<1					96	
Benzo(a)anthracene	µg/L	1	Org-012	<1						
Chrysene	µg/L	1	Org-012	<1					109	
Benzo(b,j&k)fluoranthene	µg/L	2	Org-012	<2						
Benzo(a)pyrene	µg/L	1	Org-012	<1					112	
Indeno(1,2,3-c,d)pyrene	µg/L	1	Org-012	<1						
Dibenz(a,h)anthracene	µg/L	1	Org-012	<1						
Benzo(g,h,i)perylene	µg/L	1	Org-012	<1						
Surrogate p-Terphenyl-d$_{14}$	%		Org-012	99					90	

Client Reference: 48-52 New Town Road

QUALITY CONTROL: HM in water - dissolved					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			30/11/2018					30/11/2018	
Date analysed	-			30/11/2018					30/11/2018	
Arsenic-Dissolved	µg/L	1	Metals-022 ICP-MS	<1					109	
Boron-Dissolved	µg/L	20	Metals-022 ICP-MS	<20					113	
Barium-Dissolved	µg/L	1	Metals-022 ICP-MS	<1					109	
Beryllium-Dissolved	µg/L	0.5	Metals-022 ICP-MS	<0.5					115	
Cadmium-Dissolved	µg/L	0.1	Metals-022 ICP-MS	<0.1					106	
Chromium-Dissolved	µg/L	1	Metals-022 ICP-MS	<1					103	
Cobalt-Dissolved	µg/L	1	Metals-022 ICP-MS	<1					103	
Copper-Dissolved	µg/L	1	Metals-022 ICP-MS	<1					106	
Manganese-Dissolved	µg/L	5	Metals-022 ICP-MS	<5					111	
Nickel-Dissolved	µg/L	1	Metals-022 ICP-MS	<1					106	
Lead-Dissolved	µg/L	1	Metals-022 ICP-MS	<1					104	
Selenium-Dissolved	µg/L	1	Metals-022 ICP-MS	<1					103	
Vanadium-Dissolved	µg/L	1	Metals-022 ICP-MS	<1					107	
Zinc-Dissolved	µg/L	1	Metals-022 ICP-MS	<1					109	
Mercury-Dissolved	µg/L	0.05	Metals-021 CV-AAS	<0.05					102	

Client Reference: 48-52 New Town Road

Result Definitions	
NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions	
Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011

Client Reference: 48-52 New Town Road

Laboratory Acceptance Criteria
Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.
Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.
In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.
When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.
Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.
Measurement Uncertainty estimates are available for most tests upon request.

GES

GEO-ENVIRONMENTAL

SOLUTIONS

CONTAMINATION MANAGEMENT PLAN (CMP) – Version 6

52 NEW TOWN ROAD, NEW TOWN.

June 2025

For the Proposed *Mixed Use Development*

For The House Family Office



Geo-Environmental Solutions P/L 29 Kirksway Place, Battery Point 7004. Ph 6223 1839 Email: office@geosolutions.net.au

DOCUMENT CONTROL **3**

1 INTRODUCTION **4**

1.1 Assessment Framework 4
1.2 Background 4
1.3 Objectives 5
1.4 Scope of Works 5
1.5 Responsibility of Implementation 5
1.6 Site Details 6

2 BACKGROUND ENVIRONMENTAL SITE ASSESSMENT INFORMATION **9**

2.1 Invasive Site Investigations 9
2.2 Conclusions from the ESA 9
2.3 Soil Assessment Results 11
2.3.1 Environmental 11
2.3.2 Human Health 11
2.3.3 IB105 12
2.4 Groundwater Assessment Results 13

3 POTENTIAL RECEPTORS **14**

3.1 Ecological Receptors & Environmental Considerations 14
3.2 Human Receptors and Exposure Routes 14

4 MINIMISING OF POTENTIAL ENVIRONMENTAL IMPACTS **16**

4.1 Soil 16
4.1.1 Soil Excavation and Management 16
4.1.2 Movement of Soil 18
4.1.3 Off-site Disposal of Soil 18
4.1.4 Importation of Fill Material to the Site 19
4.1.5 Dust and odour control 19
4.2 Groundwater & Stormwater Management 19
4.3 Surface Water and Sediment Control 20
4.4 Spill Avoidance 20

5 MINIMISATION OF RISK TO HEALTH OF SITE WORKERS **22**

5.1 Exposure Routes 22
5.1.1 Soil 22
5.1.2 Groundwater and Surface Water 22
5.2 Control measures 22

6 MITIGATION MEASURES FOR DEVELOPMENT **23**

6.1 Physical separation layers 23

7 CMP REVIEW AND REPORTING **24**

7.1 Review 24
7.2 Reporting 24
7.3 Excavation Works 24

8 SUMMARY OF ROLES AND RESPONSIBILITY **25**

LIMITATIONS STATEMENT **26**

REFERENCES **27**

APPENDIX 1 GES STAFF **28**

APPENDIX 2 SOIL AND WATER MANAGEMENT PLAN (SWMP) **29**

APPENDIX 3 IB105 BOREHOLE LOGS **30**

APPENDIX 4 JSA CONSULTING ENGINEERS INFERRED SITE IB105 SOIL CLASSIFICATION GRID **87**

APPENDIX 5 SOIL RESULTS COMPARED AGAINST IB105 ..... **99**

APPENDIX 6 SOIL AND WATER MANAGEMENT GUIDELINE FACT SHEETS **117**
APPENDIX 7 SOIL TRACKING FROM **147**
APPENDIX 8 SITE INDUCTION COMPLETION ACKNOWLEDGEMENT SIGN-IN FORM **148**

DOCUMENT CONTROL

Title	Version	Date	Author	Reviewed
Draft Contamination Management Plan, 48 – 52 New Town Road, New Town	Version 1	20 March 2019	Sarah Joyce	Kris Taylor
Contamination Management Plan, 48 – 52 New Town Road, New Town	Version 2	16 April 2019	Kris Taylor	JP Cumming
Contamination Management Plan, 48 – 52 New Town Road, New Town	Version 3	21 April 2020	Sarah Joyce	JP Cumming
Contamination Management Plan, 48 – 52 New Town Road, New Town	Version 4	5th November April 2020	Sarah Joyce	JP Cumming
Contamination Management Plan, 48 – 52 New Town Road, New Town Version 5	Version 5	12th December 2024	Sarah Joyce	JP Cumming
Contamination Management Plan, 52 New Town Road, New Town Version 6	Version 6	30th June 2025	Mark Downie	Sarah Joyce

1 Introduction

Geo-Environmental Solutions Pty. Ltd. (GES) of 29 Kirksway Place, Battery Point, Tasmania were originally engaged by Swanbury Penglase Architects in 2018 to assess 48-52 New Town Road, New Town - hereby referred to as 'The Site'. This report is Version 6 of the Contamination Management Plan (CMP) report, GES has been reengaged to update the report for The House Family Office (the 'Client') for The Site, now known as 52 New Town Road, for their proposed mixed-use development, and to address a Request For Information (RFI) from City Of Hobart addressed to PlanBuild Tasmania (Permit PLN-HOB-2024-0716), since the previous versions of the CMP and Environmental Site Assessment (ESA) reports were compiled.

1.1 Assessment Framework

The council contaminated site register suggests that potentially contaminating activities may have taken place at the site or on a neighbouring site. The proposed development has therefore flagged the Interim Planning Scheme (IPS) E2.0 Potentially Contaminated Land Code. The following potentially contaminating activities (IPS Table E2.2) have been identified in the ESA:

- Imported fill from a potentially contaminated source, largely covering the title of *52 New Town Road* and up to a thickness of 6m.
- Underground refuelling infrastructure relating to the operation of a former service station at *48-50 New Town Road.*

As the EPA director, or a person approved by the Director has not certified that the land is suitable for the intended use and there is no approved plan to manage contamination and associated risk to human health or the environment, there are no acceptable solutions to the proposed development and therefore all E2.0 performance criteria relevant to the proposed development are to be addressed.

GES prepared an environmental site assessment in accordance with IPS E2.0 performance criteria. The ESA report has been prepared by suitably qualified person (see Appendix 1) and 'defines the nature, extent and levels of existing contamination and the actual or potential risk to human health or the environment, on or off the site, resulting from that contamination, prepared in accordance with the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 16 May 2013.'

1.2 Background

GES completed the Environmental Site Assessment (ESA) report for the site in January 2019, the most recent update of the ESA (Version 9) was compiled on the 26th June 2025 which included a Tier 1 health risk assessment to determine potential soil contamination risks which may arise from the proposed building development and associated works.

It was identified through the ESA that 48 to 50 New Town Road hosted a service station prior to 1973. Dangerous Goods Records provided four (4) records relating to dangerous substances including a 2000 gallon underground super spirit tank with a S/E pump later referred to as a 5.4 KL tank plus a 1.15KL on-ground tank for Diesel.

The ESA confirmed that the site is contaminated. There are elevated levels of lead and benzo(a)pyrene in the fill and elevated hydrocarbons and metals in the groundwater, the majority of the groundwater contamination was observed in MW1, directly down gradient from the former service station, with negligible hydrocarbon concentrations further downgradient at MW2. The soil contamination mostly exceeded ecological guidelines and there is an absence of a proximal ecological receptor. There are human health exceedances for dermal contact, dust inhalation and soil ingestion. The soil classified on site ranges from Level 1 Material (Clean Fill) to Level 4 Material (contaminated soil for remediation) classification.

Given the contamination risks, as per the Hobart City Council (HCC) Interim Planning Scheme (IPS), there is a requirement that this CMP document is implemented and followed to mitigate any adverse impact upon human health or the environment as a result of the proposed works.

1.3 Objectives

The objective of this CMP is to comply with HCC IPS requirements. The purpose of this CMP is to:

- Identify the site hazards associated with contaminated soil exposure;
- Minimise risks to site workers and the environment; and
- Provide advice on and advise of safety measures to be adopted during future excavation or construction works at the site.

1.4 Scope of Works

The scope of work for the CMP is to produce a guidance document that includes information in relation to identifying measures and outlining procedures to minimise human health hazards and potential environmental impacts during all phases of site works including additional soil testing, excavation, construction and post construction future trench works at the site. Note prescriptions relating to demolition have been removed as this phase of work is now complete, as of December 2024. This report is intended to;

- Minimise potential adverse environmental consequences associated with exposing contaminated soils. The most significant and direct pathway is through soil erosion into stormwater drains which feed into the marine environment of the River Derwent.
- Minimise potential health risks from the exposure of contaminated soil during excavation works. Contaminated soil may be spread onsite and offsite through various mechanisms including foot traffic, vehicle movements, dust erosion as well as stormwater erosion.
- Provide guidance for management of soil for onsite reuse or off-site soil disposal in accordance with IB105 guidelines.

1.5 Responsibility of Implementation

It will be the responsibility of the owner(s) of the site to implement this CMP. The owner(s) of the site may at times expressly delegate responsibility for site management as appropriate. The site owner(s) retains overall responsibility for implementation of this CMP and any modifications required to this CMP should site conditions change.

The owner(s) of the site are responsible for the distribution of this CMP to any contractors working on site associated with the site redevelopment and these contractors must comply with the requirements of this CMP.

To manage potential health risks, the advice stipulated in this CMP should be followed by all persons involved in works or other activities at the site that may result in the disturbance and/or excavation of soil.

1.6 Site Details

Site details are presented in Table 1 and the site investigation areas are presented in Figure 1 (recent conditions) and Figure 2 (former conditions).

Table 1 Site Details

INVESTIGATION AREA LOCATED BETWEEN: 48-52 New Town Road, New Town, Tasmania
APPROXIMATE INVESTIGATION AREA 7,731m^2 (both titles combined).
TITLE REFERENCES According to the Cadastral Parcels layer on the LIST; *48-50 New Town Road* Property ID 5517199, CT 198029/1 *52 New Town Road* is Property ID 5517180, CT 252465/1
SITE OWNER 52 New Town Road Pty Ltd (both titles)
SITE ELEVATION & GRADIENT Elevation at the range from 60.3m AHD in the south-east, 56.2m AHD in the north and 57.5m AHD in the west.
SITE SURFACING The surface of the site is a combination of grass, garden beds, asphalt and concrete. All former buildings on site have now been removed.
PREVIOUS LANDUSE Commercial – carpark and commercial buildings plus former service station at 48-50 New Town Road (1957-1973).
SITE ZONING Urban Mixed Use *under the Tasmanian Interim Planning Scheme 2015*
SITE LAND USE Currently Vacant
PROPOSED LAND USE Mixed Use – Residential Dwellings, Short Stay Accommodation, Communal Spaces, Commercial Spaces.
SURROUNDING LAND USE: *Inner Residential* consistent with zoning



Figure 1 Aerial Photograph of Current Site Conditions (The LIST Map, 2023-2024 Aerial Photo Season).



Figure 2 Aerial Photograph of Former Site Conditions (The LIST Map, Prior to 2019 Aerial Photo Season).

2 Background Environmental Site Assessment Information

2.1 Invasive Site Investigations

A total of fifteen site visits were conducted to complete the ESA. Site investigation works comprised of soil bore drilling and groundwater sampling Figure 3. Borehole drilling and soil sample collection was conducted over 9 days, a total of 142 primary soil samples were selected for analysis. Groundwater sampling took place over 2 days, a total of 4 groundwater samples were selected for analysis.

2.2 Conclusions from the ESA

- The site assessment has confirmed the site is contaminated and a Contamination Management Plan (CMP) will be required to manage contaminated soil and groundwater at the site during site redevelopment.
- At the time of production of this report (June 2025) there is no evidence that the UPSS infrastructure had been removed and is therefore assumed to be present. As it is a potential ongoing source for hydrocarbon contamination ii should be decommissioned as soon as possible. It is anticipated that once the UPSS infrastructure is removed, any residual risk from hydrocarbons (TRH Fractions and naphthalene) in the groundwater will be eliminated.
- Elevated levels of lead and benzo(a)pyrene are present in the fill at the site and without adequate management may pose a risk to human health both onsite and offsite during development works to adjacent residents and commercial workers through dermal contact, dust inhalation and soil ingestion and may adversely impact the environment as a result of sediment erosion into the waterways.
- Elevated levels of naphthalene, benzo(a)pyrene and some other metals are present in the groundwater which may pose a risk human health and the environment without adequate management.
- Once the CMP is put in place and recommendations are adhered to, the site will be suitable for the proposed use, the redevelopment of the site with residential units separated from soil by basement carparking and ground floor commercial land use.
- In terms of soil disposal; elevated levels of barium, beryllium, lead, manganese, mercury, zinc, copper and benzo(a)pyrene and hydrocarbons have been identified and will require careful consideration when managing.
- The proposed site redevelopment will involve the excavation of large volumes of fill from the site which will remove most of the contaminated material at site.

During Construction

- CMP All construction workers and trench workers should be informed of the site contamination during their site induction as identified within the CMP. The CMP should be made available to all contractors prior to the commencement of excavation works.
- Removal of UPSS infrastructure: As there is no evidence of UPSS removal, it is assumed the UPSS is in-situ and the UPSS infrastructure will require a Development Application to remove the UPSS infrastructure in line with the Hobart City Councils planning requirements with *Hobart Interim Planning Scheme 2015*, and EPA Tasmania's UPSS decommissioning Regulations.
- IB105 Classification The soil classified on site ranges from Level 1 Material (Clean Fill) to Level 4 Material (contaminated soil for remediation) classification. To accurately manage the excavated material for appropriate disposal, grid soil sampling was conducted. The construction company undertaking the development should be provided with these results, as this will assist with soil management on site. Additional soil sampling may be required in areas not adequately sampled in the original program. For all future excavation of soil, soil should be classified according to the EPA Tasmania's IB105, and TCLP leachate testing should be conducted to assess PAH including Benzo(a)pyrene.
- Validation sampling Post excavation to construction level, the site must be validation to ensure soil and groundwater contamination does not pose a vapor instruction risk to future site inhabitants.



Note: BH#-Soil bores; MW# - groundwater bore and GT# - Geotechnical Hole

Figure 3 Borehole Plan

2.3 Soil Assessment Results

From the soil assessment, it is concluded that:

- There were 98 detections of hydrocarbons out of 142 samples sent for analysis.
- There were 40 samples that did not have any guideline exceedances.
- Detections for TRH, PAHs and metals were observed across the site. These results confirm multiple sources of contamination at the site, most likely sourcing from the former UPSS infrastructure and uncontrolled fill at the site.

2.3.1 Environmental

Despite the large number of ecological guideline exceedances, it should be noted that there is an absence of close ecological receptors to the site. Benzo(a)pyrene exceeded ESL guideline limits in most samples. The exceedances were mostly in the fill material and there is no clear pattern to the distribution for the ESL exceedances.

There were many low-level detections of hydrocarbons, with guideline exceedances for TRH C_{16}-C_{34} in the following boreholes 8, 13, 14, 17, 23, 40, 42, 44; depths ranged from 0.5 to 2.5 m below ground surface (bgs). There is no clear pattern to the distribution; holes 14 and 17 are isolated on the southern and western boundary retrospectively and the remaining boreholes are on the eastern boundary, see Figure 3.

Ecological Setting - Urban Residential Land Use

Ecological Screening Levels: There were the following ESL guideline limit exceedances in an urban residential land use setting; 89 samples for Benzo(a)pyrene, six samples for TRH Fraction F2 and 17 samples for TRH Fraction F3. A total of 61 samples from 142 samples had no detections above laboratory Limit Of Reporting (LOR).

Ecological Investigation Levels: There were three exceedances above the EILs residential land use guideline limits, one for copper, one for zinc, and one for lead. There were another 8 samples that had exceedances above the EILs residential land use guideline limits, however they have been discounted as a risk because the sample will be deeper than 2m below the finished floor level.

Environmental Risks

There are no onsite ecological receptors identified. The following offsite ecological receptors have been identified:

- Maypole Creek which is 1.7 km to the north near Risdon Road; and
- The River Derwent at Cornelian Bay which is 2.12 km from the site.

Benzo(a)pyrene, TRH and copper levels are elevated across the site.

Once pavement is removed from the site, soil erosion into the stormwater system may result in environmental impact to the freshwaters of Maypole Creek and the marine waters of the River Derwent. This will need to be managed to ensure that soil is not washed into stormwater culverts and ultimately the marine environment. The potential for leaching has been determined to be LOW to MODERATE for benzo(a)pyrene, PAH's and metals. Soil leaching into groundwater is considered LOW risk and surface water monitoring will be required to ensure discharged water does not exceed nominated ANZG guideline limits.

Mitigation measures relating to the identified risks are detailed in Section 4, and a Soil and Water Management Plan (SWMP) is included in Appendix 2.

2.3.2 Human Health

Health Screening Levels – Dermal Contact

- There were a total of three exceedances from 142 samples selected for analysis, of dermal contact for residential land use.

- There were two samples that had exceedances above HSL A, low density residential guidelines: including BH23 2.5-2.6 and BH40 0.5-0.6 both for TRH Fraction F3 >C_{16}-C_{34}. There was one sample that had exceedances above HSL B, high density residential guidelines, that sample was BH40 0.5-0.6 for TRH Fraction F3 >C_{16}-C_{34}.
- There were no exceedances above the HSL D guidelines for commercial land use for dermal contact in any of the samples.
- It is anticipated that all residential units will be separated from soil on the site by basement and/or commercial/recreational premises. In this case, if soil movement off-site can be contained, then the dermal contact risk has been negated, as there are no dermal contact risks identified at commercial land use for the construction phase of the development.

Health Investigation Levels – Dust Inhalation and Soil Ingestion

- There were a total of 72 HIL A exceedances for assessing dust inhalation and soil ingestion risk to neighbouring residential receptors. These exceedances included a total of 56 samples exceeded HIL A for benzo(a)pyrene, a total of 10 samples exceeded HIL A for total PAH's and a total of 7 samples exceeded HIL A for lead.
- There were a total of 30 HIL B exceedances for assessing dust inhalation and soil ingestion risk to neighbouring residential receptors. These exceedances included a total of 26 samples exceeded HIL B for benzo(a)pyrene and a total of 4 samples exceeded HIL B for total PAH's.
- There were nine guideline exceedances for dust inhalation and soil ingestion for *commercial land use* HIL D for benzo(a)pyrene at the site indicating a risk to commercial workers developing the site.

Indoor Vapour Risk

- From the soil assessment there were no guideline exceedances and no indoor vapour intrusion risk identified.

Trench Worker

- From the soil assessment there were no guideline exceedances and no risk to trench workers identified.

Human Health Risks

Based on the proposed land-use and layout, the ESA concluded the following with respect to human health risks from the soil assessment:

- There may be isolated occurrences of lead and benzo(a)pyrene in the fill and in some instances in the natural soil material where contaminants have been leached and mobilized by groundwater. Nine samples were identified as a risk for dust inhalation and soil ingestion at commercial land use HIL D – applicable to construction workers at the redevelopment phase. An assumption needs to be made that any soil encountered at the site may be contaminated.
- There may be hydrocarbons present in the vicinity of the former fuel storage infrastructure.

Once pavement is removed from the site, potential offsite human health receptors will need to be considered during the excavation and construction phases of the work. Consideration to wind dispersion of soil and water movement to neighbouring properties. Mitigation measures relating to the identified risks are detailed in Section 5.

2.3.3 IB105

Soil samples collected at the site were compared against EPA Tasmania (2018) Information Bulletin 105 (IB105) to assess disposal options. Findings from the assessment are presented in borehole logs (Appendix 3). Findings are further illustrated in indicative JSA Consulting Engineers IB105 plans (Appendix 4), which although the plans have been superseded, Appendix 4 still provides a good guideline of the locations of different contamination concentrations. Tables of results for all samples compared against IB105 are presented in Appendix 5. Please note that due to heterogeneity of the fill material, these findings are indicative only. The following findings were made during the invasive soil investigation in relation to the IB105 guidelines:

- The main contaminants were identified in the thick layer of imported fill at the site and include benzo(a)pyrene (a PAH), some heavy metals including barium, beryllium, copper, lead,

manganese, mercury and zinc (Level 2) and petroleum hydrocarbons at limited locations; mostly in the area surrounding the former service station infrastructure.

- Benzo(a)pyrene was present in most boreholes across the site.
- Material tested at the site is classified in a range from Level 1 Material to Level 4 Material.
- Following leachate testing;
    - benzo(a)pyrene has been reduced from Level 3 Material and Level 4 Material to Level 2 Material.
    - Some heavy metals were also reduced to Level 2 Material.
    - This reduction means that although the benzo(a)pyrene and heavy metals are present, they have limited mobility in water and material can be disposed of as Level 2 Material.
    - The only contaminant that could not be reduced with leachate testing was total petroleum hydrocarbons, C_{10}-C_{36}. The majority of the detection were of Level 2 classification in the following boreholes 2, 4, 8, 9, 13, 14, 39 42, 44, 48. There were two detections of Level 3 classification in the following boreholes 23 and 40. Hence some locations with elevated TPH C_{10}-C_{36} are likely to be considered Level 3 Material at the time of excavation and disposal.
- Some areas featured limited access due to the presence of buildings, the soil in these areas will require further testing at a rate of 1 sample per 25 m^3 to confirm these conditions.

2.4 Groundwater Assessment Results

A total of three groundwater monitoring wells were installed to capture any potential contamination from the former service station infrastructure. Results indicate that the underground refuelling infrastructure has been compromised over time onsite as there was a presence of elevated levels of hydrocarbons and some heavy metals are present in the groundwater. The following information was obtained:

- The results indicate that the underground refuelling infrastructure relating to the former service station has been compromised over time. Elevated metals indicate leaching from the surrounding fill material on site.
- Ecological: The groundwater results for MW1 on two occasions confirm the presence of hydrocarbons (PAHs and TRH Fractions). Copper exceeded both freshwater and marine guideline limits (ANZG 2018) in MW2. Cobalt exceeded marine guideline limits (ANZG 2018) in MW1. The following PAHs exceeded both freshwater and marine guideline limits (ANZG 2018) in MW1, naphthalene, phenanthrene, anthracene, fluoranthene and benzo(a)pyrene. Benzo(a)pyrene accumulated in the upgradient well but not in the two downgradient wells. These guideline exceedances focussed at MW1 suggest that groundwater is contaminated in that part the site, but there is no evidence of contaminated groundwater migrating offsite. Future works will need to prevent the movement of potentially contaminated groundwater offsite, with the use of the SWMP and testing before disposal of groundwater accumulated from dewatering excavations.
- Human health: despite the elevated levels of contaminants in the groundwater, no indoor vapour risk to human health has been identified at HSL D commercial land use guidelines. HSL D commercial land use guidelines are applicable to the proposed developments as residential units will be separated from the ground floor level by basement carpark and commercial spaces. The risk of contaminated groundwater migrating to off-site residential receptors has been dismissed as there were no detections of contamination in the downgradient monitoring well, MW2. Future works will need to prevent the movement of potentially contaminated groundwater offsite, with the use of the SWMP and testing before disposal of groundwater accumulated from dewatering excavations.
- It is anticipated that once the UPSS infrastructure is removed then the risk from the groundwater will be mitigated. Given the groundwater monitoring data is from 2018, and that removal of UPSS will be required, it is recommended that a further groundwater monitoring event be conducted after the UPSS removal and decommissioning. This can be used to compare current site conditions to past data, and if contamination concentrations have decreased then it may provide evidence that the risk to ecological and human health receptors has been negated.

In situ water testing is recommended to monitor groundwater and surface water across the site during the development phase. During excavations there is the potential that groundwater will surface in excavations at the site and surface waters may accumulate after rain. Any groundwater intrusion into excavations, or pooling of surface waters should be assessed by an environmental scientist prior to disposal to assess contaminant concentrations. It is possible that a dewatering operation may be required for the basement excavation, given basement FFL is anticipated to be 54.7m AHD with slab excavation depth to 55.35m AHD, and observed groundwater standing water levels have been around 55-58m AHD.

3 Potential Receptors

3.1 Ecological Receptors & Environmental Considerations

No sensitive terrestrial or freshwater ecosystem receptors have been identified on or near the site. The closest ecological receptor is the water source of Maypole Creek which is 1.7 km to the north of the site near Risdon Road. As stormwater from the site may discharge into Maypole Creek or the marine environment, all water sampled from the site during site development is to be compared against ANZG (2018) guidelines limits for marine ecosystems, and ANZG (2018) guideline limits for fresh water ecosystems. If exceedances are reported, measures will need to be put in place to manage disposal of stormwater from the site. A SWMP will be put in place to minimise onsite erosion of contaminated soil and sediments to offsite ecological receptors.

3.2 Human Receptors and Exposure Routes

As a result, from the previous land use activities and reclamation of land, there is localised contamination around the former service station infrastructure and contamination throughout the fill material at the site. Potential health exposure risks may be associated with soil excavation and management as well as general movement of soil around the site caused by foot & vehicle traffic, mobile machinery, as well as natural elements including wind and rain. Onsite and offsite exposure pathways include dermal contact, ingestion of contaminated soil/water and inhalation of dust. A potential exposure for petroleum vapour intrusion from groundwater contamination to residential site users is not applicable to the site given future ground floor and basement use is considered commercial, and there is no evidence of contaminated groundwater migration off-site to residential receptors.

A SWMP will be put in place to minimise onsite erosion of contaminated soil to offsite human receptors which in this instance is residential users. A SWMP has been provided for the site in Appendix 2, this SWMP may require updating if proposed demolition, excavation or construction plans alter over time.

Figure 4 presents the spatial relationship between the site and the potential human receptors. Note that the adjacent properties on Seymour Street plus the properties at 54 and 56 New Town Road are down gradient and most likely to be affected by potential soil or water runoff from the site. All adjacent properties may be impacted by dust and noise during the site redevelopment work.



Figure 4 Adjacent Properties with Potential Human Receptors

4 Minimising of Potential Environmental Impacts

Potential environmental impacts during any subsurface works or excavations may be associated with:

- Soil excavation and management
- Movement of soil
- Off-site disposal of soil
- Where relevant, groundwater and surface water extraction, removal and disposal
- Importation of fill to the site
- Dust and odour
- Stormwater management and sedimentation

To minimise potential environmental impacts, all work must be conducted in accordance with the:

- The Environmental Management and Pollution Control Act (EMPCA, 1994)
- Environmental Management and Pollution Control (Waste Management) Regulations (2010),
- Environmental Management and Pollution Control (Controlled Waste Tracking) Regulations 2010, and
- The guidance set out in this plan.

4.1 Soil

4.1.1 Soil Excavation and Management

The relevant sections of the CMP should be referred to during the following phases of site work: prior to commencement, additional soil testing, excavation, construction and ongoing future trenchwork at the site.

Prior to Commencement

Contractors and workers must be made aware of the potential soil and groundwater contamination and be familiar with the requirements of the CMP and they should also know that there may be environmental or human health consequences that result from noncompliance which may incur a fine from the EPA Tasmania.

Contractors must prepare one or more of the following: a site-specific Health and Safety Plan, a Job Safety Analysis (JSA) or a Safe Work Methods Statement (SWMS) covering their workers at the site for any reasonably anticipated risks.

Work procedures conducted on the site must be in accordance with relevant Occupational Health and Safety (OH&S) Regulations. It is the responsibility of the principal contractor that site workers are made aware of the OH&S issues at the site.

A Soil and Water Management Plan (SWMP) should be written and implemented prior to the commencement of any site excavation work. The SWMP should be closely aligned with recommendations identified in this CMP and Fact Sheets presented in Appendix 6. A SWMP has been provided for the site in Appendix 2, this SWMP may require updating if proposed demolition, excavation or construction plans alter over time.

Additional Soil Testing

The following procedures must be carried out prior to, during and following the completion of any soil excavation and/or surface cover disturbance at the site.

In areas where access was limited due to the presence of existing buildings, additional soil testing will be required at a rate of 1 sample per 25 m^3 to confirm contaminant levels at these locations. Surface coverings of concrete and asphalt should remain intact during this phase of work as much as practically possible.

Note that many of the soil boreholes across the site and, the soil bores in the current building were unable to reach the depth of the fill/bedrock and resampling in these areas to greater depths may be required prior to excavation for soil disposal.

Validation testing of the underlying soil in the vicinity of the UPSS infrastructure will be required, in accordance with EPA Tasmania's UPSS Decommissioning Regulations.

Soil Excavation & Stockpiling

The proposed finished floor levels (FFL) of the basement carpark is anticipated to be at 55.35 m ASL with an excavation down to 54.7m ASL for the slab. There will be the requirement to relocate underground services according to the new FFL and develop a new foundation system potentially involving bored piers and earth cuttings.

Soil exposed and excavated from the site must be managed so as not to cause environmental harm in accordance with the Environmental Management and Pollution Control (Waste Management) Regulations (2010) and the Environmental Management and Pollution Control Act (EMPCA, 1994). Harm can be caused from contamination from soils leaching further underground, leaving the site through wind (as dust), carried off site with rain (as runoff stormwater), or released into the atmosphere as vapour.

Stockpiles should be sampled by a suitably experienced and qualified environmental assessor and analysed using a NATA registered laboratory to determine their contamination status, consistent with the procedures described in Section 4.1.3.

In order to prevent soil leaving the site the following erosion control measures must be followed:

- Develop a stabilized site access (Fact Sheet 12 Appendix 6);
- Clean up any soil spilt on roads adjoining the site.
- Ensure vehicles and equipment are free from excess soil when leaving the site, to avoid tracking soil off-site.
- Establish an equipment wash down area if necessary (Fact Sheet 13 Appendix 6);

Soil stockpiles must be managed in accordance with the Environmental Management and Pollution Control (Waste Management) Regulations, 2010 and best practice guidelines. The following are recommended:

- Separate stockpiles be constructed to separate varying levels of apparent soil contamination, if encountered.
- The source area of stockpiled soil must be recorded on a plan for reference to ensure the movement of potentially contaminated soil is tracked (see Section 4.1.2).
- Soil should be classified for disposal or reuse in accordance with EPA Tasmania (2018) Information Bulletin 105 (IB105) before being transported off site (see Section 4.1.3) unless being transported to a facility approved by the EPA;
- Stockpiles should always be covered and sealed if possible (refer Section 4.1.5 Dust and Odour Control & Fact Sheet 9 Appendix 6).
- All soil stockpiles must have sediment control devices around any temporary or longer-term stockpiles (Fact Sheet 14 Appendix 6), for example hay bales.

UPSS Validation Sampling

Post excavation to construction level and removal of UPSS infrastructure validation sampling must be undertaken in accordance with EPA Tasmania's UPSS Decommissioning Regulations. This will confirm that the soil and groundwater at the site does not pose an ongoing risk of vapor intrusion to future building inhabitants.

Construction

If there are any changes to the plans during the construction phase and additional excavations are required, the CMP should be revisited. Additional soil and water testing may be required, or current results may need to be reassessed against different criteria.

SWMP measures must remain in place as long as soil is exposed at surface or in excavations including footing exposures and service trenches.

Following Completion of Excavation Works

Equipment used for excavation of potentially contaminated soil must be cleaned of loose soil prior to use in another area. The loose soil must be contained within the stockpiles at the site.

Future Trench Work

It is anticipated that over time, future trench workers or contractors will visit the site from time to time as services require repairs or new infrastructure is required.

The anticipated that the site layout will vary greatly to the current conditions; the site will be sealed by a lower ground floor concrete carpark encompassing the southern half of the site. It is expected that some fill will remain on the northern half of the site with ground level commercial and recreational land uses. Therefore, future trench workers and contractors should be made aware of the potential contamination that may be encountered at the site and should be provided with a copy of this document.

4.1.2 Movement of Soil

If soil is going to be removed from site is to be assessed and sampled by an Environmental Consultant and results compared against Information Bulletin 105 (IB105) for Classification and Management of Contaminated Soil for Disposal. It is not necessary for undisturbed soil that remains on site to be classified against IB105.

Movement of soil at the site must be tracked to ensure its origin, contamination status and fate is documented. An example soil tracking form is provided in Appendix 7. Soil tracking forms are to be completed by the Site Foreman/supervisor of the site.

The source and destination of any soil moved around the site or off-site can be identified using references to development features, or a site grid. The appearance of soils encountered during excavation must be noted and checked to confirm they are consistent with those materials noted in the preliminary assessment. Soil appearance checks must be conducted by the Site Foreman or delegated to a suitably experienced and trained person.

4.1.3 Off-site Disposal of Soil

Waste soil generated at the site must be managed, transported and disposed in accordance with the Environmental Management and Pollution Control (Waste Management) Regulations 2010 and the Environmental Management and Pollution Control (Controlled Waste Tracking) Regulations 2010.

Aspects of these regulations related to classification and disposal of contaminated soils are summarised in Information Bulletin 105: Classification and Management of Contaminated Soil for Disposal (November 2018), published by EPA Tasmania.

See Appendix 5 for the comparison of soil analytical results from the ESA against IB105 plus IB105 in full. It is anticipated benzo(a)pyrene, some heavy metals and some hydrocarbon contamination will be encountered across the site.

Given the elevated levels of contamination encountered at the site, GES recommends that all soil excavated at the site is stockpiled systematically. Unclassified material will require systematic sampling for contamination levels. Soil flagged for landfill disposal is to be assessed by an Environmental Consultant and results compared against *Information Bulletin 105 (IB105) for Classification and Management of Contaminated Soil for Disposal*.

Soil samples would need to be obtained from the excavated soil and must comply with the sampling frequency in the EPA guidelines for off-site soil disposal.

Where excavated soil requires off-site disposal, the following is required:

- Communicate with the environmental consultant as early as possible. This will enable classification to be undertaken and relevant documentation prepared, prior to the proposed disposal date.
- Ensure that excavated soil volumes and origins are documented, to assist with classification for off-site disposal.

- Separate soils based on appearance and location of excavation. This will minimise the volume of higher category waste for dispose, and in turn minimise costs associated with disposal.
- Soils must be classified in accordance with Information Bulletin 105: Classification and Management of Contaminated Soil for Disposal (November 2018), published by EPA Tasmania or as updated.
- Where applicable, an application to transport excavated soil to an approved intermediate soil waste transfer facility for offsite IB105 characterization as approved by the Director, EPA Tasmania for review in accordance with Environmental Management and Pollution Control (Waste Management) Regulations, 2010 and the Environmental Management and Pollution Control (Controlled Waste Tracking) Regulations 2010.
- An application for disposal to an approved waste facility must be submitted to the Director, EPA Tasmania for review in accordance with Environmental Management and Pollution Control (Waste Management) Regulations, 2010 and the Environmental Management and Pollution Control (Controlled Waste Tracking) Regulations 2010.
- If approved, waste soils must be transported to the approved facility by a Controlled Waste Handler approved by EPA Tasmania.
- The Controlled Waste Handler must meet requirements for waste collection as well as disclosure of tracking information.

4.1.4 Importation of Fill Material to the Site

Fill imported to the site must meet Tasmanian EPA (IB105) "Fill Material" and NEPM HIL 'A' criteria (NEPM, 2013). Fill must be adequately sampled and analysed to demonstrate it meets Tasmanian EPA (IB105) "Fill Material" criteria prior to import to the site, as set out in this plan. A suitably qualified environmental consultant must conduct sampling and analysis.

A qualified environmental consultant must assess that the contamination status of the fill is suitable for use at the site. The environmental consultant shall inspect the source location of the fill. The material must be sampled and analysed at a minimum rate of one sample per 25 m^3 bulk soil volume and a minimum of 3 samples.

4.1.5 Dust and odour control

Generation of dust can spread contaminated soil and pose a risk to human health risk onsite and offsite and off-site ecological receptors. Fact Sheet 18 in Appendix 6 should be used as a guide for managing dust onsite. Measures that can be undertaken to assist in minimising the generation of dust and limit the amount of soil leaving the site include:

- Minimise movement of equipment on the site.
- Minimise excavation and movement of soils.
- Use a water spray sparingly to dampen work areas if excess dust is generated.
- Use a water spray sparingly to dampen soil prior to and during excavation if excess dust is generated.
- Avoid soil excavations that create dust on windy days.
- Always keep soil stockpiles covered where possible, with an impermeable membrane (eg. plastic sheeting) to minimise generation of dust, release of odours and to limit runoff of sediment.
- Avoid extended stockpiling of soil.
- Use dust barriers such as hessian or cloth screening.

4.2 Groundwater & Stormwater Management

To minimise potential migration of contaminants into the marine environment, all work must be conducted in accordance with the State Policy on Water Quality Management 1997 and the guidance set out in this plan.

The groundwater is known to contain high concentrations of contaminants particularly benzo(a)pyrene around MW1 (the former service station infrastructure) and the southern end of the site. There is concern that during the site redevelopment potentially impacted surface and groundwater will drain either:

- Offsite as overland flow onto neighboring properties; or
- Into stormwater systems without appropriate silt traps being put in place; or
- Exceeds recommended ANZG (2018) guidelines limits.

It is expected that surface waters will drain to the north towards 17 Seymour Street and 54 New Town Road and to less of an extent the rear of the properties to the west; 5, 7, 9 ,11 ,13 and 15 Seymour Street (Figure 4).

The following needs to be put in place to manage groundwater and surface water at the site:

- Surface water at the site will need to bypass a main primary surface water sample collection point which will be used to test water before it enters the stormwater system;
- Sampled by an Environmental Consultant and compared against ANZG 2018 guidelines for 95% protection of marine water ecosystems and freshwater ecosystems and TasWater's disposal requirements.
- Sampling should occur when rainfall exceeds 5 mm within a 24 hours period for the Ellerslie Road gauging station (approximately 1.5 weather front passing per month based on 2018 Bureau of Meteorology records).
- In the event there is a trigger, management measures will need to be put in place to collect water existing the site to ensure compliance with identified ANZG 2018 guidelines.

4.3 Surface Water and Sediment Control

Measures to minimise the potential for contamination of stormwater and migration of contaminants include:

- Silt fencing is required around the perimeter of the site to reduce the extent of soil erosion from wind and rain (Fact Sheet 14 Appendix 6).
- Where possible overland flow should be diverted away from excavation workings to reduce the risk of surface waters becoming impacted as a result of mixing with contaminated soil (Fact Sheet 7 Appendix 6);
- The site will need to be regularly inspected for signs of scour including around all earthen drains (Fact Sheet 11 Appendix 2) and site slopes. Where scour is identified, erosion should be controlled with the use of erosion control matts and blankets (Fact Sheet 8 Appendix 6)
- Collect stormwater on-site and allow suspended solids to settle before disposal in accordance with EMPCA and/or local Water Authority requirements (Fact Sheet 17 Appendix 6).
- Control measures such as cut-off drains/mounds and or sand bags will be required to prevent soil and water from existing the site boundary at locations which are not identified as a Legal Point Of Discharge (LPOD). Measures will need to be put in place to ensure that water does not migrate on to neighboring properties.
- Silt traps will be required around all drainage pits to prevent soil from entering the stormwater system (Fact Sheet 15 Appendix 6). Soil collected around the pits will need to be excavated and placed into skip bins for disposal with other excavated soil. The silt traps will need to be regularly maintained and checked to ensure they are not discharging sediments into the stormwater.
- Install drainage and/or grade soil surfaces to minimise pooling of water on exposed soils. Pooling surface water may be contaminated and can be managed through placement of aggregate.

4.4 Spill Avoidance

The following measures are recommended to manage preventable spills and contamination during site redevelopment works:

- Avoid conducting vehicle or machinery maintenance on-site.
- Ensure any fuel, oil or other chemicals are stored safely and securely in a temporary bunded area and that storage containers are absent from leaks and cracks.
- Repair or remove any leaking containers or machinery from the site immediately.
- Always have a complete spill kit onsite during site works.
- Clean up any spilt fuel, oil or other chemicals as soon as practically possible.
- Check sediment control measures regularly (at least daily) and clean and maintain as necessary.
- Inspect sediment control measures more frequently during rain periods, to check they are adequate for site conditions.

5 Minimisation of Risk to Health of Site Workers

Work procedures conducted on the site must be in accordance with relevant Occupational Health and Safety (OH&S) Regulations. It is the responsibility of the principal contractor that site workers are made aware of the OH&S issues at the site.

Engaged companies/contractors must prepare a site-specific Health and Safety Plan covering their workers at the site. In terms of managing exposure risks, given the complexity in defining where soil and contamination risks are located onsite, workers need to assume that all soil and water encountered at the site is contaminated.

5.1 Exposure Routes

5.1.1 Soil

Potential hazards for site workers associated with the presence of contaminants primarily in fill material at the site may be encountered during excavation or construction works must be considered as part of the overall Health and Safety Plan for the site, including:

- Ingestion of contaminated soil.
- Inhalation of dust.
- Dermal (skin) contact
- Inhalation of petroleum hydrocarbon vapours (low risk)

5.1.2 Groundwater and Surface Water

Potential hazards for site workers associated with the presence of contaminants in groundwater that may be encountered during excavation works must be considered as part of the overall Health and Safety Plan for the site, including:

- Ingestion of contaminated water.
- Dermal (skin) contact.
- Inhalation of petroleum hydrocarbon vapours (low risk)

5.2 Control measures

Personnel working at or visiting the site during excavation and construction works must be provided with an induction briefing, based on the example Site Induction Record and GES cover note is provided in Appendix 8. This induction record may be incorporated into the general site induction procedure. The principal contractor is responsible for ensuring that workers are aware of contamination issues at the site.

Measures that must be undertaken to manage exposure of site workers to contaminants include:

- It is identified that groundwater and potentially surface water at the site contains toxic concentrations of PAH's including benzo(a)pyrene. It is recommended that PAH (includes benzo(a)pyrene) is monitored in surface waters across the site in areas where workers are likely to be in direct contact with pooling or flowing water. Outcomes of the testing will assist in making modifications to drainage around workings to reduce exposure to toxic chemicals. The source of any contamination may not be readily apparent, and testing will assist in mitigating health exposure risks.
- Avoid handling of potentially contaminated soil and/or water.
- Wash hands before eating, drinking or smoking.
- Avoid activities that may introduce soil and/or water to the mouth, such as nail biting.
- Store and consume food and drink in a designated clean area.

- Remove soiled clothing and footwear before entering a designated clean area and before leaving the site.
- Use personal protective equipment (PPE) as required. In addition to hard hats, safety boots, safety glasses and hearing protection, this equipment may include:
    - Impermeable (latex or nitrile) gloves, if handling potentially contaminated soil and/or water
    - Long sleeved shirt and long trousers
    - Dust masks
- Store personal protective equipment in a clean place to avoid contamination.
- Replace gloves and masks regularly, and other equipment as required.
- The principal contractor must ensure that site workers and visitors are provided with:
    - Site safety induction briefing.
    - Adequate hand washing facilities.
    - A designated clean area for storage and consumption of food and drink.
    - Adequate personal protective equipment, as described above.

6 Mitigation measures for development

Based on the findings of the ESA (GES, 2025) it was concluded that risk mitigation measures would be required to control soil ingestion and dust inhalation risks to future users of the site.

6.1 Physical separation layers

In the areas of the site not covered by a permanent hardstand surface (such as bitumen, concrete or building slabs) capping measures for the various landscaping finishes are required to prevent contact with the underlying soil as a precautionary measure.

The physical cap must ensure that future site users do not meet the potentially contaminated soil. The construction of the cap can be tailored to the specific area use, considering the potential for incidental digging and the action of erosion or tree roots. Some examples of suitable capping layers are described in Table 2 below.

Table 2 Examples of Capping Layers

Surface Landscape Type	Area/ Land Use	Characteristic	Capping Requirements
Concrete Path	Footpaths and high wear areas	High traffic areas	Suitable in a range of areas due to the ability to provide a level surface. Provides effective barrier to underlying soils.
Asphalt / Bitumen	Carpark and driveway area	High traffic areas	Suitable in a range of areas due to the ability to provide a level surface. Provides effective barrier to underlying soils.
Re-instated Grass	Around footpaths and high wear areas	High traffic area for general public and dust/soil exposure risks from maintenance	If validation testing confirms that contaminated soil has been removed, then at least 0.15m of clean soil and development and maintenance of good grass cover. If validation testing identifies some potentially contaminated soil is remaining, then a geotextile cloth should be placed over the remnant potentially contaminated soil and clean fill topsoil of approximately 0.3m depth (increased to 0.5m depth in sloped areas) should be applied.
Garden Beds	Around footpaths and high wear areas	Maintenance/gardening is conducted. Covers small areas and includes plants and shrubs that stabilize soil movement.	In relatively flat areas, clean fill topsoil should be placed to the depth of likely digging and root penetration (approximately 0.3 m). This should be increased to at least 0.5m in sloped areas. If contaminated soil remains beneath the garden beds (i.e. it is not all removed from the area, as noted in validation testing) then a geotextile should be placed between the clean fill and contaminated soil. Tanbark / timber mulch would be placed over clean fill and topsoil mixture.

7 CMP review and reporting

7.1 Review

Following changes in the understanding of site contamination conditions, work requirements, legislation, or work scope (including excavation or construction), this CMP must be revised and reviewed by a competent person prior to use for the proposed works. In the event that no changes to the above-mentioned conditions occur, the CMP should be reviewed every 2 years. The CMP must be revised to reflect any changes and provide adequate procedures for ensuring continued worker, public and environmental safety and compliance with legislation.

7.2 Reporting

It is recommended that Site Management maintain documentation demonstrating that the requirements of this CMP have been met. Such documentation is likely to include:

- Site survey levels.
- Soil tracking records.
- Repair details to vapour barrier or venting system (if required).
- Volumes of fill removed and imported to the site.
- Records of complaints, notices or breaches of the CMP requirements and an outline of actions taken.
- Signed induction records to the site which demonstrate workers commitment to following the CMP.
- Evidence that imported fill meets Tasmanian EPA (IB105) "Fill Material" and HIL A' criteria (NEPM, 2013).
- Evidence that excavated fill was disposed of in accordance with EMPCA (1994) requirements.

7.3 Excavation Works

There is proposed excavation works at the site, and therefore E2.6.2 P1 performance criteria are to be addressed. In accordance with IPS E2.6.2 performance criteria, it is concluded from the ESA that the proposed excavation will not adversely impact on human health and the environment, proved the following specific remediation and protection measures are implemented before excavation commences:

- This CMP document is accessible to any workers at the site;
- All workers are to be made aware of contamination issues associated with the site before a CMP induction form is filled in;
- At all times, dust must be prevented from being generated at the site;
- Appropriate PPE are worn including gloves when handling soil;
- Measures must be put in place to prevent soil from eroding and moving offsite;
- Water testing is conducted by GES following 5 mm of rainfall over a 24-hour period. A risk assessment report is to be subsequently prepared by GES to determine likely impacts on the waterways and measures which need to be put in place to mitigate any adverse environmental risks. Mitigation measures to be recommended may include stormwater capture.
- Any groundwater intrusion into excavations, or pooling of surface waters should be assessed by an environmental scientist prior to disposal to assess contaminant concentrations. It is possible that a dewatering operation may be required for the basement excavation, given basement FFL is anticipated to be 55.35m AHD, and observed groundwater standing water levels have been around 55-58m AHD.

Given these measures are put in place, there is a low risk of adverse impact on human health and the environment.

8 SUMMARY OF ROLES AND RESPONSIBILITY

Site Owner	The owner(s) of the site are responsible for the distribution of this CMP to any building or development contractors working on site and these contractors must also comply with the requirements of this CMP. There is a responsibility to ensure the Soil and Water Management Plan (SWMP) is put in place prior to excavation works, and the plan is active as soon as site coverings are removed. The SWMP should not be removed until all surfaces have been covered. Post the site redevelopment, the site owner(s), who may delegate to a site operator is responsible and must inform future site contractors and trench workers of the CMP and the requirements to follow its contents.
Site Manager during site redevelopment, including following phases of site work: prior to commencement, excavation, additional soil testing, construction and future trenchwork	Responsible for the preliminary assessment of potential contamination discovered and assessing whether further action is required. The Site Manager is responsible for ensuring the induction of Site Operatives, assessing the adequacy of quarantine measures and contacting the relevant Consultant and/or Contractors where appropriate. Potential offsite migration of surface water and soil needs to be assessed. The site manager is to contact the Environmental Consultant to arrange for surface water to be tested in accordance with ANZG (2018) and Stockpiled soil to be tested in accordance with IB105. The site manager is to become familiar with IB105 and determine the appropriate actions for soil transport and disposal following receiving final laboratory testing results. All soil must remain onsite until the fate of the soil material is determined.
Site Operatives	During the works, the Site Operative will be vigilant for potential contamination. Where potential contamination is identified, Site Operatives will quarantine the area and inform the Site Manager. An Environmental Consultant may be required to assess the site. Potential offsite migration of surface water and soil needs to be assessed during and after rain events. The site operator is to notify the site manager when soil is ready for testing to discern the appropriate disposal actions.
Environmental Consultant	The services of an Environmental Consultant will be required for additional soil testing in accordance with IB105 and validation sampling for future land use for human health and environment. The Environmental Consultant may also be required to sample temporarily stored groundwater. If unexpected or gross soil contamination is encountered (not identified in the ESA), an Environmental Consultant will need to be engaged to assess the potential contamination find, undertaking any necessary sampling and delineation, if required, developing a remedial scope and validating remediation. The Environmental Consultant must have appropriate qualifications and expertise in environmental assessment (e.g. an experienced environmental scientist, environmental soil scientist, environmental geologist or environmental engineer). All findings and conclusions will be reported, as appropriate, to the satisfaction of the Site Manager and the Site Owner

LIMITATIONS STATEMENT

This Contamination Management Plan has been prepared in accordance with the scope of services between Geo-Environmental Solutions Pty. Ltd. (GES) and The House Family Office (the 'Client'). To the best of GES's knowledge, the information presented herein represents the Client's requirements at the time of printing of the Report. However, the passage of time, manifestation of latent conditions or impacts of future events may result in findings differing from that described in this Report. In preparing this Report, GES has relied upon data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations referenced herein. Except as otherwise stated in this Report, GES has not verified the accuracy or completeness of such data, surveys, analyses, designs, plans and other information.

The conclusions described within this report are based the results of analysis from the Environmental Site Assessment by GES (2019) and an assessment of their contamination status. The scope of the ESA does not allow for the review of every possible soil and groundwater contaminant over the whole area of the site.

This report does not purport to provide legal advice. Readers of the report should engage professional legal practitioners for this purpose as required.

No responsibility is accepted for use of any part of this report in any other context or for any other purpose by third party.

REFERENCES

ANZECC (2000) Australian and New Zealand Environment & Conservation Council – National Water Quality Management Strategy. Australian and New Zealand Guidelines for Fresh and Marine Water Quality

ADWG (2025) Australian Drinking Water Guidelines 2011, updated 2025, National Health and Medical Research Council (NHMRC).

ANZG (2018), Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia

Australian Standard: AS 4482.1-2005 Guide to the investigation and sampling of potentially contaminated soil. Part 1: Non-volatile and semi-volatile compounds

Australian Standard: AS 4482.2-1999 Guide to the sampling and investigation of potentially contaminated soil. Part 2: Volatile substances

CRC CARE (2011) – Technical Report No. 10 – Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater, September 2010. Friebel, E., Nadebaum, P. & GHD Pty Ltd.

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GES (2019). *Environmental Site Assessment Version 3 48-52 New Town Road*, New Town. Swanbury Penglase Architects April 2019.

GES (2025). *Environmental Site Assessment Version 9 48-52 New Town Road*, New Town. For The House Family Office, June 2025.

Information Bulletin 105: Classification and Management of Contaminated Soil for Disposal (Version 3 2018), EPA Tasmania.

NEPM (2013) National Environment Protection (Assessment of Site Contamination) Measure, 1999 as amended 2013.

Appendix 1 GES Staff

Geo-Environmental Solutions (GES) is a specialist geotechnical and environmental consultancy providing advice on all aspects of soils, geology, hydrology, and soil and groundwater contamination across a diverse range of industries.

Geo Environmental Solutions Pty Ltd:

- ACN – 115 004 834
- ABN – 24 115 004 834

GES STAFF - ENGAGED IN SITE INVESTIGATION WORKS

Dr John Paul Cumming B.Agr.Sc (Hons) Phd CPSS GAICD

- Principle Environmental Consultant
- PhD in Environmental Soil Chemistry from the University of Tasmania in 2007
- 25 years' experience in environmental contamination assessment and site remediation.

Mr Mark Downie B.Agr.Sc

- Soil Scientist
- 12 Years' experience in contamination assessment and reporting of soils and groundwater.

Ms Sarah Joyce BSc (Hons)

- Senior Environmental Scientist
- Honours in Geography and Environmental Science at the University of Tasmania in 2003;
- Undergraduate Degree Double Major in Geology and Geography & Environmental Science
- 25 years professional work experience and 12 years contaminated site assessment

GES STAFF – CONTAMINATED SITES EXPERIENCE

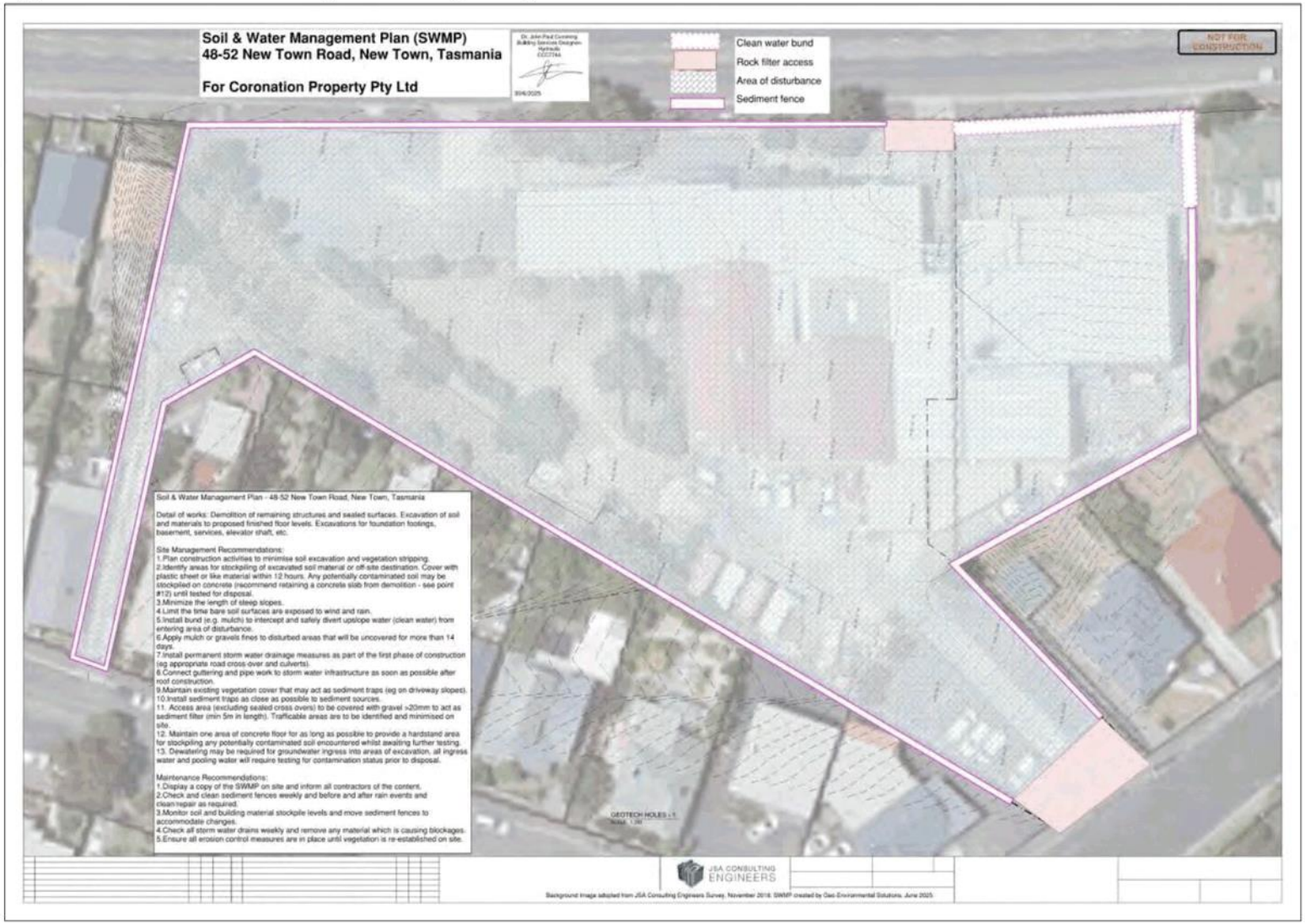
Mr Grant McDonald (Adv. cert. hort.)

- Soil Technician
- 10 years' experience in hydrocarbon and heavy metal contamination sampling of soils and groundwater.

Mr Aaron Plummer(Cert. IV)

- Soil Technician
- 8 years' experience in hydrocarbon and heavy metal contamination sampling of soils and groundwater.

Appendix 2 Soil and Water Management Plan (SWMP)



Appendix 3 IB105 Borehole Logs

GES GEO·ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH01

EASTING: 5254124.978 GDA94
NORTHING: 525375.976 GDA94
ELEVATION AND DATUM: 56.754 m AHD
TOTAL DEPTH (m): 4.5
NATURAL (m): WATER TABLE (m):

BORING LOCATION: New Town
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY: S. Joyce
SAMPLING: Direct Push DATE: 23/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Asphalt				0.6			56.6
0.1	FILL: Gravelly silty SAND: Pale yellow brown, fine to coarse grained, medium dense, non-plastic, dry. Gravel comprises dolerite		SP					56.4
0.4	FILL: Sandy gravelly CLAY: Pale grey brown, firm, moist, low plasticity. Gravel is rounded and angular siltstone, brick and cha		CL		0.0			56.2
0.7								56.0
1.0				BH01 1.0-1.1	0.1			55.8
1.1								55.6
1.5				BH01 1.5-1.6	0.5			55.4
1.6								55.2
1.8	FILL: Sandy CLAY trace gravels: Dark brown, firm, moist, medium to high plasticity. Contains occasional fragments of ceramic an	FILL	CI		0.1			55.0
2.0								54.8
2.1								54.6
2.5				BH01 2.5-2.6	0.4			54.4
2.6								54.2
2.7								54.0
3.0	FILL: CLAY with gravel: Dark brown, stiff, moist, high plasticity. Contains gravels of dolerite, siltstone, brick, glass, charc		CH		0.0			53.8
3.1								53.6
3.2								53.4
3.5				BH01 3.5-3.6	0.0			53.2
3.6								53.0
3.7								52.8
4.0	FILL: Gravelly sandy CLAY: Yellow-brown, stiff, medium plasticity, moist. Gravel comprises angular dolerite. Refusal on likely		CI		0.0			52.6
4.1								52.4
4.4				BH01 4.4-4.5	0.1			52.2
4.5								

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 ☐2 Level 2: ☐3 Level 3: ☐4 Level 4 | SAMPLE IN EXCAVATION | ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH02

EASTING: 525367.355 GDA94
NORTHING: 5254107.407 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.18 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 4.1
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY: S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 23/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Asphalt				0.1			
0.1	FILL: Sandy GRAVEL: Pale yellow brown, fine to coarse grained, medium dense, non-plastic, dry. Gravel comprises dolerite		SP					
0.5				BH02 0.5-0.6	0.1	1 2 1 1 1 1 2 1 2 1 1 2 2 1 1 1 1 1 1		
1.0				BH02 1.0-1.1	0.0	1 2 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1		
1.4							✕	
1.5					0.1			
2.0		FILL		BH02 2.0-2.1	0.0	1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
2.2	FILL: Sandy gravelly CLAY: Pale brown, moist, stiff, medium plasticity. Gravel is rounded and angular siltstone& dolerite, bric		CI					
2.8				BH02 2.8-2.9	0.1	1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
3.5					0.1			
4.0				BH02 4.0-4.1	0.0	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2; 3 Level 3; 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH03

EASTING: 5254105.348 GDA94
NORTHING: 525380.051 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.054 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 4
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY: S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 23/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Asphalt	FILL			0.0			57.0
0.5	FILL: Sandy gravelly CLAY: Pale grey brown, firm, moist, low plasticity. Gravel is rounded and angular siltstone, brick and cha		CL	BH03 0.5-0.6	0.2	1 1 1 1 1 1 2 1 1 1 1 2 1 1 1 1 1		56.6
1.0				BH03 1.0-1.1	0.2	1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1		56.0
1.3	FILL: GRAVEL with Clay: brown/dark grey, slightly moist, dense. Contains fragments of Slate		GW		0.1			55.6
2.5				BH03 2.5-2.6	0.2	1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1		54.6
3.0	FILL: CLAY with gravel: Dark brown, stiff, moist, high plasticity. Contains gravels of dolerite, siltstone, brick, glass, charc			BH03 3.0-3.1	0.3	1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1		54.0
3.5					0.2			53.6
3.9				BH03 3.9-4.0		1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1		53.2

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 [2] Level 2, [3] Level 3, [4] Level 4 | SAMPLE IN EXCAVATION | ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH04

EASTING: 5254104.766 GDA94
NORTHING: 525361.385 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.233 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 4.6
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY: S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 23/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Asphalt	FILL			0.0			57.2
0.6	FILL: Gravelly sandy CLAY: brown/trace yellow, moist, stiff, medium plasticity, Gravel comprises angular dolerite & mudstone.		CI	BH04 0.5-0.6	0.0	1 1 1 1 1 1 1 1 1 1 2 3 1 1 1 1 1		56.6
1.4					0.0			55.8
1.6	FILL: Clayey Sandy GRAVEL: grey/brown, dry, dense, brick fragments.		GW	BH04 1.5-1.6	0.0	1 1 1 1 1 1 1 1 1 1 1 4 1 2 1 1 1 1		55.6
2.3					0.0			55.0
2.6	FILL: Sandy gravelly CLAY: Pale brown, moist, stiff, medium plasticity. Gravel is rounded and angular siltstone& dolerite, bric		CI	BH04 2.5-2.6	0.0	1 2 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1		54.6
3.0				BH04 3.0-3.1	0.0	1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1		54.2
3.6	FILL: Gravelly sandy CLAY: Yellow-brown, stiff, medium plasticity, moist. Gravel comprises angular dolerite. Refusal on likely		CI	BH04 3.5-3.6	0.0	1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1		53.6
4.6				BH04 4.5-4.6	0.0	1 1 1 1 1 1 1 2 1 1 1 2 1 1 1 1 1		52.8

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2, 3 Level 3, 4 Level 4 | SAMPLE IN EXCAVATION | ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH05

EASTING: 525356.395 GDA94
NORTHING: 5254082.471 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.58 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 4.6
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY: S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 23/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.2	FILL: CLAYEY SAND: dark brown, moist, medium dense, trace gravels	FILL	SC		0.0			57.4
0.2–1.2	FILL: Sandy CLAY trace gravels: Dark brown, firm, moist, medium to high plasticity. Contains occational gravels of dolerite, si		CI	BH05 1.0-1.1	0.0	1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1		57.2 / 57.0 / 56.8 / 56.6
1.2–1.8					0.0			56.4 / 56.2 / 56.0
1.8–2.0				BH05 2.0-2.1	0.0	1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1		55.8 / 55.6
2.0–3.0	FILL: Gravelly sandy CLAY: Yellow-brown, stiff, medium plasticity, slightly moist. Gravel comprises angular dolerite & sandston		CI	BH05 3.0-3.1	0.0	1 1 1 1 1 1 1 1 1 1 2 2 1 1 1 1 1		55.4 / 55.2 / 55.0 / 54.8 / 54.6
3.0–4.0				BH05 4.0-4.1	0.0	1 1 1 1 1 1 1 1 1 1 2 3 1 1 1 1 1		54.4 / 54.2 / 54.0 / 53.8 / 53.6
4.0–4.6	FILL: Cobble - Sandstone: pale yellow-grey, dry, moderate rock		GP	BH05 4.5-4.6	0.2	1 1 1 1 1 1 1 1 1 1 1 3 1 1 1 1 1		53.4 / 53.2 / 53.0

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2; 3 Level 3; 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH06

EASTING: 5254075.47 GDA94
NORTHING: 525341.576 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.277 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 0.4
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY: S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 23/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0								
0.1	FILL: CLAYEY SAND: dark brown, moist, medium dense, trace gravels	FILL	SC		0.1			57.2
0.2	FILL: Sandy CLAY with gravels: Dark brown, firm, moist, medium plasticity. Contains gravels of dolerite.		CI	BH06 0.2-0.3				57.0
0.3								
0.4	FILL: GRAVEL: blue-grey, moist, dense to Refusal		GP		0.2			

Tas EPA IB105 CLASSIFICATION ☐ Level 1 [2] Level 2, [3] Level 3, [4] Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH07

EASTING: 5254072.05 GDA94
NORTHING: 525342.579 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.482 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 2.3
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY: S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 23/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.2	FILL: CLAYEY SAND: dark brown, moist, medium dense, trace gravels	FILL	SC		6.9			57.4
0.2–1.2	FILL: Sandy CLAY trace gravels: Dark brown, firm, moist, medium to high plasticity. Contains occational gravels of dolerite		CI		0.0			57.2–56.4
				BH07 1.0-1.1	2.2			
1.2–1.7					0.1			56.2–55.8
1.7–2.2	FILL: Clayey Sandy GRAVEL: grey, dry, dense to Refusal		GW		0.2			56.0–55.2
				BH07 2.2-2.3	2.1			

Tas EPA IB105 CLASSIFICATION: Level 1, Level 2, Level 3, Level 4 | SAMPLE IN EXCAVATION | APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH08

EASTING: 525386.867 GDA94
NORTHING: 5254073.937 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.78 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 4.6
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY: S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 24/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: CLAYEY SAND: dark brown, moist, medium dense, trace gravels	FILL	SC		0.0			57.6
0.2–1.9					0.0			57.4–56.0
1.0–1.1				BH08_1.0-1.1	0.0	1 1 1 1 1 1 1 1 1 1 1 4 1 2 1 1 1 1 1		56.8
1.2–1.9					0.0			56.6–56.0
2.0				BH08_2.0-2.1	0.0	1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1		55.8
2.1–2.3	FILL: Gravelly sandy CLAY: brown/yellow-brown/grey, stiff, medium plasticity, slightly moist. Gravel comprises angular dolerite		CI					55.6
2.4–2.5				BH08_2.5-2.6	0.0	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		55.4–55.2
2.6–3.9					0.0			55.0–54.8
3.0–3.1					0.0			54.8–54.6
3.2–3.9					0.0			54.4–54.2
4.0–4.1					0.0			54.0–53.8
4.2–4.5					0.0			53.6–53.4
4.5–4.6				BH08_4.5-4.6	0.0	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		53.2

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2; 3 Level 3; 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH09

EASTING: 5254043.755 GDA94
NORTHING: 525388.559 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 58.83 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 6.4
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY: S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 24/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete slab	FILL	P					58.8
0.3					0.3			58.6
0.6					0.0			58.4
1.0				BH09_1.0-1.1	5.8	1 1 1

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH10

EASTING: 525391.194 GDA94
NORTHING: 5254030.284 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 59.53 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 5.5
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY: S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 24/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Asphalt		TP					59.4
0.1–0.2	FILL: Concrete slab							59.2
0.2–1.1	FILL: Sandy Gravelly CLAY: Pale brown, moist, stiff, low to medium plasticity. Gravel is rounded and angular dolerite	FILL	CI	BH10_1.0-1.1	0.0			59.0–58.4
1.1–2.0	FILL: Sandy SILTY CLAY: pale brown, moist, stiff, medium plasticity	FILL	CI		0.0			58.2–57.6
2.0–3.4	FILL: Sandy CLAY trace gravels: Dark brown, moist, stiff, medium plasticity.	FILL	CI	BH10_3.0-3.1	0.0 / 0.0 / 0.1			57.4–56.6
3.4–3.7	Silty SANDY CLAY: pale brown, moist, stiff, medium plasticity	FILL	CI		0.1 / 0.1			56.4–55.8
3.7–5.3	Sandy CLAYEY SILT: pale brown, wet, loose, 'puggy', fine grained sand	Rv	ML	BH10_5.0-5.1	0.0 / 0.9			55.8–54.2
5.3–5.5	MUDSTONE INTERBEDDED WITH SILTSTONE: Fine grained, dark grey and pale yellow brown, low strength, distinctly weathered.							

Tas EPA IB105 CLASSIFICATION: Level 1, Level 2, Level 3, Level 4 | SAMPLE IN EXCAVATION | APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH11

EASTING: 5254019.694 GDA94
NORTHING: 525386.54 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 59.837 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 3.4
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY: S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 24/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Concrete slab		P					59.8
0.2–0.4	FILL: CLAYEY GRAVEL: brown, moist, medium dense, Contains occational gravels of dolerite, siltstone, charcoal fragments.		GC		0.5			59.6–59.4
0.5–1.0		FILL		BH11_1.0-1.1	0.6	1 1 1 1 1 1 1 1 1 1 1 1 1 3 1 1 1 1 1 1		59.2–58.8
1.1–1.9	FILL: Gravelly sandy CLAY: brown/yellow-brown/grey, slightly moist, stiff, medium plasticity. Contains gravels of siltstone, ch		CI		0.8			58.6–58.0
2.0				BH11_2.0-2.1	0.8	1 1 2 1 1 1 1 1 1 1 1 1 1 3 1 1 1 1 1 1		57.8
2.1–2.5								57.6–57.4
2.5–2.6				BH11_2.5-2.6	1.0	1 1 1 1 1 1 1 1 1 1 1 2 2 1 1 1 1 1 1 1		57.2
2.7–3.0					1.0			57.0–56.8
3.1–3.3	MUDSTONE INTERBEDDED WITH SILTSTONE: Fine grained, dark grey-brown, low strength, distinctly weathered.	Rv		BH11_3.3-3.4	0.9	1 1 2 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1		56.6

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2; 3 Level 3; 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

Soil and Water Management Plan (SWMP)

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH12

EASTING: 5254028.704 GDA94
NORTHING: 525384.995 GDA94

BORING LOCATION: New Town
ELEVATION AND DATUM: 59.565 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 4.5
EQUIPMENT/METHOD: AMS 9110Ag Probe
LOGGED BY: S. Joyce
NATURAL (m):
WATER TABLE (m):
SAMPLING: Direct Push
DATE: 24/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.2	FILL: Concrete slab		P					59.4
0.2–3.5	FILL: Sandy Gravelly CLAY: brown, moist, stiff, medium plasticity. Contains gravels of siltstone, charcoal fragments.	FILL	CI		3.3			59.2
				BH12_1.0-1.1	2.0	1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1		58.6
					0.5			58.4
				BH12_2.0-2.1	1.6	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		57.6
				BH12_2.5-2.6	1.6	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		57.0
					1.5			56.8
				BH12_3.5-3.6	1.5	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		56.0
3.8–4.4	Silty SANDY CLAY: pale brown, moist, stiff, medium plasticity	Rv	CI		0.4			55.8
4.4–4.5	MUDSTONE INTERBEDDED WITH SILTSTONE: Fine grained, dark grey-brown, low strength.							55.2

Tas EPA IB105 CLASSIFICATION: Level 1, 2 Level 2, 3 Level 3, 4 Level 4 | SAMPLE IN EXCAVATION | APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH13

EASTING: 5254008.024 GDA94
NORTHING: 525398.145 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 60.436 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 3.2
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY: S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 25/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Asphalt	FILL	P					60.4
0.1	FILL: Concrete slab							
0.2	FILL: Sandy clayey GRAVEL: Brown, medium dense, fine to coarse grained, moist, low plasticity.		GC		0.9			60.2
0.3								
0.4								60.0
0.5								
0.6								59.8
0.7								
0.8	FILL: Layer of brick and concrete.							59.6
0.9								
1.0				BH13 1.0-1.1	0.7	1 1 1 1 1 1 2 1 1 1 1 1 4 1 2 1 1 1 1 1		59.4
1.1								
1.2								59.2
1.3	FILL: Sandy CLAY: Brown, firm becoming stiff, moist, high plasticity. Contains occasional fragments of brick.		CH					
1.4								59.0
1.5				BH13 1.5-1.6	0.8	1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1		
1.6								58.8
1.7								
1.8	SILT: Pale brown, stiff, non-plastic, moist.		ML					58.6
1.9								
2.0								58.4
2.1				BH13 2.0-2.1	0.1	1 1 1 1 1 1 1 2 1 1 1 1 2 1 1 1 1 1 1 1		
2.2	Silty CLAY: Pale brown mottled orange, stiff, medium to high plasticity, moist.		CH					58.2
2.3								
2.4								58.0
2.5		Rvv						
2.6								57.8
2.7	SANDSTONE INTERBEDDED WITH MUDSTONE: Fine to medium grained, pale grey brown, medium strength, slightly weathered.							
2.8								57.6
2.9								
3.0								57.4
3.1								

Tas EPA IB105 CLASSIFICATION ☐ Level 1 [2] Level 2, [3] Level 3, [4] Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH14

EASTING: 5254002.799 GDA94
NORTHING: 525363.871 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.758 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 0.5
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY: S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 25/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0								
0.1	FILL: Concrete slab		P					57.6
0.2	FILL: CLAYEY GRAVEL: brown, moist, medium dense, Contains occational gravels of dolerite, siltstone, charcoal fragments.	FILL	GC		1.3			
0.3								
0.4				BH14 0.4-0.5	3.3			57.4
0.5	MUDSTONE INTERBEDDED WITH SILTSTONE: Fine grained, dark grey-brown, low strength, distinctly weathered.	R						

Tas EPA IB105 CLASSIFICATION ☐ Level 1 [2] Level 2, [3] Level 3, [4] Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH15

EASTING: 5254012.204 GDA94
NORTHING: 525357.875 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.707 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 0.65
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY: S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 25/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0								
0.1	FILL: Concrete slab		P					57.6
0.2	FILL: CLAYEY GRAVEL: brown, moist, medium dense, Contains occational gravels of dolerite, siltstone, charcoal fragments.	FILL	GC		1.8			
0.3								
0.4								57.4
0.5								
0.6	MUDSTONE INTERBEDDED WITH SILTSTONE: Fine grained, dark grey-brown, low strength, distinctly weathered.			BH15 0.55-0.65	0.7	1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1		57.2

Tas EPA IB105 CLASSIFICATION ☐ Level 1 ☐2 Level 2, ☐3 Level 3, ☐4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH16

EASTING: 5254017.943 GDA94
NORTHING: 525350.1 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.704 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 0.4
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY: S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 25/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0 0.1	FILL: Concrete slab		P					57.6
0.2	FILL: GRAVEL: brown/grey, slightly moist, dense	FILL	GC		0.4			
0.3 0.4	FILL: CLAYEY GRAVEL: brown, moist, medium dense. Contains occational gravels of dolerite, siltstone, charcoal fragments.		GC	BH16 0.3-0.4	1.2			57.4

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 ☐ Level 2, ☐ Level 3, ☐ Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH17

EASTING: 5254042.699 GDA94
NORTHING: 525330.158 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.587 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 1.2
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY: S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 25/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Concrete slab		P					
0.2–0.4	FILL: Gravelly sandy CLAY: brown/grey, slightly moist, stiff, medium plasticity	FILL	CI		0.3			57.4
0.5–1.0	Sandy SILTY CLAY: pale brown, moist, stiff, medium to high plasticity	CI	CH	BH17 0.5-0.6	0.6	1 1 1 1 1 1 1 1 1 1 1 1 4 1 2 1 1 1 1 1		57.2 57.0 56.8 56.6
1.1–1.2	SANDSTONE: Quartz rich, fine to medium grained, pale grey brown, medium strength, slightly weathered.	Rw		BH17 1.1-1.2	0.9 1.0	1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		56.4

Tas EPA IB105 CLASSIFICATION ☐ Level 1 2 Level 2, 3 Level 3, 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH18

EASTING: 5254054.073 GDA94
NORTHING: 525344.624 GDA94
ELEVATION AND DATUM: 57.718 m AHD
TOTAL DEPTH (m): 3.6
NATURAL (m): WATER TABLE (m):

BORING LOCATION: New Town
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY: S. Joyce
SAMPLING: Direct Push DATE: 25/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Concrete slab	FILL	P					57.6
0.1–1.5	FILL: Sandy Gravelly CLAY: brown, moist, stiff, medium plasticity. Contains gravels of siltstone, brick & charcoal fragments.		Cl	BH18 0.5-0.6	0.8	1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1		57.4–56.2
					0.8			
1.5–1.9				BH18 1.5-1.6	1.1	1 1 1 1 1 1 1 1 1 1 2 2 1 1 1 1 1 1 1		56.2–55.8
1.9–3.5	FILL: Sandy CLAY trace gravels: Dark brown, moist (wet at 3.2m), stiff, medium plasticity. Refusal on likely cobble		Cl		0.8			55.8–54.2
				BH18 2.5-2.6	0.9	1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1		
				BH18 2.7-2.8	1.2	1 2 1 1 1 1 1 2 1 2 1 1 2 2 1 1 1 1 1		
				BH18 3.1-3.2	0.9	1 1 1 1 1 1 2 1 2 1 1 2 2 1 1 1 1 1 1		
				BH18 3.5-3.6	0.8	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2; 3 Level 3; 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH19

EASTING: 5254044.768 GDA94
NORTHING: 525343.195 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.694 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 2.2
EQUIPMENT/METHOD: AMS 9110Ag Probe LOGGED BY: S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 25/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Concrete slab		P					57.6
0.1–1.9	FILL: Sandy CLAY trace gravels: Dark brown, moist (perched water at 1.2m), stiff, medium plasticity	FILL	CI	BH19 1.0-1.1	0.8	1 1 1

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH20

EASTING: 5254035.024 GDA94
NORTHING: 525338.362 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 57.732 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 3
EQUIPMENT/METHOD: Tasmanian Drilling Services LOGGED BY: S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Hollow Stem Auger DATE: 30/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Concrete slab	FILL	P					57.6
0.1–0.4	FILL: Gravelly sandy CLAY: Pale grey, firm, fine to medium grained, angular, moist to wet, high plasticity. Gravel comprises do		CH					57.4
0.5–0.6				BH20 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1		57.2
0.7–1.0	FILL: Sandy CLAY with gravel: Dark brown, firm, moist, high plasticity. Contains fine to coarse angular gravels of brick, dole		CH					57.0
1.0–1.1				BH20 1.0-1.1		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		56.8
1.2–1.9								56.6
1.3–1.9								56.4
1.4–1.9								56.2
1.5–1.9								56.0
1.6–1.9								55.8
1.7–1.9								55.6
1.8–1.9								55.4
1.9–2.7	SANDSTONE: Fine grained, pale yellow brown, low to medium strength, slightly weathered.	Rv						55.2
2.0–2.1								55.0
2.2–2.7								54.8
2.8–2.9	SANDSTONE: Fine grained, pale yellow brown, low strength, distinctly weathered.							

Tas EPA IB105 CLASSIFICATION ☐ Level 1 2 Level 2, 3 Level 3, 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH21

EASTING: 5254116.448 GDA94
NORTHING: 525378.118 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 56.821 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 4.2
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 24/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Asphalt							56.8
0.5	FILL: Sandy Gravelly CLAY: Pale grey brown, firm, moist, low plasticity. Gravel is angular siltstone & Dolerite, brick and char	FILL	CL	BH21 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1		56.2
1.0								55.8
1.5				BH21 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1		55.2
2.5	FILL: Gravelly Sandy CLAY: dark brown, firm to stiff, moist, medium to high plasticity. Gravel is angular siltstone & Dolerite.		CI	BH21 2.5-2.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1		54.2
3.5				BH21 3.5-3.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1		53.2
4.1								52.8

Tas EPA IB105 CLASSIFICATION ☐ Level 1 [2] Level 2, [3] Level 3, [4] Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH22

EASTING: 525369.105 GDA94
NORTHING: 5254118.419 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 56.94 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 3.7
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 24/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Asphalt							56.8
0.1–0.9	FILL: Sandy Gravelly CLAY; Pale brown, moist, stiff, medium plasticity. Gravel is angular siltstone & dolerite, brick fragments	FILL	CI	BH22 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1		56.6
1.0–1.1	FILL: Sandy GRAVEL: pale yellow-brown, slightly moist to dry, dense, fine to course angular Dolerite gravel		GC					56.4
1.2–1.4	FILL: Sandy Clayey GRAVEL; grey/brown, dry, very dense, fine to coarse angular gravel (2-40mm). lense of brick fragments at bas							56.2
1.5–1.6			CH	BH22 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		56.0
1.7–1.9	FILL: Sandy CLAY trace gravels; dark brown, moist, stiff, medium to high plasticity. Contains occational gravels of dolerite, s							55.8
2.0–2.5		FILL						55.6
2.5				BH22 2.5-2.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		55.4
2.6–3.4	FILL: Sandy Clayey GRAVEL: grey/brown, dry, very dense, fine to coarse angular gravel (2-40mm). EOH		GC					55.2
3.4				BH22 3.4-3.5		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		55.0
3.5–3.6								54.8

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2, 3 Level 3, 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH23

EASTING: 5254094.233 GDA94
NORTHING: 525368.937 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.361 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 5.3
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 24/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Asphalt	FILL	SW					57.2
0.1	FILL: Gravelly Clayey SAND: brown, slightly moist, fine to coarse grained, medium dense, non-plastic, Gravel comprises dolerite							57.0
0.5				BH23 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1		56.8
0.6			GC					
0.8	FILL: Sandy Clayey GRAVEL: red/grey/brown, dry, dense, fine to medium angular gravel (2-10mm), brick fragments							56.6
1.1								56.4
1.2	FILL: Sandy Gravelly CLAY: Pale brown, moist, stiff, medium plasticity. Gravel is angular siltstone & dolerite, brick fragments		CI					56.2
1.5				BH23 1.5-1.6		1 1 1 1 1 1 1 1 1 1 2 2 1 1 2 1 1 1 1		56.0
1.6							X	55.8
1.7	FILL: Sandy Clayey GRAVEL: red/grey/brown, dry, dense, fine to medium angular gravel (2-10mm), brick fragments		GC					55.6
2.4								55.4
2.5				BH23 2.5-2.6		1 1 1 1 1 1 1 1 1 1 2 1 2 1 1 1 1		55.2
2.6								55.0
2.7								54.8
2.8								54.6
2.9								54.4
3.0								54.2
3.1	FILL: Gravelly Sandy CLAY: dark brown, firm to stiff, moist, medium to high plasticity. Gravel is angular siltstone & Dolerite.		CI					54.0
3.4								53.8
3.5				BH23 3.5-3.6		1 2 1 1 1 1 1 1 1 1 2 2 1 1 2 1 1 1 1		53.6
3.6								53.4
3.7								53.2
3.8								53.0
3.9								52.8
4.0								52.6
4.1								52.4
4.2								52.2
4.3								
4.4								
4.5	FILL: Sandy Gravelly CLAY: Pale brown, moist, stiff, medium plasticity, Gravel is angular siltstone & dolerite. EOH		CI					
4.6				BH23 4.5-4.6		1 1 1 1 1 1 1 2 1 1 1 2 1 1 2 1 1 1 1		
4.7								
4.8								
4.9								
5.0								
5.1								
5.2								
5.3								

Tas EPA IB105 CLASSIFICATION ☐ Level 1 [2] Level 2, [3] Level 3, [4] Level 4 SAMPLE IN EXCAVATION X APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH24

EASTING: 5254096.239 GDA94
NORTHING: 525357.19 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.3 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 3.6
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 24/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.2	FILL: Silty SAND; dark brown, trace fine grave, dry, meidum dense	FILL	SM					57.2
0.2–0.7	FILL: Sandy Clayey GRAVEL; grey/brown, dry, very dense, fine to coarse angular gravel (2-40mm)		GC	BH24 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1		57.0 56.8
0.7–1.5	FILL: Gravelly Sandy CLAY: pale yellow-brown, slightly moist, very stiff, medium plasticity. Gravel is angular siltstone & Dole		CI	BH24 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	✕	56.6 56.4 56.2 56.0 55.8
1.5–2.5								55.6 55.4 55.2 55.0
2.5–3.4	FILL: Gravelly Sandy CLAY: grey/brown, slightly moist, very stiff, medium plasticity. Gravel is angular siltstone & Dolerite. E		CI	BH24 2.5-2.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		54.8 54.6 54.4 54.2
3.4–3.5				BH24 3.3-3.4		1 1 1 1 1 1 2 1 1 1 3 2 1 1 1 1 1 1 1		54.0 53.8

Tas EPA IB105 CLASSIFICATION ☐ Level 1 2 Level 2; 3 Level 3; 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

Soil and Water Management Plan (SWMP)

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH25

EASTING: 5254080.711 GDA94
NORTHING: 525350.801 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.587 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 5.8
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 24/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–1.2	FILL: Silty SAND; dark brown, trace fine grave, dry, meidum dense	FILL	SM	BH25 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1		57.4 57.2 57.0 56.8 56.6 56.4
1.2–1.8	FILL: Sandy Clayey GRAVEL; grey/brown/'pink', dry, very dense, fine to coarse angular gravel (2-40mm), red brick fragments	FILL	GC					
1.8–4.1	FILL: Gravelly Sandy CLAY; grey/brown, slightly moist, very stiff, medium plasticity overall. Gravel is angular siltstone & Dol	FILL	CI	BH25 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		56.2 56.0 55.8 55.6 55.4 55.2
				BH25 2.5-2.6		1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		55.0 54.8 54.6 54.4 54.2
				BH25 3.5-3.6		1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1		54.0 53.8 53.6 53.4 53.2
4.1–5.8	FILL: Mixed Gravelly Sandy CLAY; red/grey/dark brown, slightly moist, very stiff, medium plasticity overall. Gravel is angular	FILL	CI	BH25 4.5-4.6		1 1 1 1 1 1 2 1 1 1 1 2 1 1 2 1 1 1		53.0 52.8 52.6 52.4 52.2
				BH25 5.5-5.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		52.0 51.8

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2; 3 Level 3; 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

Soil and Water Management Plan (SWMP)

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH26

EASTING: 5254037.771 GDA94
NORTHING: 525329.284 GDA94

BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.605 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 0.7
EQUIPMENT/METHOD: AMS 9110Ag
LOGGED BY: A. Plummer
NATURAL (m):
WATER TABLE (m):
SAMPLING: Direct Push
DATE: 30/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete		P					57.6
0.1–0.3	FILL: Clayey GRAVEL; dark orange-brown, slightly moist, very dense, fine to coarse angular Dolerite gravel	FILL	GC	BH26 0.1-0.2		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		57.4
0.4–0.6	Sandy Silty CLAY: high plasticity, dark grey, moist, very stiff	Cl	CH	BH26 0.5-0.6		1 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		57.2
0.7	Sandy MUDSTONE: fine grained, yellow/pale brown/orange, slightly moist, low strength, extremely weathered	Rw						57.0

Tas EPA IB105 CLASSIFICATION: Level 1, 2 Level 2, 3 Level 3, 4 Level 4 | SAMPLE IN EXCAVATION | ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH27

EASTING: 5254040.377 GDA94
NORTHING: 525338.728 GDA94
ELEVATION AND DATUM: 57.729 m AHD
BORING LOCATION: New Town, Tasmania
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 2
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 30/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete	FILL	P					
0.1				BH27 0.1-0.2		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1		57.6
0.2								
0.3								57.4
0.4	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff		CI					
0.5				BH27 0.5-0.6		2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		57.2
0.6								
0.7								57.0
0.8								
0.9	FILL: Sandy GRAVEL; orange, slightly moist, dense		GW					56.8
1.0				BH27 1.0-1.1		1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1 1		
1.1	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff		CI					56.6
1.2								
1.3	Gravelly SILT: low plasticity, dark grey/black, moist, stiff		ML					56.4
1.4								
1.5	Gravelly Silty CLAY: medium plasticity, pale brown-grey, moist, very stiff, gradual transition to	Cl	CI	BH27 1.5-1.6		1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		56.2
1.6								
1.7								56.0
1.8								
1.9	Sandy MUDSTONE: fine grained, yellow/pale brown/orange, slightly moist, low strength, extremely weathered	Rwl		BH27 1.9-2.0		1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		55.8

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 [2] Level 2; [3] Level 3; [4] Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH28

EASTING: 5254047.014 GDA94
NORTHING: 525333.614 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.992 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1.4
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 30/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete	FILL	P					
0.1				BH28 0.1-0.2		1 1 1

Soil and Water Management Plan (SWMP)

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH29

EASTING: 5254003.063 GDA94
NORTHING: 525381.977 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 59.713 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 2.2
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 30/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete	FILL	P					59.6
0.1								
0.2								59.4
0.3								
0.4								
0.5	FILL: Gravelly Sandy CLAY; medium plasticity, pale brown/grey, slightly moist, stiff, fine to coarse angular gravel			BH29 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1		59.2
0.6								
0.7			Cl					59.0
0.8								
0.9								58.8
1.0								
1.1								
1.2								58.6
1.3								
1.4	FILL: Sandy CLAY; medium plasticity, dark brown/black, slightly moist, very stiff		Cl					58.4
1.5				BH29 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		58.2
1.6	FILL: Brick fragments; red, dry, dense							
1.7								58.0
1.8	FILL: Sandy GRAVEL; orange, slightly moist, dense		GW					
1.9								57.8
2.0	Sandy Silty CLAY; high plasticity, dark grey, moist, very stiff	CI	CH					
2.1				BH29 2.1-2.2		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		57.6
	Sandy MUDSTONE: fine grained, yellow/pale brown/orange, slightly moist, low strength, extremely weathered							

Tas EPA IB105 CLASSIFICATION ☐ Level 1 [2] Level 2, [3] Level 3, [4] Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH30

EASTING: 5254000.95 GDA94
NORTHING: 525372.89 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 58.412 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 0.4
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 30/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete	FILL	P					58.4
0.1	FILL: Gravelly Sandy CLAY; medium plasticity, pale brown/grey, slightly moist, stiff, fine to coarse angular gravel		Cl					
0.2		Cl	CH	BH30 0.3-0.4				58.2
0.3	Sandy Silty CLAY: high plasticity, dark grey, moist, very stiff							
0.4	Sandy MUDSTONE: fine grained, yellow/pale brown/orange, slightly moist, low strength, extremely weathered							

Tas EPA IB105 CLASSIFICATION ☐ Level 1 ☐2 Level 2, ☐3 Level 3, ☐4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH31

EASTING: 5254015.916 GDA94
NORTHING: 525314.878 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 60.523 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1.9
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 30/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Bitumen							60.4
0.1								
0.2								60.2
0.3								
0.4								
0.5	FILL: Gravelly Sandy CLAY: medium plasticity, pale brown/grey, slightly moist, stiff, fine to coarse angular gravel	FILL	CI	BH31 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		60.0
0.6								
0.7								59.8
0.8								
0.9								
1.0								59.6
1.1								
1.2								59.4
1.3								
1.4	Sandy MUDSTONE: fine grained, yellow/pale brown/orange, slightly moist, low strength, extremely weathered	Rvl						59.2
1.5				BH31 1.5-1.6		1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1		59.0
1.6								
1.7								58.8
1.8								

Tas EPA IB105 CLASSIFICATION ☐ Level 1 2 Level 2, 3 Level 3, 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

Soil and Water Management Plan (SWMP)

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH32

EASTING: 5254009.27 GDA94
NORTHING: 525321.543 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 60.816 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1.2
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 30/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Bitumen							60.8
0.1								
0.2								60.6
0.3								
0.4								60.4
0.5	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	CI	BH32 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1		60.2
0.6								
0.7								
0.8								60.0
0.9								
1.0	Sandy MUDSTONE: fine grained, yellow/pale brown/orange, slightly moist, low strength, extremely weathered	Rvvl						59.8
1.1								
1.2								

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2, 3 Level 3, 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH33

EASTING: 5254025.94 GDA94
NORTHING: 525321.493 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 59.262 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 30/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Bitumen							59.2
0.1								
0.2	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	CI					59.0
0.3								
0.4								
0.5								58.6
0.6	Sandy Silty CLAY: high plasticity, dark grey, moist, very stiff	O	CH	BH33 0.5-0.6		1 1 1

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH34

EASTING: 525330.254 GDA94
NORTHING: 5254019.551 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 59.42 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1.2
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 30/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Bitumen							59.4
0.1								
0.2								59.2
0.3	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	CI					
0.4								59.0
0.5				BH34 0.5-0.6		1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
0.6								58.8
0.7								
0.8	Sandy Silty CLAY: high plasticity, dark grey, moist, very stiff	O'	CH					58.6
0.9								
1.0								
1.1								58.4
1.2	Sandy MUDSTONE: fine grained, yellow/pale brown/orange, slightly moist, low strength, extremely weathered							

Tas EPA IB105 CLASSIFICATION ☐ Level 1 [2] Level 2, [3] Level 3, [4] Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

Soil and Water Management Plan (SWMP)

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH35

EASTING: 5254064.796 GDA94
NORTHING: 525336.154 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.373 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 2
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 30/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–1.9	FILL: Gravelly Silty CLAY: medium plasticity, grey/brown/black, moist, stiff	FILL	CI	BH35 0.5-0.6; BH35 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1	✕	57.2–55.4

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 ☐2 Level 2; ☐3 Level 3; ☐4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH36

EASTING: 525343.65 GDA94
NORTHING: 5254033.037 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.72 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1.3
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 31/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Bitumen		P					57.6
0.1–0.8	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	CI	BH36 0.5-0.6		1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1		57.4 57.2 57.0
0.8–1.2	Sandy Silty CLAY: high plasticity, dark grey, moist, very stiff	CI	CH					56.8
1.2–1.3	Sandy MUDSTONE: fine grained, yellow/pale brown/orange, slightly moist, low strength, extremely weathered							56.6

Tas EPA IB105 CLASSIFICATION ☐ Level 1 [2] Level 2, [3] Level 3, [4] Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH37

EASTING: 525355.025 GDA94
NORTHING: 5254034.878 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.77 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 3.6
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 31/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Concrete		P					57.6
0.1–1.5	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	CI	BH37 0.5-0.6		1 1 1 1 1 1 1 1 2 1 1 2 2 1 1 2 1 1 1 1		57.4 57.2 57.0 56.8 56.6 56.4
1.5–2.0				BH37 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 2 2 1 1 2 1 1 1 1		56.2 56.0
2.0	✕						✕	55.8
2.0–2.8				BH37 2.5-2.6		1 1 1 1 1 1 1 1 1 1 1 2 2 1 1 2 1 1 1 1		55.6 55.4 55.2
2.8–3.5	Silty Sandy CLAY: low plasticity, orange/yellow/pale brown, moist, firm to stiff, extremely weathered	O	CL	BH37 3.5-3.6		1 1 1 1 1 1 1 1 1 1 1 2 2 1 1 2 1 1 1 1		55.0 54.8 54.6 54.4 54.2

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 [2] Level 2; [3] Level 3; [4] Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

Soil and Water Management Plan (SWMP)

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH38

EASTING:	525366.493	GDA94
NORTHING:	5254034.512	GDA94
ELEVATION AND DATUM:	57.78	m AHD
TOTAL DEPTH (m):	2.7	
NATURAL (m):		WATER TABLE (m):

BORING LOCATION: New Town, Tasmania
DRILLING CONTRACTOR: Geo-Environmental Solutions
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
SAMPLING: Direct Push DATE: 31/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete		P					
0.1								
0.2								57.6
0.3								
0.4								57.4
0.5				BH38 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1		
0.6								57.2
0.7								
0.8								57.0
0.9								
1.0								56.8
1.1								
1.2	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	CI					56.6
1.3								
1.4								56.4
1.5				BH38 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1		
1.6								56.2
1.7								
1.8								56.0
1.9								
2.0								55.8
2.1								
2.2								55.6
2.3								
2.4	Sandy Clayey SILT: low plasticity, dark grey, moist, soft		ML					55.4
2.5	Sandy Silty CLAY: high plasticity, dark grey, moist, very stiff	O	CH	BH38 2.5-2.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
2.6	Sandy MUDSTONE: fine grained, yellow/pale brown/orange, slightly moist, low strength, extremely weathered							55.2

Tas EPA IB105 CLASSIFICATION: Level 1, 2 Level 2, 3 Level 3, 4 Level 4 | SAMPLE IN EXCAVATION | APPROXIMATE GROUNDFLOOR LEVEL

Soil and Water Management Plan (SWMP)

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH39

EASTING: 5254035.33 GDA94
NORTHING: 525378.498 GDA94

BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 58.426 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 3.1
EQUIPMENT/METHOD: AMS 9110Ag
LOGGED BY: A. Plummer
NATURAL (m):
WATER TABLE (m):
SAMPLING: Direct Push
DATE: 31/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete		P					58.4
0.1	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff		CI					58.2
0.5				BH39 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		58.0
0.6								57.8
0.7	FILL: Sandy Clayey GRAVEL: dark brown/black, slightly moist, medium dense, assorted debris including metal fragments	FILL	GC					57.6
1.5				BH39 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1		57.0
1.8								56.8
1.9								56.6
2.0								56.4
2.5				BH39 2.5-2.6		1 1 1 1 1 1 1 2 1 1 1 1 2 2 1 2 2 1 1 1 1		56.2
2.6								56.0
2.7								55.8
2.8								55.6
2.9								55.4
3.0								

Tas EPA IB105 CLASSIFICATION: Level 1, 2 Level 2, 3 Level 3, 4 Level 4 | SAMPLE IN EXCAVATION | APPROXIMATE GROUNDFLOOR LEVEL

Soil and Water Management Plan (SWMP)

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH40

EASTING: 5254036.898 GDA94
NORTHING: 525385.824 GDA94

BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 59.048 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 4
EQUIPMENT/METHOD: AMS 9110Ag
LOGGED BY: A. Plummer
NATURAL (m):
WATER TABLE (m):
SAMPLING: Direct Push
DATE: 31/10/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete		P					59.0
0.1								
0.2								58.8
0.3								
0.4								58.6
0.5				BH40 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 3 2 1 1 1 1		
0.6								58.4
0.7								
0.8								58.2
0.9								
1.0								58.0
1.1								
1.2								57.8
1.3								
1.4								57.6
1.5				BH40 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 2 2 1 1 1 1		
1.6								57.4
1.7								
1.8								57.2
1.9	FILL: Sandy Clayey GRAVEL: dark brown/black, slightly moist, medium dense, assorted debris including metal fragments	FILL	GC					
2.0								57.0
2.1								
2.2								56.8
2.3								
2.4								56.6
2.5				BH40 2.5-2.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1		
2.6								56.4
2.7								
2.8								56.2
2.9								
3.0								56.0
3.1								
3.2								55.8
3.3								
3.4								55.6
3.5				BH40 3.5-3.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 2 2 1 1 1 1		
3.6								55.4
3.7								
3.8								55.2
3.9								

Tas EPA IB105 CLASSIFICATION: Level 1, 2 Level 2, 3 Level 3, 4 Level 4 | SAMPLE IN EXCAVATION | APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH41

EASTING: 525359.526 GDA94
NORTHING: 5254017.36 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.75 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 0.8
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 1/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete	FILL	P					57.6
0.1								
0.2								
0.3	FILL: Sandy Clayey GRAVEL: dark brown/black, slightly moist, medium dense, assorted debris including metal fragments		GC					57.4
0.4								
0.5				BH41 0.5-0.6				
0.6								57.2
0.7								
0.8	Sandy MUDSTONE: fine grained, yellow/pale brown/orange, slightly moist, low strength, extremely weathered							57.0

Tas EPA IB105 CLASSIFICATION ☐ Level 1 ☐2 Level 2, ☐3 Level 3, ☐4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH42

EASTING: 5254020.873 GDA94
NORTHING: 525393.432 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 59.976 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 3.1
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 1/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Bitumen		P					59.8
0.1								
0.2	FILL: Concrete							59.6
0.3	FILL: SAND; pale grey, slightly moist, loose		SP					
0.4								59.4
0.5				BH42 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 2 1 1 1 1 1 1		
0.6								59.2
0.7								
0.8								59.0
0.9								
1.0								58.8
1.1								
1.2								58.6
1.3								
1.4								
1.5	FILL: Gravelly Sandy CLAY; medium plasticity, pale brown/grey, slightly moist, stiff, fine to coarse angular gravel	FILL	CI	BH42 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 2 1 1 1 1 1 1		58.4
1.6								
1.7								58.2
1.8								
1.9								58.0
2.0								
2.1								57.8
2.2								
2.3								
2.4								57.6
2.5				BH42 2.5-2.6		1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
2.6								57.4
2.7								
2.8								57.2
2.9	Silty Sandy CLAY: medium to high plasticity, grey/brown, moist, stiff	CI	CH					
3.0	SANDSTONE: fine grained, yellow/pale brown/orange, slightly moist, low strength, extremely weathered	Rock						57.0

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 [2] Level 2; [3] Level 3; [4] Level 4 | SAMPLE IN EXCAVATION | ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH43

EASTING: 5254061.419 GDA94
NORTHING: 525385.491 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 58.43 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 4.1
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 1/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete	FILL	P					58.4
0.1	FILL: SAND; pale grey, slightly moist, loose		SP					
0.2								58.2
0.3								
0.4								58.0
0.5				BH43 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1 1 1		
0.6								57.8
0.7								
0.8								57.6
0.9								
1.0								57.4
1.1								
1.2								57.2
1.3								
1.4								57.0
1.5				BH43 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1 1 1		
1.6								56.8
1.7								
1.8								56.6
1.9								
2.0								56.4
2.1	FILL: Gravelly Sandy CLAY; medium plasticity, pale brown/grey, slightly moist, stiff, fine to coarse angular gravel		CI					
2.2								56.2
2.3								
2.4								56.0
2.5								
2.6				BH43 2.5-2.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1 1 1		55.8
2.7								
2.8								55.6
2.9								
3.0								55.4
3.1								
3.2								55.2
3.3								
3.4								55.0
3.5				BH43 3.5-3.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1 1 1		
3.6								54.8
3.7								
3.8								54.6
3.9								
4.0								54.4

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 2 Level 2; 3 Level 3; 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH44

EASTING: 5254075.885 GDA94
NORTHING: 525383.3 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 58.908 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 3.9
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 1/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Concrete	FILL	P					58.8
0.1–1.5	FILL: Gravelly Sandy CLAY: medium plasticity, pale brown/grey, slightly moist, stiff, fine to coarse angular gravel		CI	BH44 0.5-0.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1 1 1		58.6–58.4
1.5–2.2				BH44 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1 1 1		57.4
2.2–3.1	FILL: Sandy Clayey GRAVEL: dark brown/black, slightly moist, medium dense, assorted debris including metal fragments		GC	BH44 2.5-2.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1 1 1		57.2–55.8
3.1–3.8				BH44 3.5-3.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1 1 1		55.6–55.2

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 [2] Level 2; [3] Level 3; [4] Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH45

EASTING: 5254068.651 GDA94
NORTHING: 525353.053 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.763 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 0.6
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 1/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Gravelly Sandy SILT; low plasticity, dark grey/brown, dry to slightly moist, stiff	FILL	ML					57.6
0.2	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff		CI					57.4
0.5				BH45 0.5-0.6				57.2
0.6								

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 ☐2 Level 2, ☐3 Level 3, ☐4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH46

EASTING: 5254071.27 GDA94
NORTHING: 525364.124 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.763 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 1/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Gravelly Sandy SILT; low plasticity, dark grey/brown, dry to slightly moist, stiff	FILL	ML					57.6
0.5	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff		CI	BH46 0.5-0.6				57.4
1.0								57.2
								57.0
								56.8

Tas EPA IB105 CLASSIFICATION ☐ Level 1 [2] Level 2, [3] Level 3, [4] Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH47

EASTING: 525348.989 GDA94
NORTHING: 5254050.965 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.87 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1.6
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 5/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Concrete		P					57.8
0.1–1.5	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	CI	BH47 0.5-0.6; BH47 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 2 1 1 1 1 1 1		57.6, 57.4, 57.2, 57.0, 56.8, 56.6, 56.4

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 ☐2 Level 2; ☐3 Level 3; ☐4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH48

EASTING: 525350.219 GDA94
NORTHING: 5254044.577 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.87 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1.6
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 5/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Concrete		P					57.8
0.1–1.5	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	CI	BH48 0.5-0.6; BH48 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 2 1 1 1 1 1 1		57.6, 57.4, 57.2, 57.0, 56.8, 56.6, 56.4

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 ☐2 Level 2; ☐3 Level 3; ☐4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH49

EASTING: 525354.935 GDA94
NORTHING: 5254047.511 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.87 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1.6
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 5/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Concrete		P					57.8
0.1–1.5	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	CI	BH49 0.5-0.6; BH49 1.5-1.6		1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1		57.6, 57.4, 57.2, 57.0, 56.8, 56.6, 56.4

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 ☐2 Level 2; ☐3 Level 3; ☐4 Level 4 | SAMPLE IN EXCAVATION | ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH50

EASTING: 525360.123 GDA94
NORTHING: 5254046.508 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.87 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1.6
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 5/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Concrete		P					57.8
0.1–1.5	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	CI	BH50 0.5-0.6; BH50 1.5-1.6		1 1 1 1 1 1 1 2 1 1 1 1 1 1 1

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH51

EASTING: 525358.911 GDA94
NORTHING: 5254052.724 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.87 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1.6
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 5/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0–0.1	FILL: Concrete		P					57.8
0.1–1.5	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	CI	BH51 0.5-0.6; BH51 1.5-1.6		1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1		57.6, 57.4, 57.2, 57.0, 56.8, 56.6, 56.4

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 ☐2 Level 2; ☐3 Level 3; ☐4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH52

EASTING: 525358.911 GDA94
NORTHING: 5254052.724 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.87 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1.6
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 5/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete		P					57.8
0.1								
0.2								57.6
0.3								
0.4								57.4
0.5				BH52 0.5-0.6		1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
0.6								57.2
0.7	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	CI					
0.8								57.0
0.9								
1.0								56.8
1.1								
1.2								56.6
1.3								
1.4								56.4
1.5				BH52 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		

Tas EPA IB105 CLASSIFICATION ☐ Level 1 [2] Level 2; [3] Level 3; [4] Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of BH53

EASTING: 525360.123 GDA94
NORTHING: 5254046.508 GDA94
BORING LOCATION: New Town, Tasmania
ELEVATION AND DATUM: 57.87 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 1.6
EQUIPMENT/METHOD: AMS 9110Ag LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Direct Push DATE: 5/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	FILL: Concrete		P					57.8
0.1								
0.2								57.6
0.3								
0.4								57.4
0.5				BH53 0.5-0.6		1 1 2 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
0.6								57.2
0.7	FILL: Gravelly Silty CLAY; medium plasticity, grey/brown/black, moist, stiff	FILL	CI					
0.8								57.0
0.9								
1.0								56.8
1.1								
1.2								56.6
1.3								
1.4								56.4
1.5				BH53 1.5-1.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 ☐2 Level 2; ☐3 Level 3; ☐4 Level 4 | SAMPLE IN EXCAVATION | ✕ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of MW1

EASTING: 525389.311 GDA94
NORTHING: 5254037.766 GDA94
BORING LOCATION: New Town
ELEVATION AND DATUM: 59.15 m AHD
DRILLING CONTRACTOR: Tasmanian Drilling Services
TOTAL DEPTH (m): 11.5
EQUIPMENT/METHOD: Drill Mac 500 LOGGED BY: S. Joyce
NATURAL (m): WATER TABLE (m):
SAMPLING: Hollow Stem Auger DATE: 30/07/2018

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
	CONCRETE	FILL	GP				Casing	59.0
	FILL: Silty sandy GRAVEL : Pale brown, medium dense, fine to coarse grained, sub-angular, moist, low plasticity. Gravels compri		GC					58.8
	FILL: GRAVEL trace clay: Brown, medium dense, medium to coarse grained, sub-angular, dry, non-plastic.							58.6
								58.4
								58.2
	FILL: Gravelly sandy CLAY : Dark brown, stiff, moist, medium plasticity. Gravel comprises dolerite		CI					58.0
								57.8
								57.6
								57.4
								57.2
								57.0
								56.8
	FILL GRAVELS AND COBBLES comprising dolerite.		GP					56.6
								56.4
								56.2
								56.0
	FILL: Gravelly sandy CLAY : Dark brown, stiff, moist, medium plasticity. Gravel comprises dolerite.		CI					55.8
								55.6
								55.4
								55.2
								55.0
								54.8
								54.6
								54.4
								54.2
	FILL: Gravelly sandy CLAY : Dark brown, stiff to very stiff, wet, medium plasticity. Gravel comprises dolerite.		CI					54.0
								53.8
								53.6
								53.4
								53.2
								53.0
								52.8
								52.6
	FILL: Dolerite GRAVEL, clay washed away.		GP					52.4
								52.2
								52.0
								51.8
								51.6
	MUDSTONE INTERBEDDED WITH SILTSTONE: Fine grained, dark grey and pale yellow brown, low strength, distinctly weathered, carbon	RT					Screen/Sand	51.4
								51.2
								51.0
								50.8
								50.6
								50.4
								50.2
								50.0
								49.8
								49.6
								49.4
								49.2
	MUDSTONE INTERBEDDED WITH SILTSTONE: Fine grained, dark grey and light grey, low to medium strength, slightly weathered, carbo							49.0
								48.8
								48.6
								48.4
								48.2
							End Cap	48.0
								47.8

Tas EPA IB105 CLASSIFICATION ☐ Level 1 2 Level 2, 3 Level 3, 4 Level 4 SAMPLE IN EXCAVATION ✕ APPROXIMATE GROUNDFLOOR LEVEL

Soil and Water Management Plan (SWMP)

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA
CLIENT: Swanbury Penglase Architects

Log of MW2

EASTING:	525344.9	GDA94
NORTHING:	5254055	GDA94
ELEVATION AND DATUM:	57.68	m AHD
TOTAL DEPTH (m):	3.2	
NATURAL (m):		WATER TABLE (m):

BORING LOCATION: New Town, Tasmania
DRILLING CONTRACTOR: Tasmanian Drilling Services
EQUIPMENT/METHOD: Drill Mac 500 LOGGED BY: A. Plummer
SAMPLING: Hollow Stem Auger DATE: 14/11/18

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	CONCRETE		P				Cement	57.6
0.1–0.4	FILL: Sandy Gravelly CLAY: brown, moist, stiff, medium plasticity. Contains gravels of siltstone, brick & charcoal fragments.	FILL	GP				Grout	57.4
0.5–2.8	FILL: Sandy CLAY trace gravels: Dark brown, moist (wet at 3.2m), stiff, medium plasticity. Refusal on likely cobble	FILL	GC				BCasinge; Screen Sand	57.2–55.0
2.8–3.1	MUDSTONE INTERBEDDED WITH SILTSTONE: Fine grained, dark grey and pale yellow brown, low strength, distinctly weathered, carbon	Rv					End Cap	54.8–54.6

Tas EPA IB105 CLASSIFICATION: Level 1, 2 Level 2, 3 Level 3, 4 Level 4 | SAMPLE IN EXCAVATION | X APPROXIMATE GROUNDFLOOR LEVEL

Soil and Water Management Plan (SWMP)

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA		**Log of MW3**
CLIENT: Swanbury Penglase Architects	EASTING: 525370.9	GDA94
	NORTHING: 5254002	GDA94
BORING LOCATION: New Town, Tasmania	ELEVATION AND DATUM: 58.6	m AHD
DRILLING CONTRACTOR: Tasmanian Drilling Services	TOTAL DEPTH (m): 15	
EQUIPMENT/METHOD: Drill Mac 500 LOGGED BY: A. Plummer	NATURAL (m):	WATER TABLE (m):
SAMPLING: Hollow Stem Auger DATE: 14/11/18		

DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances	MONITORING WELL	ELEVATION (metres)
0.0	CONCRETE		P					
0.2	FILL: CLAYEY GRAVEL: brown, moist, medium dense, Contains occational gravels of dolerite, siltstone, charcoal fragments.	FILL	GC				Groutbrite	58.4
0.3								58.2
0.4								58.0
0.5							0.5	57.8
0.6								57.6
0.7								57.4
0.8								57.2
0.9							Casing Bentonite	57.0
1.0								56.8
1.1								56.6
1.2								56.4
1.3								56.2
1.4								56.0
1.5								55.8
1.6								55.6
1.7								55.4
1.8								55.2
1.9								55.0
2.0								54.8
2.1								54.6
2.2								54.4
2.3								54.2
2.4								54.0
2.5								53.8
2.6								53.6
2.7								53.4
2.8								53.2
2.9								53.0
3.0								52.8
3.1								52.6
3.2								52.4
3.3								52.2
3.4								52.0
3.5								51.8
3.6								51.6
3.7								51.4
3.8								51.2
3.9								51.0
4.0								50.8
4.1								50.6
4.2								50.4
4.3								
4.4								
4.5								
4.6								
4.7								
4.8								
4.9								
5.0								
5.1								
5.2								
5.3								
5.4								
5.5								
5.6								
5.7								
5.8								
5.9								
6.0								
6.1								
6.2								
6.3								
6.4								
6.5								
6.6								
6.7								
6.8								
6.9								
7.0								
7.1								
7.2								
7.3								
7.4								
7.5								
7.6								
7.7		Rv						
7.8	MUDSTONE INTERBEDDED WITH SILTSTONE: Fine grained, dark grey-brown, low strength, distinctly weathered,							
7.9								
8.0								
8.1								
8.2								
8.3							and	

Tas EPA IB105 CLASSIFICATION: Level 1, 2 Level 2, 3 Level 3, 4 Level 4 | SAMPLE IN EXCAVATION | ✕ APPROXIMATE GROUNDFLOOR LEVEL

Soil and Water Management Plan (SWMP)

GES GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 48-52 New Town Road ESA		**Log of MW3**
CLIENT: Swanbury Penglase Architects	EASTING: 525370.9	GDA94
	NORTHING: 5254002	GDA94
BORING LOCATION: New Town, Tasmania	ELEVATION AND DATUM: 58.6	m AHD
DRILLING CONTRACTOR: Tasmanian Drilling Services	TOTAL DEPTH (m): 15	
EQUIPMENT/METHOD: Drill Mac 500 LOGGED BY: A. Plummer	NATURAL (m):	WATER TABLE (m):
SAMPLING: Hollow Stem Auger DATE: 14/11/18		

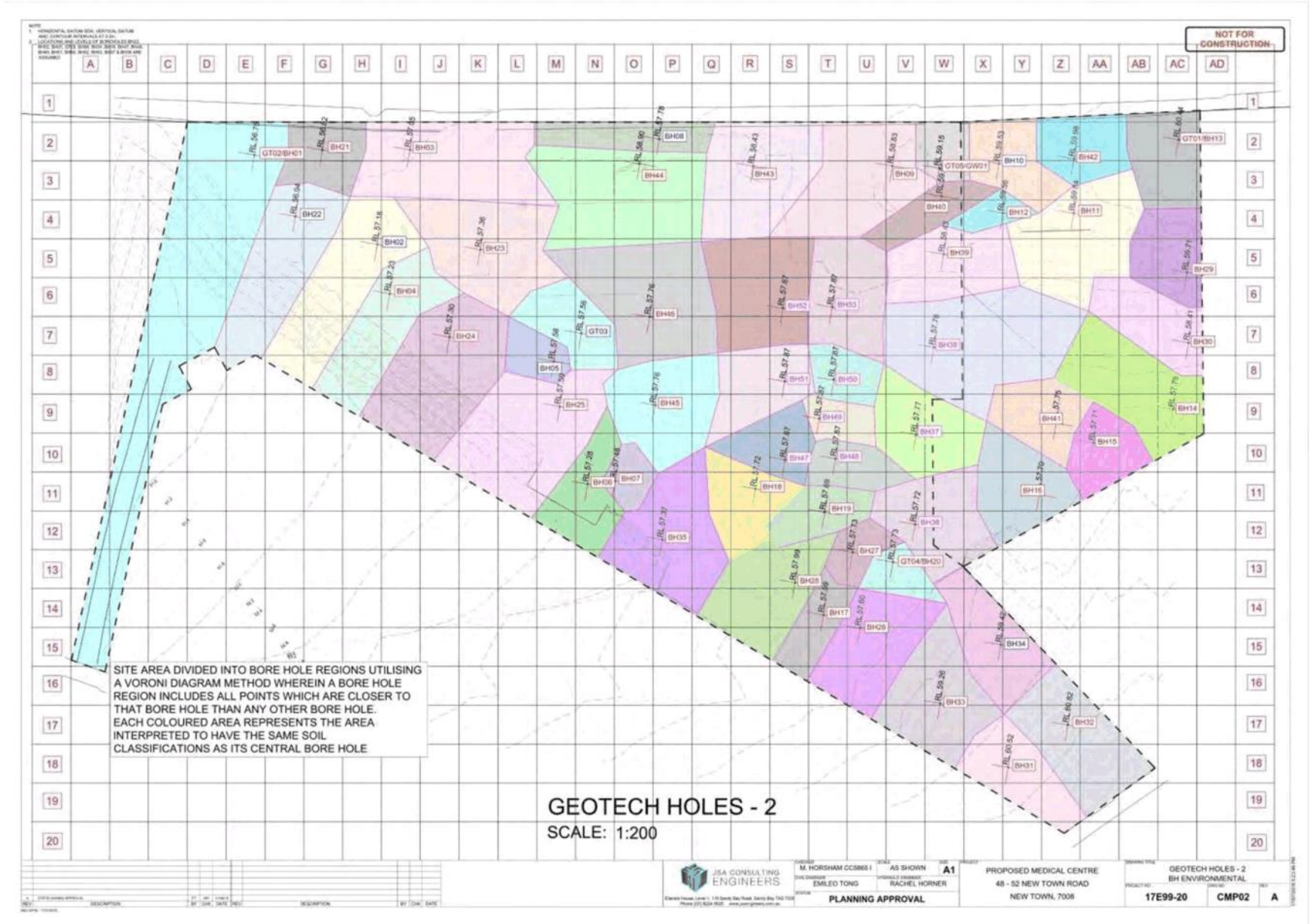
DEPTH (metres)	MATERIAL DESCRIPTION	Geology	USCS Lithology	Laboratory Sample	Field PID (ppm)	IB105 Analyte IL Exceedances (Arsenic, Barium, Beryllium, Cadmium, Chromium, Chromium VI, Copper, Cobalt, Lead, Manganese, Mercury, Molybdenum, Nickel, Selenium, Silver, Tin, Zinc, Aldrin+Dieldrin, DDT etc, Benzo(a)pyrene, Phenol, TPH C6 - C9, TPH C10 - C36, PAH Sum/TEQ, PCB's, Benzene, Toluene, Ethylbenzene, Total Xylenes, Cyanide, Fluoride)	MONITORING WELL	ELEVATION (metres)
8.4							S	50.2
8.5								50.0
8.6								49.8
8.7							Screen	49.6
8.8								49.4
8.9								49.2
9.0								49.0
9.1								48.8
9.2								48.6
9.3								48.4
9.4								48.2
9.5								48.0
9.6								47.8
9.7								47.6
9.8								47.4
9.9								47.2
10.0								47.0
10.1								46.8
10.2								46.6
10.3								46.4
10.4								46.2
10.5								46.0
10.6								45.8
10.7								45.6
10.8								45.4
10.9								45.2
11.0								45.0
11.1								44.8
11.2								44.6
11.3								44.4
11.4								44.2
11.5								44.0
11.6								43.8
11.7								43.6
11.8								
11.9								
12.0								
12.1								
12.2								
12.3								
12.4								
12.5								
12.6								
12.7								
12.8								
12.9								
13.0								
13.1								
13.2								
13.3								
13.4								
13.5								
13.6								
13.7								
13.8								
13.9								
14.0								
14.1								
14.2								
14.3								
14.4								
14.5								
14.6								
14.7								
14.8							End Cap	
14.9								
15.0								

Tas EPA IB105 CLASSIFICATION: ☐ Level 1, 2 Level 2, 3 Level 3, 4 Level 4 | SAMPLE IN EXCAVATION | ✕ APPROXIMATE GROUNDFLOOR LEVEL

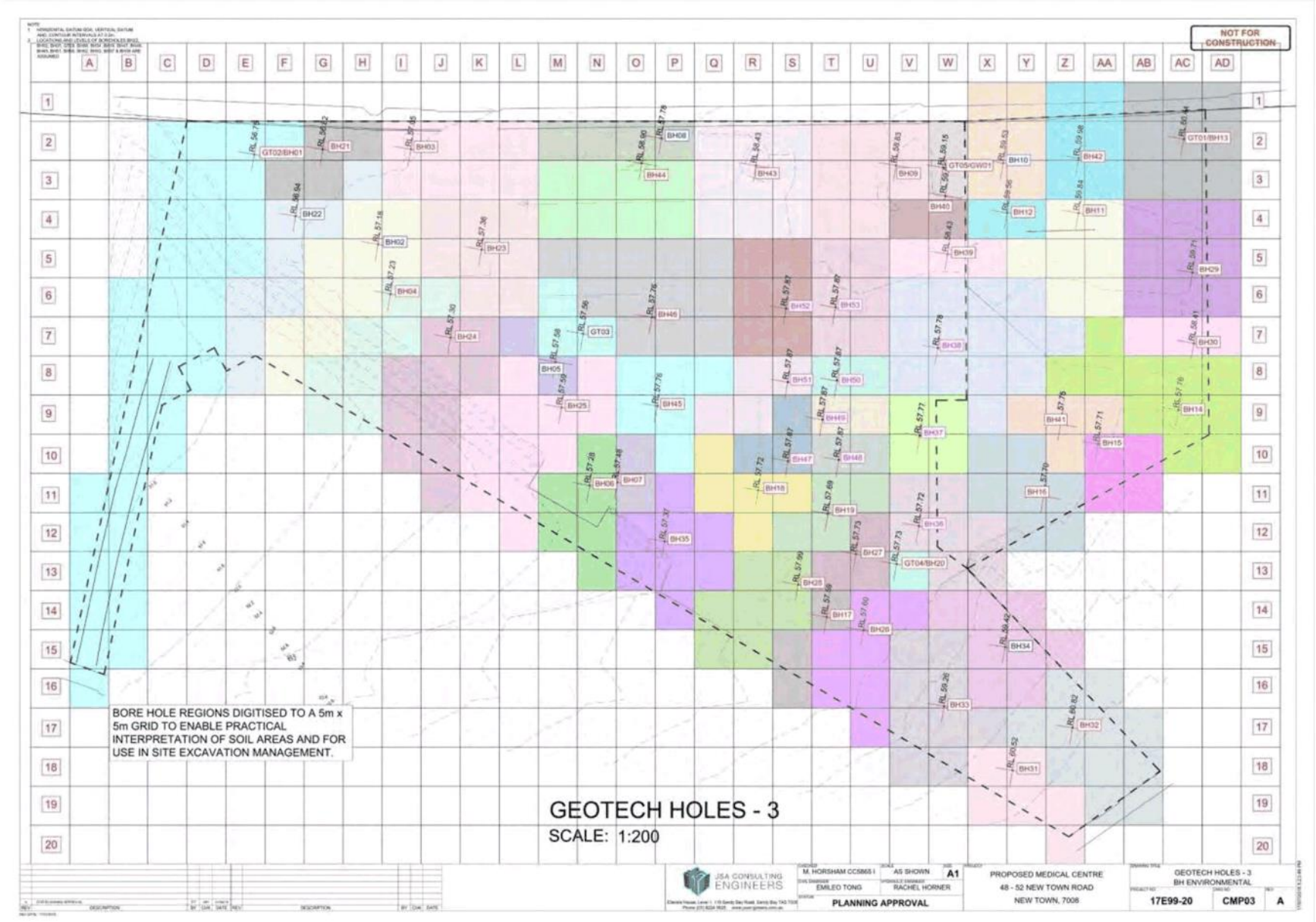
Appendix 4 JSA Consulting Engineers Inferred Site IB105 Soil Classification Grid



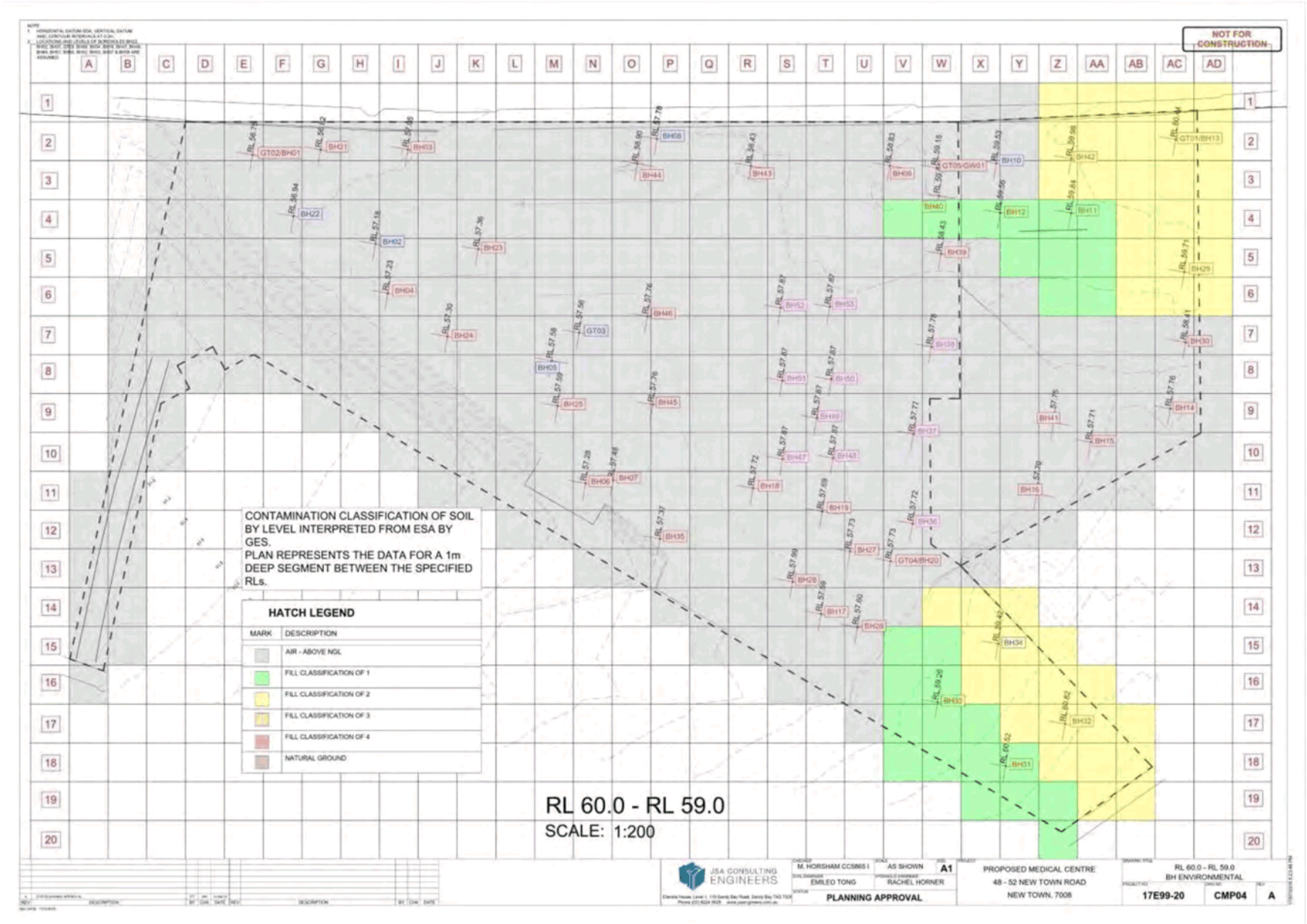
JSA Consulting Engineers Inferred Site IB105 Classification Grid



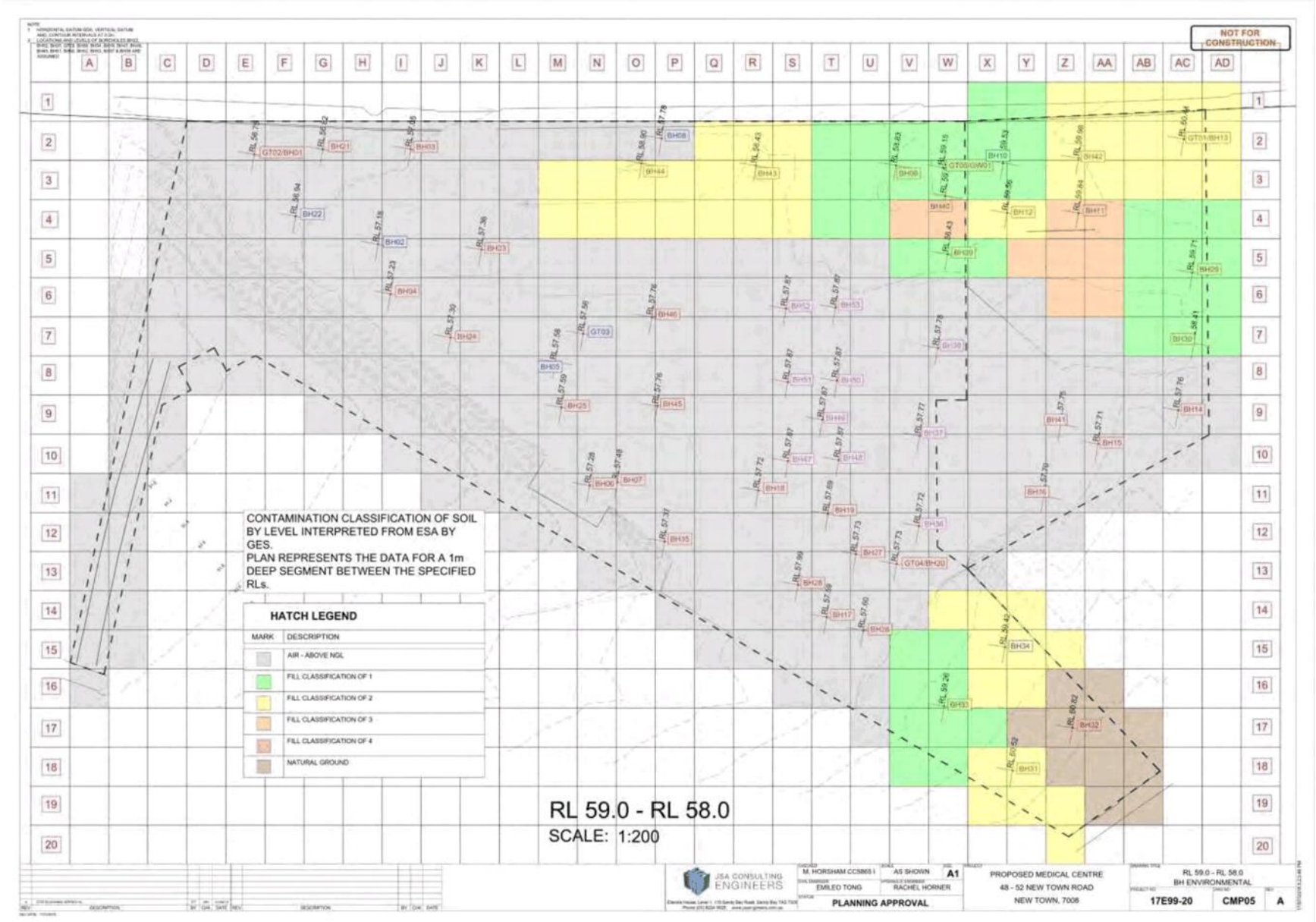
JSA Consulting Engineers Inferred Site IB105 Classification Grid



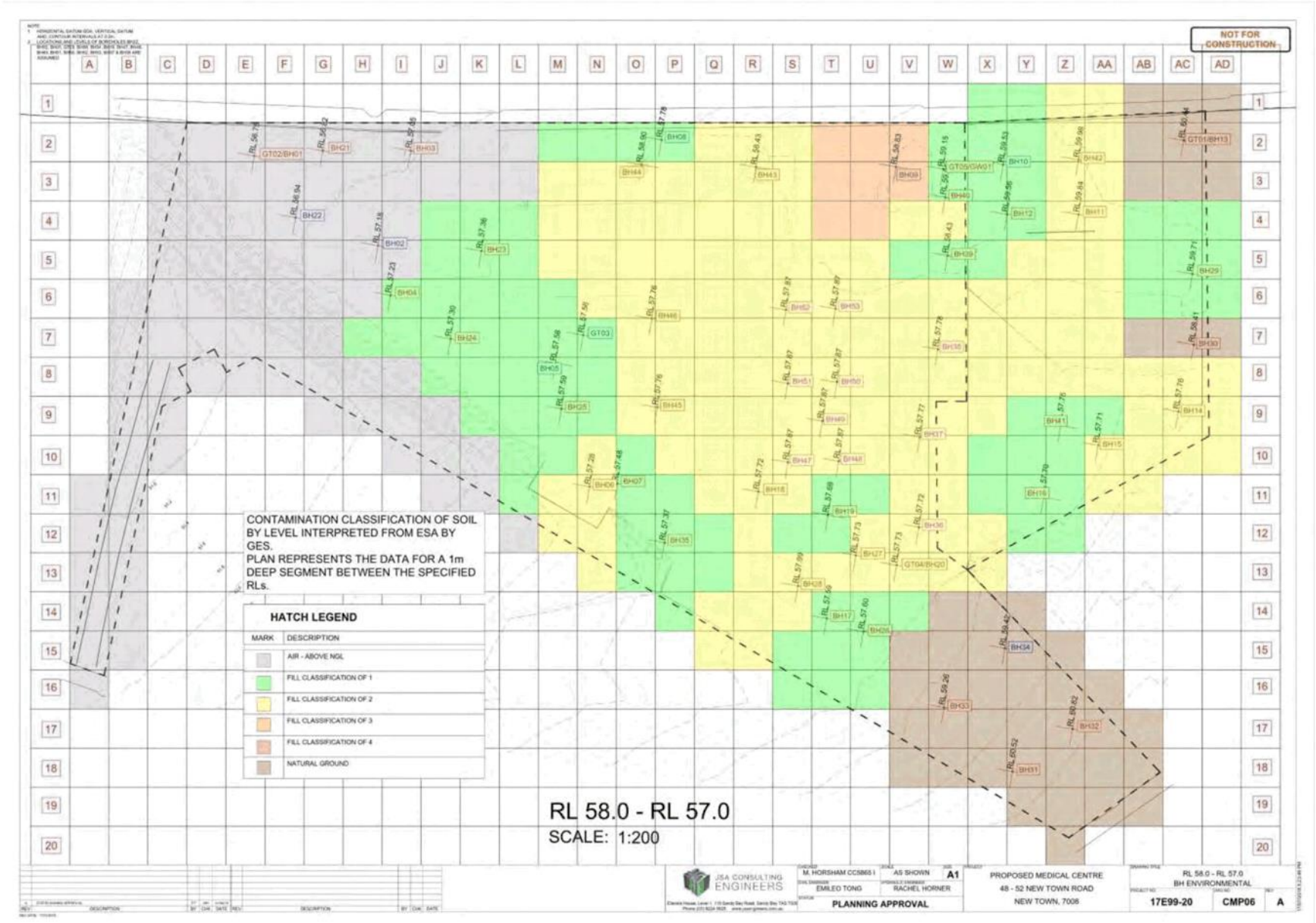
JSA Consulting Engineers Inferred Site IB105 Classification Grid



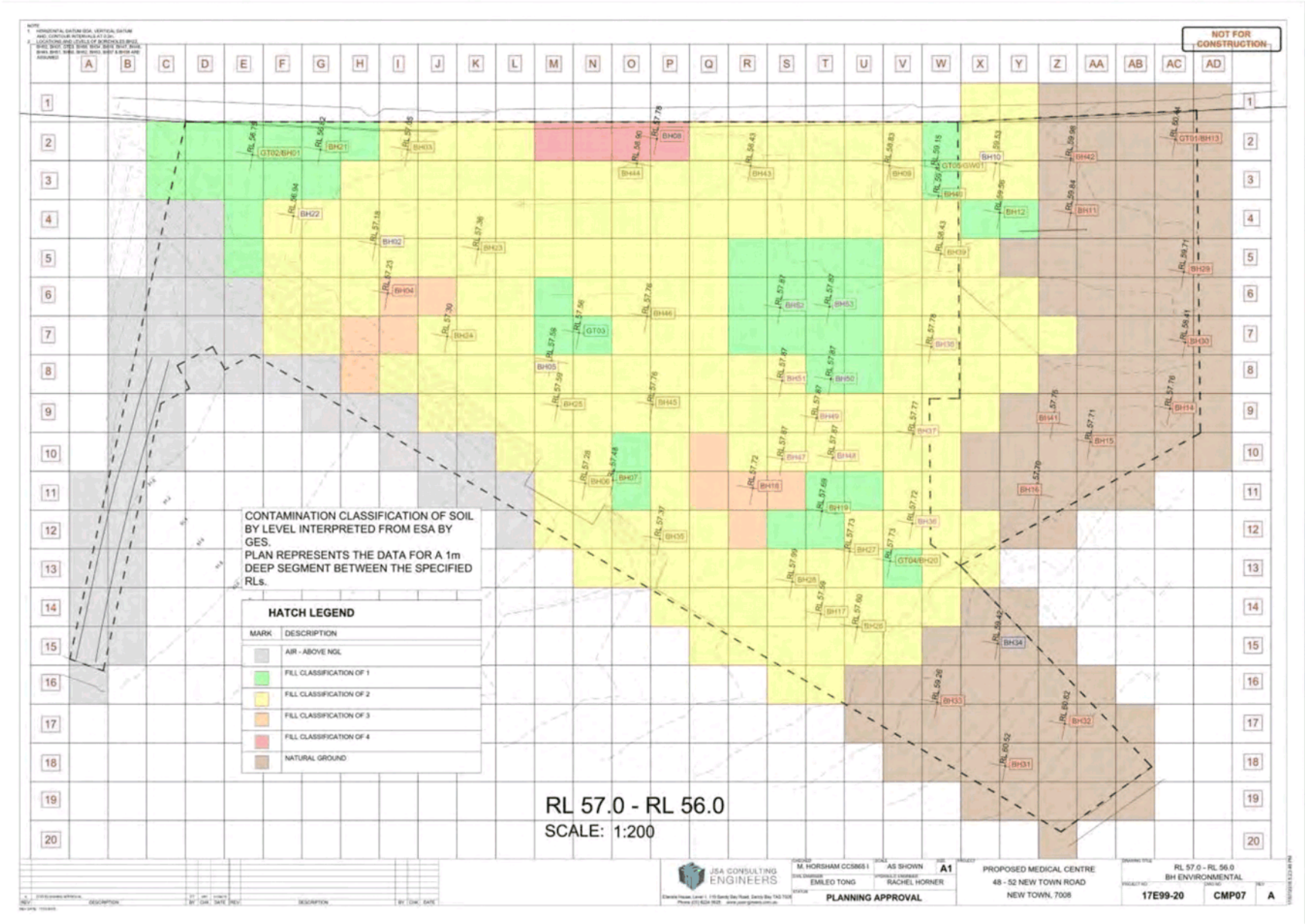
JSA Consulting Engineers Inferred Site IB105 Classification Grid



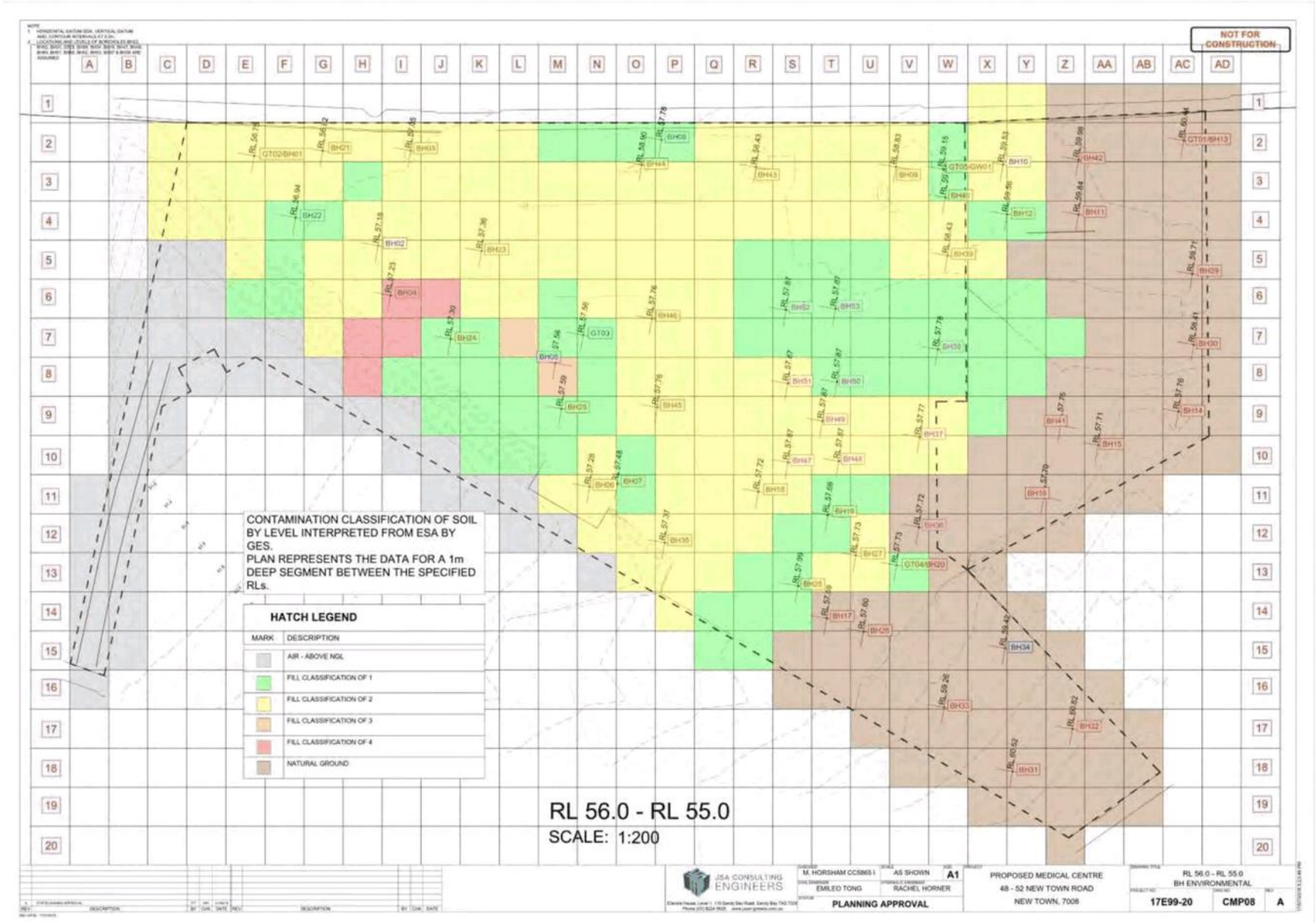
JSA Consulting Engineers Inferred Site IB105 Classification Grid



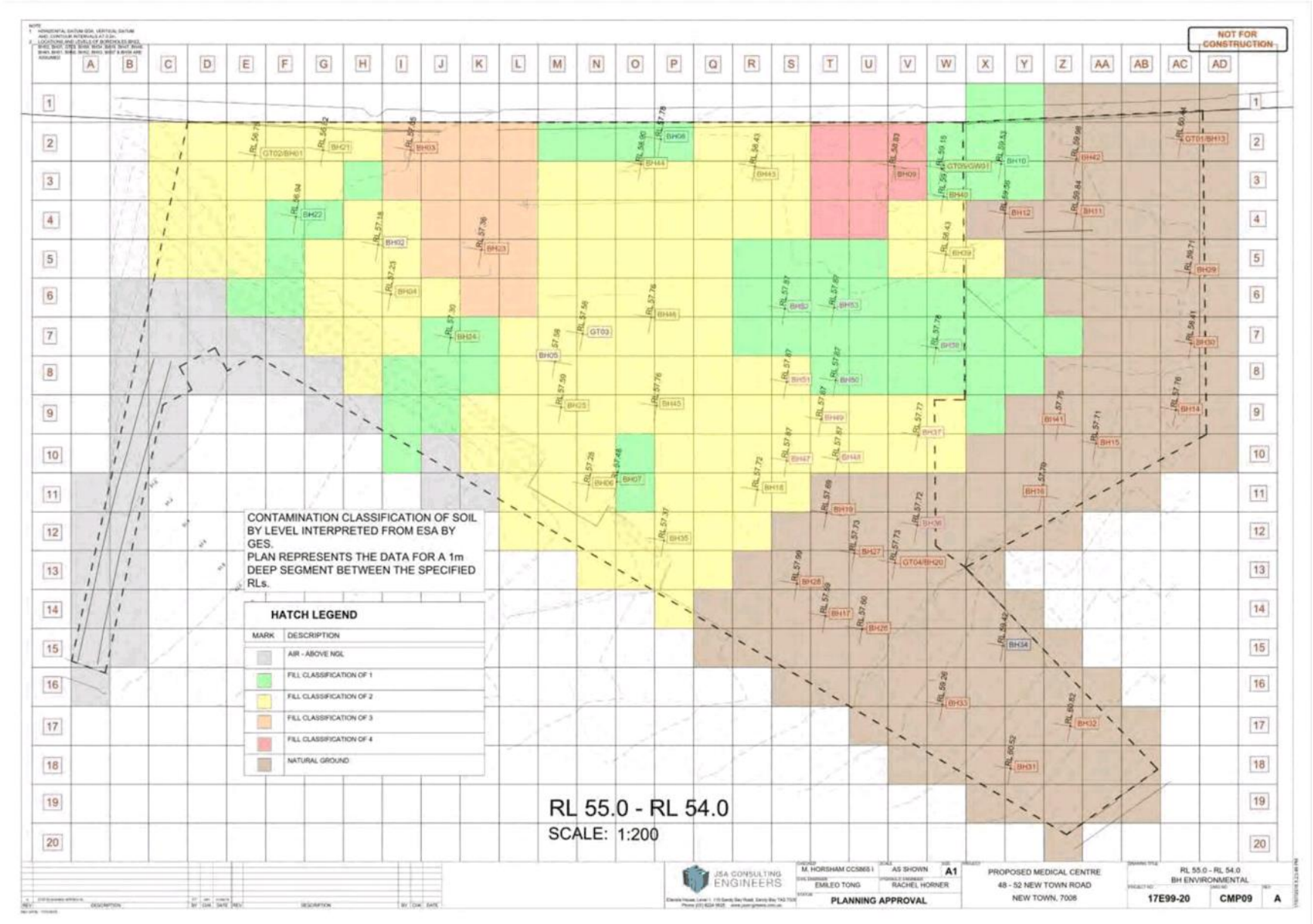
JSA Consulting Engineers Inferred Site IB105 Classification Grid



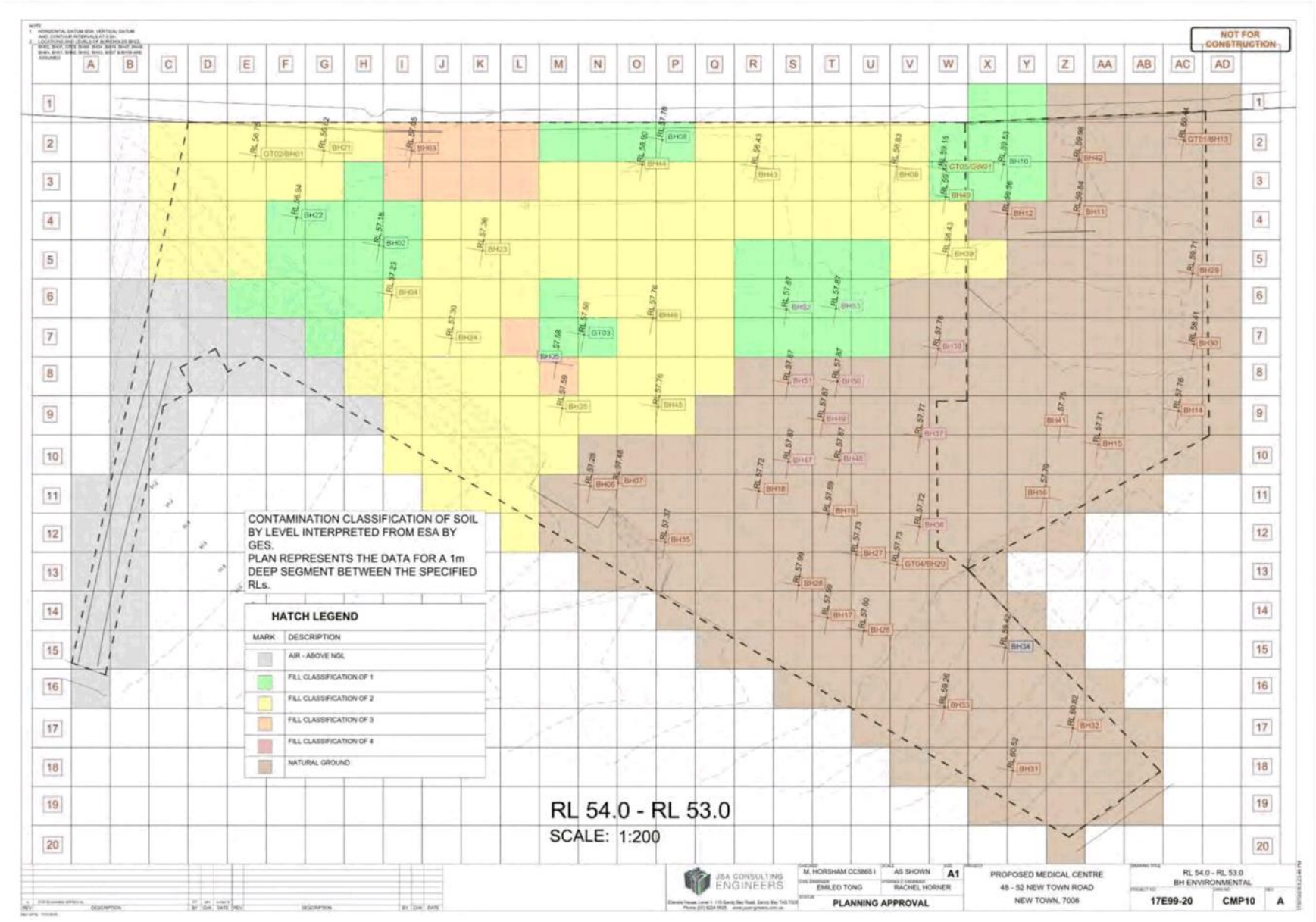
JSA Consulting Engineers Inferred Site IB105 Classification Grid



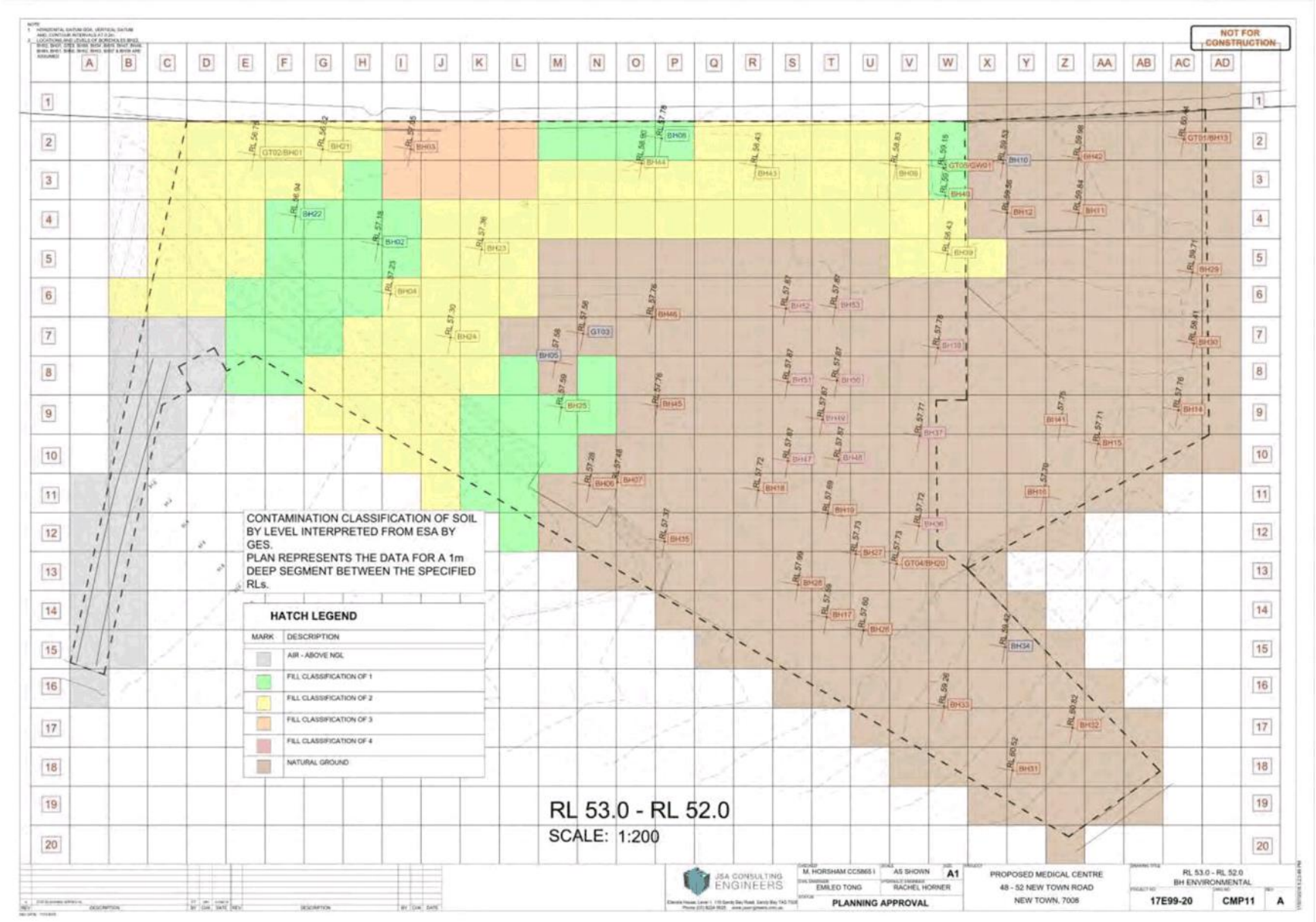
JSA Consulting Engineers Inferred Site IB105 Classification Grid



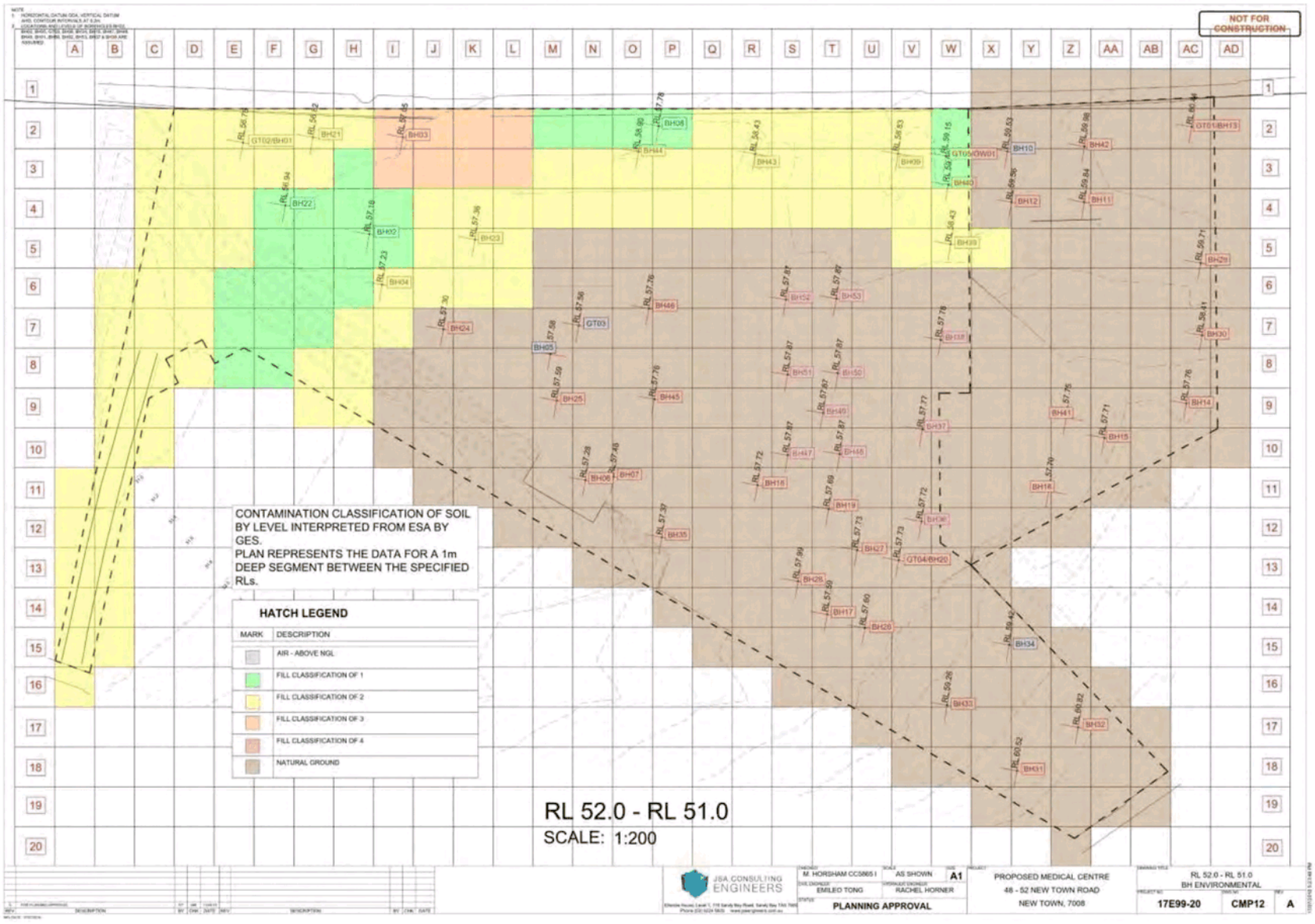
JSA Consulting Engineers Inferred Site IB105 Classification Grid



JSA Consulting Engineers Inferred Site IB105 Classification Grid



JSA Consulting Engineers Inferred Site IB105 Classification Grid



IB105

Appendix 5 Soil Results compared against IB105

The soil samples have been compared against IB105 guidelines for soil disposal, refer to Table 3 to Table 7

IB105

Table 3 Soil Analytical Results Compared Against IB105 Total Solids Investigation Limits for soil Disposal – BH01-BH20

Information Bulletin 105 Classification and Management of Contaminated Soil For Disposal		Arsenic	Barium	Beryllium	Cadmium	Chromium Total	Copper	Cobalt	Lead	Manganese	Mercury	Nickel	Selenium	Zinc	Benzo(a)pyrene	C6 - C9 Fraction	C10 - C36 Fraction (sum)	Sum of polycyclic aromatic hydrocarbons	Benzene	Toluene	Ethylbenzene	Total Xylenes
Unit		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR		5	10	1	1	2	5	2	5	5	0.1	2	5	5	0.5	10	50	0.5	0.2	0.5	0.5	0.5
Investigation Level Selected																						
IB105 Level 1		<20	<300	<2	<3	<50	<100	<100	<300	<500	<1	<60	<10	<200	<0.08	<65	<1000	<20	<1	<1	<3	<14
IB105 Level 2		20	300	2	3	50	100	100	300	500	1	60	10	200	0.08	65	1000	20	1	1	3	14
IB105 Level 3		200	3000	40	40	500	2000	200	1200	5000	30	600	50	14000	2	650	5000	40	5	100	100	180
IB105 Level 4		750	30000	400	400	5000	7500	1000	3000	25000	110	3000	200	50000	20	1000	10000	200	50	1000	1080	1800
23/07/2018	BH01 1.0-1.1 X	<5	50	<1	<1	8	8	5	35	82	<0.1	7	<5	45	0.6	<10	<50	6.7	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH01 2.5-2.6	<5	30	<1	<1	10	15	5	25	25	<0.1	8	<5	1100	5.1	<10	420	77.8	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH01 4.4-4.5	6	50	<1	<1	6	54	11	52	846	1	12	<5	66	17.4	<10	1170	152	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH02 1.0-1.1 X	<5	440	<1	<1	10	46	13	162	236	0.4	13	<5	132	0.6	<10	<50	6.8	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH02 2.8-2.9	<5	730	1	<1	16	12	13	56	63	<0.1	12	<5	71	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH02 4.0-4.1	<5	220	1	<1	22	54	26	7	99	<0.1	22	<5	35	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH03 0.5-0.6 X	5	140	<1	<1	13	24	14	502	378	0.1	16	<5	118	1.4	<10	<50	17	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH03 2.5-2.6	<5	260	<1	<1	3	28	10	12	105	<0.1	7	<5	40	7.8	<10	540	83.7	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH03 3.9-4.0	<5	70	<1	<1	12	25	11	14	261	<0.1	16	<5	44	8.9	<10	780	119	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH04 1.5-1.6 X	<5	130	<1	<1	14	35	10	128	301	0.2	14	<5	113	25.6	<10	1360	306	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH04 3.0-3.1	<5	170	<1	<1	14	35	11	217	224	0.1	14	<5	127	1.7	<10	<50	20.7	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH04 4.5-4.6	<5	180	<1	<1	12	28	14	136	1040	0.1	27	<5	184	1.5	<10	<50	16.1	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH05 1.0-1.1 X	<5	60	<1	<1	8	7	7	21	78	<0.1	11	<5	244	<0.5	<10	<50	3.1	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH05 3.0-3.1	<5	120	<1	2	15	44	21	94	179	0.1	22	<5	322	1.9	<10	<50	22	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH05 4.5-4.6	<5	100	<1	<1	8	32	17	122	199	0.2	14	<5	102	3.9	<10	110	58.2	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH06 0.2-0.3 X	<5	150	<1	<1	10	30	10	174	253	0.4	12	<5	168	1.7	<10	<50	22.4	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH07 1.0-1.1 X	<5	230	<1	<1	11	20	11	80	173	0.1	13	<5	161	<0.5	<10	<50	3.2	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH07 2.2-2.3 X	<5	260	<1	<1	8	17	9	120	309	0.4	7	<5	70	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH01 1.5-1.6 X	5	40	<1	<1	15	8	9	28	223	<0.1	12	<5	64	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH01 3.5-3.6	<5	20	<1	<1	8	29	14	23	277	<0.1	12	<5	60	12.7	<10	820	131	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH02 0.5-0.6 X	5	1880	<1	<1	24	37	10	349	297	1.2	12	<5	221	1.8	<10	<50	15.8	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH02 2.0-2.1 X	<5	340	1	<1	12	11	16	82	125	0.2	13	<5	62	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH03 1.0-1.1 X	6	140	<1	<1	19	44	16	93	308	0.1	17	<5	176	0.9	<10	<50	8.6	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH03 3.0-3.1	<5	80	<1	<1	5	52	10	218	263	<0.1	9	<5	573	17.5	<10	1230	205	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH04 0.5-0.6 X	<5	110	<1	<1	14	35	18	56	276	0.1	17	<5	236	4.7	<10	310	60.5	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH04 2.5-2.6	<5	320	<1	<1	12	25	24	37	576	<0.1	50	<5	74	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH04 3.5-3.6	<5	140	<1	<1	10	26	17	76	441	<0.1	23	<5	130	1	<10	<50	9	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH05 2.0-2.1 X	<5	140	<1	<1	12	36	19	120	206	0.3	14	<5	111	4.3	<10	270	57.2	<0.2	<0.5	<0.5	<0.5
23/07/2018	BH05 4.0-4.1	<5	150	<1	<1	9	40	12	221	269	0.3	13	<5	280	4.9	<10	490	54.7	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH08_1.0-1.1 X	<5	50	<1	<1	6	40	8	25	211	<0.1	9	<5	42	25.5	<10	2080	301	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH08_2.0-2.1 X	<5	60	<1	<1	10	18	6	7	69	<0.1	7	<5	12	1.5	<10	<50	13.8	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH08_2.5-2.6 X	<5	80	<1	<1	13	30	13	29	210	<0.1	12	<5	20	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH08_4.5-4.6	5	90	<1	<1	11	<5	39	13	171	<0.1	14	<5	31	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH09_1.0-1.1 X	<5	50	<1	<1	7	33	8	16	257	<0.1	10	<5	40	16.6	<10	1610	161	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH09_2.5-2.6 X	<5	50	<1	<1	7	20	7	24	377	<0.1	10	<5	30	1	<10	<50	10.5	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH09_4.5-4.6	<5	40	<1	<1	4	31	7	15	92	<0.1	5	<5	23	22.8	<10	1470	268	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH09_6.0-6.1	6	120	<1	<1	13	29	11	289	120	0.7	15	<5	170	0.7	<10	<50	8.5	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH10_1.0-1.1 X	<5	140	<1	<1	<2	56	30	37	408	<0.1	13	<5	47	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH10_3.0-3.1 X	<5	140	<1	<1	9	90	9	114	462	0.6	11	<5	123	1	<10	<50	8.8	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH10_5.0-5.1	<5	70	<1	<1	8	7	16	14	325	<0.1	12	<5	34	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH11_1.0-1.1 X	7	120	<1	<1	8	55	12	60	202	0.1	11	<5	105	4	<10	560	42.2	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH11_2.0-2.1 X	<5	100	2	<1	8	17	27	14	294	<0.1	20	<5	61	5.5	<10	520	62	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH11_2.5-2.6 X	<5	180	<1	<1	11	84	7	256	310	0.8	10	<5	321	1.9	<10	<50	16.5	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH11_3.3-3.4 X	13	160	2	<1	17	7	42	15	1630	<0.1	47	<5	44	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH12_1.0-1.1 X	<5	110	<1	<1	9	26	9	49	116	<0.1	9	<5	125	1.2	<10	<50	14.7	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH12_2.0-2.1 X	<5	100	<1	<1	11	24	12	24	448	<0.1	13	<5	50	<0.5	<10	<50	3.5	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH12_2.5-2.6 X	<5	120	<1	<1	3	77	43	9	281	<0.1	7	<5	32	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
24/07/2018	BH12_3.5-3.6 X	<5	90	<1	<1	7	33	8	72	236	0.5	9	<5	50	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH13 1.0-1.1 X	5	80	<1	<1	11	51	10	779	296	0.4	11	<5	44	29.8	<10	3260	496	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH13 1.5-1.6 X	<5	90	<1	<1	8	44	10	128	252	0.2	12	<5	41	0.8	<10	<50	9.2	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH13 2.0-2.1 X	11	100	1	<1	22	9	16	30	552	<0.1	13	<5	33	0.8	<10	<50	10.3	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH14 0.4-0.5 X	5	100	<1	<1	8	10	11	16	1030	<0.1	11	<5	32	<0.5	<10	3220	0.5	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH15 0.55-0.65 X	6	20	1	<1	14	17	28	14	830	<0.1	42	<5	82	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH16 0.3-0.4 X	<5	20	<1	<1	7	69	11	7	381	<0.1	10	<5	42	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH17 0.5-0.6 X	<5	100	<1	<1	12	40	9	62	167	<0.1	14	<5	107	89.1	<10	4870	1290	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH17 1.1-1.2 X	12	1620	1	<1	12	9	18	17	111	<0.1	33	<5	57	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH18 0.5-0.6 X	<5	120	<1	<1	14	22	13	46	239	<0.1	14	<5	72	0.5	<10	<50	3.6	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH18 1.5-1.6 X	5	170	<1	<1	15	35	18	123	242	0.4	22	<5	242	3.4	<10	460	34.4	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH18 2.5-2.6 X	<5	80	<1	<1	34	60	29	7	517	<0.1	28	<5	103	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH18 2.7-2.8 X	<5	310	<1	<1	17	136	12	1160	199	4.5	23	<5	593	1.6	<10	210	14.8	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH18 3.1-3.2	5	180	<1	<1	16	96	10	479	194	1.5	15	<5	293	1.3	<10	<50	11.1	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH18 3.5-3.6	6	130	1	<1	11	<5	18	11	256	<0.1	19	<5	27	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH19 1.0-1.1 X	<5	150	<1	<1	4	58	11	56	179	<0.1	5	<5	66	<0.5	<10	<50	1.3	<0.2	<0.5	<0.5	<0.5
25/07/2018	BH19 2.1-2.2 X	6	80	1	<1	15	10	14	10	109	<0.1	19	<5	33	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
30/07/2018	BH20 0.5-0.6 X	<5	40	<1	<1	9	23	4	18	91	<0.1	7	<5	40	1.1	<10	<50	10.2	<0.2	<0.5	<0.5	<0.5
30/07/2018	BH20 1.0-1.1 X	<5	120	<1	<1	13	25	9	114	212	0.5	11	<5	117	<0.5	<10	<50	1.6	<0.2	<0.5	<0.5	<0.5
Averaging		<5	180	<1	<1	12	35	14	105	300	0.2	14	<5	135	5.5	<10	450	70	<0.2	<0.5	<0.5	<0.5

- Note no Leachate testing.
- It is likely that if testing had been conducted the metals would come down to Level 1. And Benzo(a)pyrene would come down to Level 2.
- Level 1 is not achievable for Benzo(a)pyrene as no test exist to meet the conservative guideline.
- C_{10}-C_{36} Total Recoverable Hydrocarbon results will not change with leachate testing either.

IB105

Table 4 Soil Analytical Results Compared Against IB105 Total Solids Investigation Limits for soil Disposal – BH21-BH40 plus GT01-BT03

Information Bulletin 105 Classification and Management of Contaminated Soil For Disposal		Arsenic	Barium	Beryllium	Cadmium	Chromium Total	Copper	Cobalt	Lead	Manganese	Mercury	Nickel	Selenium	Zinc	Benzo(a)pyrene	C6 - C9 Fraction	C10 - C36 Fraction (sum)	Sum of polycyclic aromatic hydrocarbons	Benzene	Toluene	Ethylbenzene	Total Xylenes
Unit		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR		5	10	1	1	2	5	2	5	5	0.1	2	5	5	0.5	10	50	0.5	0.2	0.5	0.5	0.5
Investigation Level Selected																						
IB105 Level 1		<20	<300	<2	<3	<50	<100	<100	<300	<500	<1	<60	<10	<200	<0.08	<65	<1000	<20	<1	<1	<3	<14
IB105 Level 2		20	300	2	3	50	100	100	300	500	1	60	10	200	0.08	65	1000	20	1	1	3	14
IB105 Level 3		200	3000	40	40	500	2000	200	1200	5000	30	600	50	14000	2	650	5000	40	5	100	100	180
IB105 Level 4		750	30000	400	400	5000	7500	1000	3000	25000	110	3000	200	50000	20	1000	10000	200	50	1000	1080	1800
24/10/2018	BH21 0.5-0.6 X	<5	50	<1	<1	15	172	11	27	168	<0.1	16	<5	41	14.3	<10	880	150	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH21 1.5-1.6 X	<5	70	<1	<1	8	11	6	77	128	<0.1	7	<5	57	0.8	<10	190	6.1	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH21 2.5-2.6	<5	50	<1	<1	<2	94	19	11	465	<0.1	6	<5	42	1.9	<10	<50	14.9	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH21 3.5-3.6	<5	40	<1	<1	4	78	19	5	436	0.1	12	<5	32	0.6	<10	<50	2.7	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH21 4.5-4.6	<5	70	<1	<1	9	82	26	17	478	<0.1	15	<5	46	6.1	<10	<50	43.4	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH21 5.5-5.6	<5	60	<1	<1	6	70	17	32	355	<0.1	10	<5	81	4.6	<10	<50	42.9	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH22 0.5-0.6 X	<5	150	<1	<1	12	30	20	90	243	0.2	20	<5	122	4.1	<10	120	44.5	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH22 1.5-1.6 X	<5	90	<1	<1	14	48	24	32	256	0.2	16	<5	48	<0.5	<10	<50	0.5	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH22 2.5-2.6	<5	90	<1	<1	25	58	23	<5	358	<0.1	24	<5	37	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH22 3.4-3.5	<5	80	<1	<1	24	57	18	12	428	<0.1	25	<5	44	<0.5	<10	<50	1.9	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH23 0.5-0.6 X	6	130	<1	<1	16	56	12	141	298	0.2	24	<5	116	6.7	<10	630	77.7	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH23 1.5-1.6 X	<5	150	<1	<1	17	41	12	175	310	0.2	22	<5	302	3.8	<10	<50	45	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH23 2.5-2.6	<5	100	<1	<1	10	39	10	220	180	0.1	11	<5	123	166	<10	5790	2080	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH23 3.5-3.6	<5	3730	<1	<1	10	2410	21	186	405	0.1	13	<5	208	2.5	<10	530	27	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH23 4.5-4.6	5	140	1	<1	11	18	18	16	1090	<0.1	21	<5	63	2.2	<10	<50	22.2	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH23 5.5-5.6	9	80	<1	<1	11	39	13	42	630	0.1	16	<5	134	45.2	<10	2510	472	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH24 0.5-0.6 X	<5	100	<1	<1	12	21	11	70	227	0.1	16	<5	120	4.8	<10	260	52.9	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH24 1.5-1.6 X	<5	160	<1	<1	19	15	9	31	222	<0.1	13	<5	51	<0.5	<10	<50	0.6	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH24 2.5-2.6	<5	170	<1	<1	24	16	14	22	455	<0.1	20	<5	56	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH24 3.3-3.4	<5	200	1	<1	17	42	19	212	518	0.6	22	<5	220	0.7	<10	<50	5.1	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH25 0.5-0.6 X	<5	210	<1	<1	8	25	16	49	305	<0.1	15	<5	114	0.9	<10	<50	15.3	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH25 1.5-1.6 X	<5	80	<1	<1	16	40	25	8	142	<0.1	20	<5	33	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH25 2.5-2.6 X	<5	160	2	<1	8	29	57	50	165	0.1	12	<5	38	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH25 3.5-3.6	<5	160	<1	<1	12	26	20	138	210	0.4	18	<5	134	2.2	<10	280	24.8	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH25 4.5-4.6	<5	170	<1	<1	12	43	17	460	372	0.3	19	<5	215	14.9	<10	770	153	<0.2	<0.5	<0.5	<0.5
24/10/2018	BH25 5.5-5.6	<5	20	<1	<1	4	<5	<2	6	28	<0.1	<2	<5	<5	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
29/10/2018	BH26 0.1-0.2 X	<5	30	<1	<1	6	23	4	14	56	<0.1	4	<5	30	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
29/10/2018	BH26 0.5-0.6 X	16	310	2	<1	16	11	31	17	221	<0.1	42	<5	52	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
29/10/2018	BH27 0.1-0.2 X	<5	90	<1	<1	6	46	10	28	255	<0.1	6	<5	59	1.1	<10	<50	12.7	<0.2	<0.5	<0.5	<0.5
29/10/2018	BH27 0.5-0.6 X	21	100	1	<1	17	21	16	43	194	<0.1	15	<5	80	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
29/10/2018	BH27 1.0-1.1 X	<5	120	<1	<1	9	38	16	278	215	0.2	18	<5	75	5.6	<10	320	35.4	<0.2	<0.5	<0.5	<0.5
29/10/2018	BH27 1.5-1.6 X	14	30	2	<1	14	6	23	10	422	<0.1	34	<5	32	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
29/10/2018	BH27 1.9-2.0 X	14	40	<1	<1	20	7	22	12	1500	<0.1	38	<5	53	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
29/10/2018	BH28 0.1-0.2 X	<5	30	<1	<1	8	<5	<2	6	30	<0.1	3	<5	12	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
29/10/2018	BH28 0.5-0.6 X	<5	80	<1	<1	18	21	16	34	314	<0.1	20	<5	72	1.2	<10	<50	11.2	<0.2	<0.5	<0.5	<0.5
29/10/2018	BH28 1.0-1.1 X	<5	30	<1	<1	12	<5	2	12	124	<0.1	6	<5	43	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
29/10/2018	BH28 1.2-1.3 X	<5	80	<1	<1	8	18	11	81	190	0.4	9	<5	456	7.3	<10	550	88.4	<0.2	<0.5	<0.5	<0.5
30/10/2018	BH29 0.5-0.6 X	<5	100	<1	<1	8	43	13	70	345	<0.1	14	<5	112	4.6	<10	440	51.3	<0.2	<0.5	<0.5	<0.5
30/10/2018	BH29 1.5-1.6 X	<5	110	<1	<1	11	25	9	78	249	0.3	10	<5	86	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
30/10/2018	BH29 2.1-2.2 X	<5	70	<1	<1	10	6	12	10	150	<0.1	11	<5	23	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
30/10/2018	BH30 0.3-0.4 X	<5	100	<1	<1	12	23	12	53	316	0.1	16	<5	100	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
30/10/2018	BH31 0.5-0.6 X	7	70	<1	<1	12	9	12	19	134	<0.1	13	<5	61	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
30/10/2018	BH31 1.5-1.6 X	6	100	<1	<1	13	7	17	12	584	<0.1	28	<5	58	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
30/10/2018	BH32 0.5-0.6 X	<5	90	<1	<1	14	13	6	21	136	<0.1	13	<5	36	1.1	<10	<50	8.5	<0.2	<0.5	<0.5	<0.5
30/10/2018	BH33 0.5-0.6 X	<5	80	<1	<1	9	6	4	15	80	<0.1	6	<5	20	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
30/10/2018	BH34 0.5-0.6 X	<5	380	<1	<1	15	6	8	10	45	<0.1	10	<5	16	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
30/10/2018	BH35 0.5-0.6 X	<5	140	<1	<1	12	32	11	152	267	0.2	12	<5	163	2.7	<10	270	29.1	<0.2	<0.5	<0.5	<0.5
30/10/2018	BH35 1.5-1.6 X	<5	180	<1	<1	11	44	15	82	346	0.2	17	<5	130	1.6	<10	<50	19	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH36 0.5-0.6 X	<5	100	<1	<1	17	40	19	10	624	<0.1	17	<5	40	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH37 0.5-0.6 X	13	160	<1	<1	13	67	12	231	295	1	14	<5	367	6.8	<10	470	63.8	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH37 1.5-1.6 X	<5	40	<1	<1	14	30	12	42	112	<0.1	11	<5	73	7.4	<10	430	105	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH37 2.5-2.6 X	9	240	1	1	25	9	11	53	350	<0.1	16	<5	40	2	<10	110	29.5	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH37 3.5-3.6	<5	20	<1	<1	15	11	12	18	238	<0.1	15	<5	44	3	<10	120	42.3	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH38 0.5-0.6 X	<5	70	<1	<1	14	13	15	57	356	0.2	13	<5	45	1.3	<10	<50	11.3	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH38 1.5-1.6 X	<5	170	<1	<1	9	14	17	89	174	<0.1	13	<5	108	0.7	<10	<50	5.2	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH38 2.5-2.6 X	<5	70	<1	<1	14	14	11	14	165	<0.1	14	<5	40	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH39 0.5-0.6 X	<5	60	<1	<1	13	18	10	42	301	0.1	16	<5	47	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH39 1.5-1.6 X	<5	80	<1	<1	15	24	7	36	146	<0.1	9	<5	71	2.2	<10	<50	28.2	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH39 2.5-2.6 X	<5	50	<1	1	8	198	8	359	176	<0.1	10	<5	227	19	<10	1120	229	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH40 0.5-0.6 X	<5	30	<1	<1	6	60	10	12	267	<0.1	12	<5	34	76.6	<10	7370	1060	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH40 1.5-1.6 X	<5	50	<1	<1	6	70	18	46	353	<0.1	14	<5	62	37.4	<10	2470	371	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH40 2.5-2.6 X	<5	60	<1	<1	9	14	13	15	183	<0.1	17	<5	60	1.6	<10	<50	14.3	<0.2	<0.5	<0.5	<0.5
31/10/2018	BH40 3.5-3.6 X	<5	40	<1	<1	9	51	14	22	272	<0.1	14	<5	51	59.6	<10	4280	621	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH51 0.5-0.6 X	<5	640	1	<1	12	10	19	31	112	<0.1	15	<5	51	1.3	<10	<50	14	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH51 1.5-1.6 X	<5	100	<1	<1	9	20	9	101	167	0.4	11	<5	76	9.4	<10	410	80.9	<0.2	<0.5	<0.5	<0.5
17/10/2018	GT01	----	----	----	----	----	----	----	----	----	----	----	----	----	6.7	----	----	101	----	----	----	----
17/10/2018	GT02	----	----	----	----	----	----	----	----	----	----	----	----	----	1	----	----	12.5	----	----	----	----
17/10/2018	GT03	----	----	----	----	----	----	----	----	----	----	----	----	----	9.1	----	----	136	----	----	----	----
Averaging		<5	150	<1	<1	12	65	14	65	285	0.1	14	<5	85	8.5	<10	500	100	<0.2	<0.5	<0.5	<0.5

IB105

Table 5 Soil Analytical Results Compared Against IB105 Leachate Investigation Limits for soil Disposal – BH21-BH40

Information Bulletin 105 Classification and Management of Contaminated Soil For Disposal Leachable Fraction *Italic/** - Based On Soil (Total) Limit Bold - Based On Leach Limit		Arsenic	Barium	Beryllium	Cadmium	Chromium Total	Hexavalent Chromium	Copper	Cobalt	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Tin	Zinc	Aldrin + Dieldrin	DDT + DDD + DDE	Benzo(a)pyrene	Phenol	C6 - C9 Fraction	C10 - C36 Fraction (sum)	Benzo(a)pyrene (TEQ)	Polychlorinated biphenyls (PCB's)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total Cyanide	Fluoride
Unit		mg/L	mg/L	mg/L	mg/L	mg/L		mg/L		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		mg/L	µg/L	µg/L	µg/L	µg/L			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L
LOR		0.1	0.1	0.1	0.1	0.1		0.1		0.1	0.1	0.001	0.1	0.1	0.1	0.1		0.1	0.5	0.5	0.5	1			0.5	1	1	2	2	2	0	0.1
Investigation Level Selected																																
IB105 Level 1																																
IB105 Level 2		<0.5	<35	<1	<0.1	<0.5		<10		<0.5	<25	<0.01	<2.5	<1	<0.1	<0.5		<25	<3	<200	<0.5	<14000			<0.5	<1	<50	<1400	<3000	<5000	<1	<15
IB105 Level 3		0.5	35	1	0.1	0.5		10		0.5	25	0.01	2.5	1	0.1	0.5		25	3	200	0.5	14000			0.5	1	50	1400	3000	5000	1	15
IB105 Level 4		5	350	4	0.5	5		100		5	250	0.1	20	8	1	5		250	30	2000	5	50000				2	500	14000	30000	50000	10	150
24/10/2018	BH21 0.5-0.6 X							*													<0.5				<0.5							
24/10/2018	BH21 1.5-1.6 X																				*											
24/10/2018	BH21 2.5-2.6																				*											
24/10/2018	BH21 3.5-3.6																				*											
24/10/2018	BH21 4.5-4.6																				<0.5				<0.5							
24/10/2018	BH21 5.5-5.6																				<0.5				<0.5							
24/10/2018	BH22 0.5-0.6 X																				<0.5				<0.5							
24/10/2018	BH22 1.5-1.6 X																															
24/10/2018	BH22 2.5-2.6																															
24/10/2018	BH22 3.4-3.5																															
24/10/2018	BH23 0.5-0.6 X																				<0.5				<0.5							
24/10/2018	BH23 1.5-1.6 X																	*			<0.5				<0.5							
24/10/2018	BH23 2.5-2.6																				<0.5			*	<0.5							
24/10/2018	BH23 3.5-3.6		**0.8**					**2.9**										*			<0.5				<0.5							
24/10/2018	BH23 4.5-4.6										*										<0.5				<0.5							
24/10/2018	BH23 5.5-5.6										*										<0.5			*	<0.5							
24/10/2018	BH24 0.5-0.6 X																				<0.5				<0.5							
24/10/2018	BH24 1.5-1.6 X																															
24/10/2018	BH24 2.5-2.6																															
24/10/2018	BH24 3.3-3.4										*							*			*											
24/10/2018	BH25 0.5-0.6 X																				*											
24/10/2018	BH25 1.5-1.6 X																															
24/10/2018	BH25 2.5-2.6 X			*																												
24/10/2018	BH25 3.5-3.6																				<0.5				<0.5							
24/10/2018	BH25 4.5-4.6									*								*			<0.5				<0.5							
24/10/2018	BH25 5.5-5.6																															
29/10/2018	BH26 0.1-0.2 X																															
29/10/2018	BH26 0.5-0.6 X		*	*																												
29/10/2018	BH27 0.1-0.2 X																				*											
29/10/2018	BH27 0.5-0.6 X	*																														
29/10/2018	BH27 1.0-1.1 X																				<0.5				<0.5							
29/10/2018	BH27 1.5-1.6 X			*																												
29/10/2018	BH27 1.9-2.0 X										*																					
29/10/2018	BH28 0.1-0.2 X																															
29/10/2018	BH28 0.5-0.6 X																				*											
29/10/2018	BH28 1.0-1.1 X																															
29/10/2018	BH28 1.2-1.3 X																	*			<0.5				<0.5							
30/10/2018	BH29 0.5-0.6 X																				<0.5				<0.5							
30/10/2018	BH29 1.5-1.6 X																															
30/10/2018	BH29 2.1-2.2 X																															
30/10/2018	BH30 0.3-0.4 X																															
30/10/2018	BH31 0.5-0.6 X																															
30/10/2018	BH31 1.5-1.6 X										*																					
30/10/2018	BH32 0.5-0.6 X																				*											
30/10/2018	BH33 0.5-0.6 X																															
30/10/2018	BH34 0.5-0.6 X		*																													
30/10/2018	BH35 0.5-0.6 X																				<0.5				<0.5							
30/10/2018	BH35 1.5-1.6 X																				*											
31/10/2018	BH36 0.5-0.6 X										*																					
31/10/2018	BH37 0.5-0.6 X											*						*			<0.5				<0.5							
31/10/2018	BH37 1.5-1.6 X																				<0.5				<0.5							
31/10/2018	BH37 2.5-2.6 X																				<0.5				<0.5							
31/10/2018	BH37 3.5-3.6																				<0.5				<0.5							
31/10/2018	BH38 0.5-0.6 X																				*											
31/10/2018	BH38 1.5-1.6 X																				*											
31/10/2018	BH38 2.5-2.6 X																															
31/10/2018	BH39 0.5-0.6 X																															
31/10/2018	BH39 1.5-1.6 X																				<0.5				<0.5							
31/10/2018	BH39 2.5-2.6 X							*		*								*			<0.5			*	<0.5							
31/10/2018	BH40 0.5-0.6 X																				<0.5			*	<0.5							
31/10/2018	BH40 1.5-1.6 X																				<0.5			*	<0.5							
31/10/2018	BH40 2.5-2.6 X																				*											
31/10/2018	BH40 3.5-3.6 X																				<0.5			*	<0.5							
5/11/2018	BH51 0.5-0.6 X		*																		*											
17/10/2018	GT01																				<0.5				<0.5							
17/10/2018	GT02																				*<0.5*				<0.5							
17/10/2018	GT03																				<0.5				<0.5							

Note:
Leachable fraction analysis will take precedence over soil analysis when calculating IB105 Limits.
There are no leachable fraction investigation limits for certain compounds eg. Cobalt, and therefore the solids limit is applied. Where solid Level 2 or greater exceedances are present, these are represented with a * in the sheet. Leachable fraction limits are not available for Level 1 classification, and therefore a minimum leachable fraction Level 2 limit is applied if the solid results exceed Level 1 guideline limits for solids, alternatively Level 1 is applied
Leachable fraction exceedances are represented with a bold and highlighted cell and Level 2 solid exceedances are defined with italics and bold highlighting
Where the benzo(a)pyrene (TEQ) limit is exceeded, the assessment is based on soil total limits

IB105

Table 6 Soil Analytical Results Compared Against IB105 Total Solids Investigation Limits for soil Disposal – BH41-BH53

Information Bulletin 105 Classification and Management of Contaminated Soil For Disposal		Arsenic	Barium	Beryllium	Cadmium	Chromium Total	Copper	Cobalt	Lead	Manganese	Mercury	Nickel	Selenium	Zinc	Benzo(a)pyrene	C6 - C9 Fraction	C10 - C36 Fraction (sum)	Sum of polycyclic aromatic Hydrocarbons	Benzene	Toluene	Ethylbenzene	Total Xylenes
Unit		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR		5	10	1	1	2	5	2	5	5	0.1	2	5	5	0.5	10	50	0.5	0.2	0.5	0.5	0.5
Investigation Level Selected																						
IB105 Level 1		<20	<300	<2	<3	<50	<100	<100	<300	<500	<1	<60	<10	<200	<0.08	<65	<1000	<20	<1	<1	<3	<14
IB105 Level 2		20	300	2	3	50	100	100	300	500	1	60	10	200	0.08	65	1000	20	1	1	3	14
IB105 Level 3		200	3000	40	40	500	2000	200	1200	5000	30	600	50	14000	2	650	5000	40	5	100	100	180
IB105 Level 4		750	30000	400	400	5000	7500	1000	3000	25000	110	3000	200	50000	20	1000	10000	200	50	1000	1080	1800
5/11/2018	BH41 0.5-0.6 X	<5	30	<1	<1	6	75	20	9	319	<0.1	15	<5	32	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH42 0.5-0.6 X	<5	50	<1	<1	7	38	11	17	188	<0.1	13	<5	39	18.9	<10	1300	185	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH42 1.5-1.6 X	<5	30	<1	<1	6	45	25	13	354	<0.1	18	<5	62	66.4	<10	3430	648	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH42 2.5-2.6 X	<5	120	<1	<1	8	30	6	84	379	1	12	<5	45	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH43 0.5-0.6 X	<5	90	<1	<1	6	35	10	67	196	0.1	7	<5	95	3.8	<10	110	42.1	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH43 1.5-1.6 X	<5	110	<1	<1	9	21	11	11	291	<0.1	13	<5	36	13.4	<10	650	114	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH43 2.5-2.6 X	<5	90	<1	<1	9	21	12	110	239	<0.1	12	<5	37	4.1	<10	140	45.2	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH43 3.5-3.6 X	<5	50	<1	<1	4	78	15	23	351	<0.1	10	<5	53	12	<10	520	112	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH44 0.5-0.6 X	<5	80	<1	<1	12	6	10	16	62	<0.1	12	<5	41	5.1	<10	370	63.1	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH44 1.5-1.6 X	<5	40	<1	<1	5	68	12	18	263	<0.1	11	<5	39	33	<10	1710	284	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH44 2.5-2.6 X	<5	40	<1	<1	5	61	11	29	218	<0.1	10	<5	33	21.6	<10	1680	173	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH44 3.5-3.6 X	<5	50	<1	<1	6	52	12	34	230	<0.1	10	<5	43	60.3	<10	3400	639	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH45 0.5-0.6 X	<5	100	<1	<1	11	66	9	83	216	0.2	13	<5	134	8.2	<10	400	98.6	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH46 0.5-0.6 X	7	170	<1	<1	17	187	13	223	294	0.3	20	<5	221	3.7	<10	240	37.8	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH47 0.5-0.6 X	<5	200	<1	<1	9	41	35	179	242	0.5	18	<5	373	6	<10	400	51.6	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH47 1.5-1.6 X	<5	80	<1	<1	16	50	16	24	540	<0.1	20	<5	77	8.3	<10	680	97.2	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH48 0.5-0.6 X	<5	140	<1	<1	7	95	26	154	344	0.2	17	<5	265	7.7	<10	520	66.6	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH48 1.5-1.6 X	<5	130	<1	<1	10	59	9	180	232	0.4	12	<5	254	14.3	<10	1370	107	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH49 0.5-0.6 X	8	60	<1	<1	38	39	13	26	923	<0.1	23	<5	65	1.1	<10	<50	5.9	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH49 1.5-1.6 X	<5	220	1	<1	12	11	28	22	1070	<0.1	25	<5	77	0.9	<10	<50	6.9	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH50 0.5-0.6 X	<5	60	<1	<1	19	20	23	25	591	<0.1	22	<5	67	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH50 1.5-1.6 X	5	80	<1	<1	10	13	13	17	350	<0.1	16	<5	47	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH51 0.5-0.6 X	<5	640	1	<1	12	10	19	31	112	<0.1	15	<5	51	1.3	<10	<50	14	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH51 1.5-1.6 X	<5	100	<1	<1	9	20	9	101	167	0.4	11	<5	76	9.4	<10	410	80.9	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH52 0.5-0.6 X	6	140	<1	<1	32	21	12	18	868	<0.1	26	<5	61	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH52 1.5-1.6 X	6	120	<1	<1	15	17	11	18	406	<0.1	17	<5	57	<0.5	<10	<50	<0.5	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH53 0.5-0.6 X	<5	200	2	<1	16	28	24	25	510	<0.1	32	<5	70	<0.5	<10	<50	1.6	<0.2	<0.5	<0.5	<0.5
5/11/2018	BH53 1.5-1.6 X	<5	30	<1	<1	12	16	5	49	122	<0.1	7	<5	30	<0.5	<10	<50	2.2	<0.2	<0.5	<0.5	<0.5
Averaging		<5	120	<1	<1	12	45	16	55	360	0.1	16	<5	90	11	<10	650	103	<0.2	<0.5	<0.5	<0.5

Table 7 Soil Analytical Results Compared Against IB105 Leachate Investigation Limits for soil Disposal – BH41-BH53

Information Bulletin 105 Classification and Management of Contaminated Soil For Disposal Leachable Fraction *Italic/** - Based On Soil (Total) Limit **Bold** - Based On Leach Limit		Arsenic	Barium	Beryllium	Cadmium	Chromium Total	Hexavalent Chromium	Copper	Cobalt	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Tin	Zinc	Aldrin + Dieldrin	DDT + DDD + DDE	Benzo(a)pyrene	Phenol	C6 - C9 Fraction	C10 - C36 Fraction (sum)	Benzo(a)pyrene (TEQ)	Polychlorinated biphenyls (PCB's)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total Cyanide	Fluoride
Unit		mg/L	mg/L	mg/L	mg/L	mg/L		mg/L		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		mg/L	µg/L	µg/L	µg/L	µg/L			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L
LOR		0.1	0.1	0.1	0.1	0.1		0.1		0.1	0.1	0.001	0.1	0.1	0.1	0.1		0.1	0.5	0.5	0.5	1			0.5	1	1	2	2	2	0	0.1
Investigation Level Selected																																
IB105 Level 1																																
IB105 Level 2		<0.5	<35	<1	<0.1	<0.5		<10		<0.5	<25	<0.01	<2.5	<1	<0.1	<0.5		<25	<3	<200	<0.5	<14000			<0.5	<1	<50	<1400	<3000	5000	<1	<15
IB105 Level 3		0.5	35	1	0.1	0.5		10		0.5	25	0.01	2.5	1	0.1	0.5		25	3	200	0.5	14000			0.5	1	50	1400	3000	5000	1	15
IB105 Level 4		5	350	4	0.5	5		100		5	250	0.1	20	8	1	5		250	30	2000	5	50000				2	500	14000	30000	50000	10	150
5/11/2018	BH41 0.5-0.6 X																															
5/11/2018	BH42 0.5-0.6 X																				**<0.5**			*	**<0.5**							
5/11/2018	BH42 1.5-1.6 X																				**<0.5**			*	**<0.5**							
5/11/2018	BH42 2.5-2.6 X										*																					
5/11/2018	BH43 0.5-0.6 X																				**<0.5**				**<0.5**							
5/11/2018	BH43 1.5-1.6 X																				**<0.5**				**<0.5**							
5/11/2018	BH43 2.5-2.6 X																				**<0.5**				**<0.5**							
5/11/2018	BH43 3.5-3.6 X																				**<0.5**				**<0.5**							
5/11/2018	BH44 0.5-0.6 X																				**<0.5**				**<0.5**							
5/11/2018	BH44 1.5-1.6 X																				**<0.5**			*	**<0.5**							
5/11/2018	BH44 2.5-2.6 X																				**<0.5**			*	**<0.5**							
5/11/2018	BH44 3.5-3.6 X																				**<0.5**			*	**<0.5**							
5/11/2018	BH45 0.5-0.6 X																				**<0.5**				**<0.5**							
5/11/2018	BH46 0.5-0.6 X						*											*			**<0.5**				**<0.5**							
5/11/2018	BH47 0.5-0.6 X																	*			**<0.5**				**<0.5**							
5/11/2018	BH47 1.5-1.6 X										*										**<0.5**				**<0.5**							
5/11/2018	BH48 0.5-0.6 X																	*			**<0.5**				**<0.5**							
5/11/2018	BH48 1.5-1.6 X																	*			**<0.5**			*	**<0.5**							
5/11/2018	BH49 0.5-0.6 X										*										*											
5/11/2018	BH49 1.5-1.6 X										*										*											
5/11/2018	BH50 0.5-0.6 X										*																					
5/11/2018	BH50 1.5-1.6 X																															
5/11/2018	BH51 0.5-0.6 X		*																		*											
5/11/2018	BH51 1.5-1.6 X																				**<0.5**				**<0.5**							
5/11/2018	BH52 0.5-0.6 X										*																					
5/11/2018	BH52 1.5-1.6 X																															
5/11/2018	BH53 0.5-0.6 X			*							*																					
5/11/2018	BH53 1.5-1.6 X																															

Note:
Leachable fraction analysis will take precedence over soil analysis when calculating IB105 Limits
There are no leachable fraction investigation limits for certain compounds eg. Cobalt, and therefore the solids limit is applied. Where solid Level 2 or greater exceedances are present, these are represented with a * in the sheet. Leachable fraction limits are not available for Level 1 classification, and therefore a minimum leachable fraction Level 2 limit is applied if the solid results exceed Level 1 guideline limits for solids, alternatively Level 1 is applied
Leachable fraction exceedances are represented with a bold and highlighted cell and Level 2 solid exceedances are defined with italics and bold highlighting
Where the benzo(a)pyrene (TEQ) limit is exceeded, the assessment is based on soil total limits

IB105

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ENVIRONMENT PROTECTION AUTHORITY

INFORMATION BULLETIN No. 105

Environmental Management and Pollution Control (Waste Management) Regulations 2010

CLASSIFICATION AND MANAGEMENT OF CONTAMINATED SOIL FOR DISPOSAL

1. Introduction

This bulletin defines the criteria used by the Environment Protection Authority (EPA) for the classification of contaminated soil that requires treatment and/or off-site disposal, and outlines the management of each classification in accordance with the *Environmental Management and Pollution Control (Waste Management) Regulations 2010* (the 'Regulations'). Although criteria set out in this bulletin have been determined for soil, they may be applicable to the classification of other solid waste material on an 'as needs basis' (see section 2.2.3). Please note, for the purposes of this Bulletin soil also includes dredge spoil (refer Section 2.2.5).

This bulletin is designed to be used by waste producers, consultants, local government, waste transporters and landfill operators that are responsible for determining whether potentially contaminated soil is suitable to be disposed of at a landfill, in assessing alternative options for contaminated soil management and how to make an application for disposal approval to the EPA.

The EPA encourages effective waste management by promoting on-site remediation, treatment and/or re-use, where appropriate, as the preferred options for dealing with contaminated soil. In accordance with the hierarchy of waste management options, direct disposal of soil to landfills should be used only when no other approved method of dealing with the contaminated soil is available. For further details on these waste management principles, see Section 1.2 of the *Landfill Sustainability Guide 2004* (DPIWE, 2004).

Treatment, re-use options and disposal of soil will be assessed and approved on a case by case basis by the Director, EPA ('the Director') or the Director's delegate.

2. Classification

The EPA uses 4 categories to classify contaminated soil: (Level 1) *Fill Material*; (Level 2) *Low Level Contaminated Soil*; (Level 3) *Contaminated Soil*; and (Level 4) *Contaminated Soil for Remediation*. Table 1 below summarises each classification.

Criteria in Table 2 below shows the maximum total concentration, and the maximum leachable concentration values for specific pollutants that are used to classify soil for off-site disposal. For soils classified as potentially acid sulfate soils (PASS), the criteria in Table 2 do not apply. Determination of risk associated with these soils should be conducted in line with the *Tasmanian Acid Sulfate Soil Management Guidelines* published by Department of Primary Industries, Parks, Water and Environment (refer Section 2.2.5).

For potential per and poly – fluoroalkyl substances (PFAS) contaminated soils, the criteria as detailed in the National Environmental Management Plan (NEMP 2018), section 14.6, should

IB105

be used for the classification and determination of risk associated with soils containing PFAS for disposal (refer to section 2.2.6 of this bulletin for further detail).

Potentially contaminated soils are classified by analysis of representative samples of the soil and comparison of the results to the chemical concentrations given in Table 2.

It is not necessary to sample for all contaminants listed in Table 2 for soil classification. However, all contaminants that are reasonably likely to be present in the soil above background levels should be included in the sample analysis.

Generally, where a leachable concentration is prescribed in Table 2 that value takes precedence over the total concentration and is used as the sole determinant of final classification for disposal (see section 2.2.4 for further information).

Please note that these values in Table 2 are ***not*** to be interpreted as clean up target levels for certain land uses.

Table 1. Summary of the classification process

	Classification (with reference to Table 2)	Controlled Waste[1]	Comments
Fill Material[2] (Level 1)	Soil that exhibits levels of contaminants below the limits defined under *Fill Material* in Table 2.	Unlikely	Soil classified as *Fill Material* can still be a 'pollutant' under the *Environmental Management and Pollution Control Act 1994* and needs to be responsibly managed.
Low Level Contaminated Soil (Level 2)	Soil that exhibits levels of contaminants above the limits defined under *Fill Material* but below the limits defined under *Low Level Contaminated Soil* in Table 2.	Likely	Where leachable concentrations have not been prescribed, maximum total concentrations will be used to classify the soil.
Contaminated Soil (Level 3)	Soil that exhibits levels of contaminants above the limits defined under *Low Level Contaminated Soil* but below the limits defined under *Contaminated Soil* in Table 2.	Yes	Where leachable concentrations have not been prescribed, maximum total concentrations will be used to classify the soil.
Contaminated Soil for Remediation (Level 4)	Soil that exhibits levels of contaminants above the limits defined under *Contaminated Soil* in Table 2 (regardless of the maximum total concentrations) is generally ***not*** considered acceptable for off-site disposal without prior treatment.	Yes	Soil that contains contaminants that do not have criteria for leachable concentrations (*e.g.* petroleum hydrocarbons), and the levels of contaminants exceed the maximum total concentrations listed in *Contaminated Soil*, are generally classified as *Contaminated Soil for Remediation*.

[1] Controlled Waste is defined in the *Environmental Management and Pollution Control Act 1994*.
[2] Criteria for *Fill Material* are the limits set by the Director for the purposes of R.9(2)(a)(ii) in the *Regulations*.

IB105

Table 2. Maximum total concentration and leachable concentration values permitted for waste classification (Note, does not apply for material classified as PASS (refer section 2.2.5) or PFAS (refer section 2.2.6))

	FILL MATERIAL Level 1	LOW LEVEL CONTAMINATED SOIL Level 2		CONTAMINATED SOIL Level 3	
CONTAMINANT	Maximum total concentration mg/kg dry weight	Maximum total concentration mg/kg dry weight	Maximum (TCLP) leachable concentration (pH 5.0 extract) mg/L	Maximum total concentration mg/kg dry weight	Maximum (TCLP) leachable concentration (pH 5.0 extract) mg/L
Arsenic	20	200	0.5	750	5
Barium	300	3,000	35	30,000	350
Beryllium	2	40	1	400	4
Cadmium	3	40	0.1	400	0.5
Chromium (total)	50	500	0.5	5,000	5
Chromium (VI)	1	200	NA*	2,000	NA
Copper	100	2,000	10	7,500	100
Cobalt	100	200	NA	1,000	NA
Lead	300	1,200	0.5	3,000	5
Manganese	500	5,000	25	25,000	250
Mercury (total)	1	30	0.01	110	0.1
Molybdenum	10	1,000	2.5	4,000	20
Nickel	60	600	1	3,000	8
Selenium	10	50	0.1	200	1
Silver	10	180	0.5	720	5
Tin (total)	50	500	NA	900	NA
Zinc	200	14,000	25	50,000	250
Tributyltin (reported as Sn)	0.005	0.07	0.05	0.7	0.5
Aldrin + Dieldrin	2	20	0.003	50	0.03
DDT + DDD + DDE	2	200	0.2	1,000	2
Benzo(a)pyrene	0.08	2	0.0005	20	0.005
Phenols	25	500	14	2,000	50
C_6-C_9 petroleum hydrocarbons	65	650	NA	1,000	NA
C_{10}-C_{36} petroleum hydrocarbons	1,000	5,000	NA	10,000	NA
Polycyclic aromatic hydrocarbons (total)	20	40	0.0005 TEQ**	200	NA
Polychlorinated biphenyls (PCBs)	2	20	0.001	50	0.002
Benzene	1	5	0.05	50	0.5
Toluene	1	100	1.4	1,000	14
Ethylbenzene	3	100	3	1,080	30
Xylene (total)	14	180	5	1,600	50
Cyanide (total)	32	1,000	1	2,500	10
Fluoride	300	3,000	15	10,000	150

*NA – a leachable concentration has not been prescribed (refer Table 1 above)
** For guidance refer to http://epa.tas.gov.au/Documents/Advisory_Note_for_classification_of_PAHs.pdf

IB105

2.1 Controlled waste

Contaminated soil may or may not be a controlled waste as defined in the *National Environment Protection Measure for the Movement of Controlled Waste between States and Territories* (NEPC, 1998) and the *Environmental Management and Pollution Control Act 1994* (EMPCA) and as further prescribed in the Regulations.

Soil and other material reasonably suspected to be a controlled waste must be sampled and analysed to determine whether it is a controlled waste before that waste can be removed from the site (R.6(3) of the Regulations). This generally includes, but is not limited to soil that is from a site that is used, or has been used, for an activity listed in Table 3 and is likely to be contaminated.

Special provisions apply to the management of controlled waste, as detailed in section 3 of this bulletin. As a general rule all *Low Level Contaminated Soil*, *Contaminated Soil* and *Contaminated Soil for Remediation* that is intended for treatment, re-use or disposal should be managed as controlled waste unless sampling proves otherwise.

2.2 Sampling and analysis

The waste producer is responsible for organising the sampling and analysis of potentially contaminated soil. It is recommended that a suitably qualified person perform all sampling. Additionally, all soil sampling should be conducted in accordance with the relevant Australian Standards, which include:

- AS 4482.1-2005 Guide to the investigation and sampling of potentially contaminated soil. Part 1: Non-volatile and semi-volatile compounds (and any subsequent editions)
- AS 4482.2-1999 Guide to the sampling and investigation of potentially contaminated soil. Part 2: Volatile substances (and any subsequent editions)
- In the case of potentially Acid Sulfate Soils, the *Tasmanian Acid Sulfate Soil Management Guidelines* published by Department of Primary Industries, Parks, Water and Environment should be consulted.

In-situ sampling is generally not recommended for classification of soils that are to be excavated later for disposal. However, if this method of classification is unavoidable, then the Australian Standards listed above should be adhered to in order to obtain a representative number of samples.

All sample analyses must be conducted by a laboratory registered with the National Association of Testing Authorities, accredited for the testing procedures undertaken ('NATA accredited'), or by a laboratory approved by the Director for the test.

2.2.1 Sampling density

The number of samples required for adequate classification of soil is dependent on the volume of material, the estimated standard deviation of contamination concentrations, and the estimated average concentration. However, as a general rule for homogeneous stockpiled soil one sample should be taken every 25 m^3.

2.2.2 Composite sampling

Generally, composite samples are not recommended for classification of soil for disposal. However, composite sampling may assist an environmental program by reducing sampling costs that could be spent elsewhere in the program. Composite sampling is only acceptable for stockpiled soil containing non-volatile contaminants

IB105

and is **not** an acceptable method for sampling of volatiles such as some hydrocarbon-contaminated soil.

All composite sampling should be undertaken by a suitably qualified person and in accordance with the Australian Standards AS 4482.1-2005 and the National Environmental Health Forum Monograph, Soil Series No. 3 – *Composite Sampling*, 1996.

2.2.3 Sampling materials other than soil

For materials such as contaminated construction materials there are no guidelines available for determining the representative number of samples for testing. Surface scrapings or bored samples may be required to classify the material. The person undertaking the sampling, preferably an environmental consultant should develop a sampling strategy and density that adequately classifies the material.

2.2.4 Leachable fraction

In order to classify soil for disposal, the leachable concentrations of metals and some organics should be undertaken. Where a leachable concentration is prescribed in Table 2, generally that value will take precedence over the total concentration value and will be used as the sole determinant of final classification for disposal.

The most appropriate procedure for determining the leachable fraction should be determined in consultation with an environmental consultant, the EPA and the analytical laboratory performing the procedures and with consideration of the waste management goals that are to be achieved. Accepted methods for determining leachable fractions are detailed below:

The Toxicity Characteristic Leaching Procedure (TCLP), in accordance with USEPA Method 1311 – SW 846, is used to simulate the leaching of contaminants into groundwater under conditions found in solid waste landfills.

The Multiple Extraction Procedure (MEP), in accordance with USEPA MEP Method 1320 – SW 846, is used to simulate leaching from repetitive acid washings and is a more rigorous test of the buffering capacity of the soil than the TCLP. In some circumstances (*e.g.* for remediation technologies that involve solidification with lime based agents), the MEP would be a more suitable test to determine the long-term stability of soil.

There is also an Australian Standard for the preparation of leachates: AS 4439-1997 (parts 1 to 3), *Wastes, Sediments and Contaminated Soils: Preparation of Leachates.*

2.2.5 Acid sulfate soils

Potentially Acid Sulfate Soils (PASS) underlie parts of Tasmania's coastline and may also underlie inland areas such as peat bogs, salt lakes and wetlands. They are natural soils that contain sulfides (mostly iron sulfides). In an undisturbed and waterlogged state these soils are harmless, but when disturbed (such as dredging estuaries etc), a process of oxidation can produce sulfuric acid in large quantities. As the acid moves through the soil profile it may 'mobilise' or cause the release of metals and other toxins from the soil, which eventually flow into surrounding waterways. Acid Sulfate Soil (ASS) runoff therefore has significant environmental, economic and social impacts. The *Tasmanian Acid Sulfate Soil Management Guidelines* provide guidance on the level of management required to minimise the risk associated with ASS. The *Guidelines* also provide criteria to characterise acid sulfate soils. The criteria in Table 2 of this Bulletin do not apply to any soils classified as PASS. Such soils should be managed as potentially acid sulfate soils. Acid Sulfate Soil predictive mapping is available for Tasmania at www.thelist.tas.gov.au. For further information regarding ASS, instructions on how to utilise the predictive mapping, or obtain a copy of the *Guidelines*, refer to:

http://www.dpiw.tas.gov.au/inter/nsf/WebPages/SWEN-83NVBG?open

IB105

2.2.6 Per and poly – fluoroalkyl substances (PFAS)

PFAS are a group of chemicals that have been used in applications such as fire-fighting foams, textile treatments for upholstery and clothing, paper products and electroplating. There are many types of PFAS, with the best known being Perfluorooctane sulfonate (PFOS), Perfluorooctane acid (PFOA) and perfluorohexane sulfonate (PFHxS). Some PFAS have been globally identified as chemicals of high concern, particularly due to their environmental persistence and bioaccumulation. Therefore, in addition to classifying soils using Table 2 of EPA Bulletin 105, the EPA has adopted the PFAS National Environmental Management Plan 2018 (NEMP). Section 14.6 of the NEMP is applicable to PFAS in soils and guides classification and determination of risk associated with disposal to landfill. Both total and leachable PFAS concentrations should be analysed.

Disposal of soils contaminated with PFAS requires the Director's approval. Applications for approval are assessed on a case by case basis in line with the NEMP (2018). To use or obtain a copy of the *NEMP*, refer to:

https://www.epa.vic.gov.au/your-environment/land-and-groundwater/pfas-in-victoria/pfas-national-environmental-management-plan

3. Re-use or disposal - waste management plan

A Waste Management Plan should be developed following the classification of soil to determine whether the soil can be remediated or re-used instead of, or prior to, disposal (see Figure 1, which summaries this process, and section 5 which details the information required).

It should be noted that a controlled waste will not be suitable for re-use in sensitive environments such as wetlands, agricultural areas or residential sites.

4. Disposal of contaminated material

Classification of soil (as defined in Table 2) will determine the category of landfill to which the soil can be disposed of in accordance with the landfill operator's permit conditions.

If disposal is the only viable management option, all possible efforts should be made to reduce the volume of material requiring disposal by minimising excavated volumes and segregating and sorting of wastes prior to disposal.

Waste Type	Category A landfill - **Solid Inert Landfill**	Category B landfill - **Putrescible Landfill**	Category C landfill - **Secure landfill**
Level 1 – *Fill Material*	✔	✔	✔
Level 2 – *Low Level Contaminated Soil*	✘	✔ (refer to Section 4.2.2)	✔
Level 3 - *Contaminated Soil*	✘	✘	✔
Level 4 - *Contaminated Soil for Remediation*	✘	✘	✘

See the *Landfill Sustainability Guide 2004* (DPIWE, 2004) for further details.

IB105

4.1 Disposal of fill material (Level 1)

4.1.1 The off-site disposal of *Fill Material* is not restricted and may be used as cover in landfills.

4.1.2 The definition of *Fill Material* includes inert construction material, soils and rocks, which have not been contaminated with any substance, and stable asphalt or bituminous pavement material, all of which are generally considered inert for use as 'fill'. However, soil and other material classified as *Fill Material* can still be a 'pollutant' under EMPCA and must be responsibly managed.

Re-use of fill material

4.1.3 The re-use of *Fill Material* must not result in environmental harm. *Fill Material* might contain contaminants above background levels and therefore may not be suitable for all uses, *e.g.* for sensitive uses such as child play areas, residential uses, or in protected nature reserves

4.1.4 In some cases, unwanted 'waste' soils or rock imported from another site to be used as fill may naturally contain contaminants at levels that are higher than *Fill Material* criteria due to regional geological characteristics. This material would be regarded as unsuitable for re-use if it posed a risk to human health or the environment in its new location.

The risk posed by importation of materials with naturally elevated levels of certain contaminants should be assessed by an environmental consultant and the evaluation and supporting information submitted to the Director for approval.

4.2 Disposal of low level contaminated soil (Level 2)*Low Level Contaminated Soil* may, in some cases, be suitable for disposal as intermediate landfill cover at nominated municipal landfills. Please note that the landfill operator should refuse soil that has not been classified and approved if there is likelihood that acceptance of the material may result in a breach of the landfill operator's permit conditions.

4.2.2 Approval for the disposal of *Low Level Contaminated Soil* must be sought from the landfill operator and the EPA. The information detailed in section 5 of this bulletin must be supplied to the EPA when making an application for approval to dispose of a waste.

Landfills at which *Low Level Contaminated Soil* (Level 2) may be accepted:

Council / Authority	Landfill
Circular Head Council	Port Latta Waste Depot
Dulverton Regional Waste Management Authority (DRWMA)	Dulverton Regional Waste Depot
Launceston City Council	Remount Rd Waste Depot
Copping Refuse Disposal Site Joint Authority	Copping Waste Depot

Re-use of low level contaminated soil

4.2.3 *Low Level Contaminated Soil* might be suitable for re-use as fill or levelling material on an industrial or commercial site, but will be judged on a case by case basis. In determining whether *Low Level Contaminated Soil* may be used as fill, an assessment of the environmental and human health hazards associated with the disposal option must be conducted by a suitably qualified environmental consultant. If the soil is classified as a controlled waste, approval must be sought from the Director as detailed in section 5.

IB105

4.3 Disposal of contaminated soil (Level 3) *Contaminated Soil* can only be disposed of at landfills that have the appropriate permit conditions and within a separate lined and contained cell.

4.3.2 Approval for the disposal of *Contaminated Soil* must be sought from the landfill operator and the EPA. The information detailed in section 5 of this bulletin must be supplied to the EPA in making an application for approval.

4.3.3 Only permitted landfills are allowed to accept Level 3 waste. Furthermore, it is at the landfill operator's discretion as to whether or not they will accept the waste. At the date of publication, no Tasmanian landfill is receiving level 3 waste for disposal.

4.4 Contaminated soil for remediation (Level 4)

4.4.1 *Contaminated Soil for Remediation* requires remediation or treatment prior to disposal to reduce total concentrations and/or leachable concentrations to levels acceptable for landfill disposal or re-use.

4.4.2 The producer (defined in the Regulations) of the *Contaminated Soil for Remediation* is responsible for identification of the treatment options, which will depend on the waste and pollutant type, waste volumes and the availability of suitable facilities in which to manage the remediation. Typical forms of treatment currently being used for remediation of contaminated soil include bioremediation, thermal treatment/desorption, soil washing, soil vapour extraction, red mud, chemical treatments and stabilisation. Specific treatment of hydrocarbon contaminated soil by bioremediation is encouraged under appropriate circumstances, as detailed in the EPA's *Information Bulletin 108: Landfarming of Petroleum Contaminated Soils*.

4.4.3 The suitable technologies for waste treatment may not be available in Tasmania and thus treatment may require transport to an interstate facility. Advice on interstate treatment options should be sought from the Controlled Waste Management Officer.

4.4.4 If the soil is to be disposed of after treatment, the EPA encourages treatment methods that minimise soil volumes prior to disposal to conserve landfill space.

4.4.5 If the remediation method has the potential to cause environmental harm, as defined in EMPCA, advice from the Director should be sought.

4.4.6 *Regulation 6 - General Responsibilities* of the Regulations requires that a person must not remove, receive, store, reuse, recycle, reprocess, salvage, incinerate, treat or use for energy recovery a controlled waste as defined within the Regulations unless approved to do so.

5. Approvals

5.1 Approval process

The waste producer, or consultant/contractor acting on behalf of the waste producer, is responsible for applying for approval for soil disposal, re-use options or remediation.

Applications are to be sent to the Director, EPA. Please allow up to ten working days for the Director to respond to an application. Please note that where it is intended to dispose of material to a landfill, an 'in principle' agreement from the landfill should be gained by the applicant prior to disposal.

Upon approval of the application, the Director, or a person authorised by the Director will provide written notification to the applicant of the approved classification of the waste where appropriate. The landfill authority will also be forwarded a copy of the

IB105

approval, along with a copy of the analytical results and any other relevant information so that they can monitor waste entering the landfill.

5.2 Information required

An application for approval to dispose of, re-use, treat, remediate, *etc*, soil must contain the following information:

Introduction:

- Details of the site(s) from which the soil is to be removed, including a brief site history and why the soil is thought to be contaminated, or likely to cause environmental harm;
- Description of the soil;
- Estimate of the volume of soil to be managed.

Sampling details:

- Sampling density and analytical suite to classify the soil;
- Sampling protocols followed;
- Scaled sampling plan showing, for example, soil stockpiles and sample locations and contamination sources;
- NATA endorsed laboratory reports.

Waste management plan:

- Proposal for the management of the soil that is in accordance with relevant guidelines and standards;
- If the soil is to be disposed of, provide justification for why re-use, on-site treatment, *etc* is not proposed;
- Details of the proposed management method, for example the name of the landfill facility that you wish to dispose of the soil at, or details of the treatment or re-use *etc*;
- The name of the waste transporter that you will be utilising (see Section 6 for further details); and
- If the soil is to be re-used, recycled, treated, *etc*, and is a controlled waste, the waste producer must apply for an environmental approval from the Director (R.12 of the Regulations). Relevant information required by the EPA to consider an application for an environmental approval is detailed in R.12(3) of the Regulations. A R12 application form can be accessed at:
- http://epa.tas.gov.au/regulation/required-approvals-and-authorisations

In situations where a site investigation report has already been lodged with the EPA, duplication of information provided in that report is not required. However, in all cases, the application will need to make reference to the specific sample numbers used for soil classification.

6. Transport of contaminated material

If a controlled waste is to be transported, a waste transport business holding a current relevant approval for that particular waste type and issued under EMPCA is required. For information regarding currently approved Waste Transporters, either contact the Controlled Waste Transport Officer (see below) or a list can be accessed at:

IB105

http://epa.tas.gov.au/regulation/document?docid=1063

Caution should be taken when transporting any material to ensure its safe transportation and prevention of secondary impacts (*e.g.* dust).

7. Further information

For further information relating to this bulletin or to make a contaminated soil or controlled waste disposal application contact:

Waste Management Section
GPO Box 1550
HOBART TASMANIA 7001

Controlled Waste Management Officer.....
Contaminated Sites Officer.....
Controlled Waste Transport Officer .....
Landfill Officer.....

EPA Division
Telephone: (03) 6165 4599

Legislation may be viewed on the Internet at http://www.thelaw.tas.gov.au.
General information can be viewed either on the EPA's website at http://www.epa.tas.gov.au

8. Currency of this bulletin

This bulletin may be subject to amendment and persons relying on this bulletin should check with an officer of the Waste Management Section or on the above EPA Division and EPA websites to ensure that it is current at any given time.

Disclaimer
The Crown gives no warranty, express or implied, as to the accuracy or completeness of the information provided in this Bulletin. The contents are based on the best information available to the Environment Protection Authority (EPA) at the time of publication and are subject to revision based upon further advice received by the EPA.

Please note that other national or state agencies may have additional requirements relating to the import/export and/or disposal of controlled wastes.

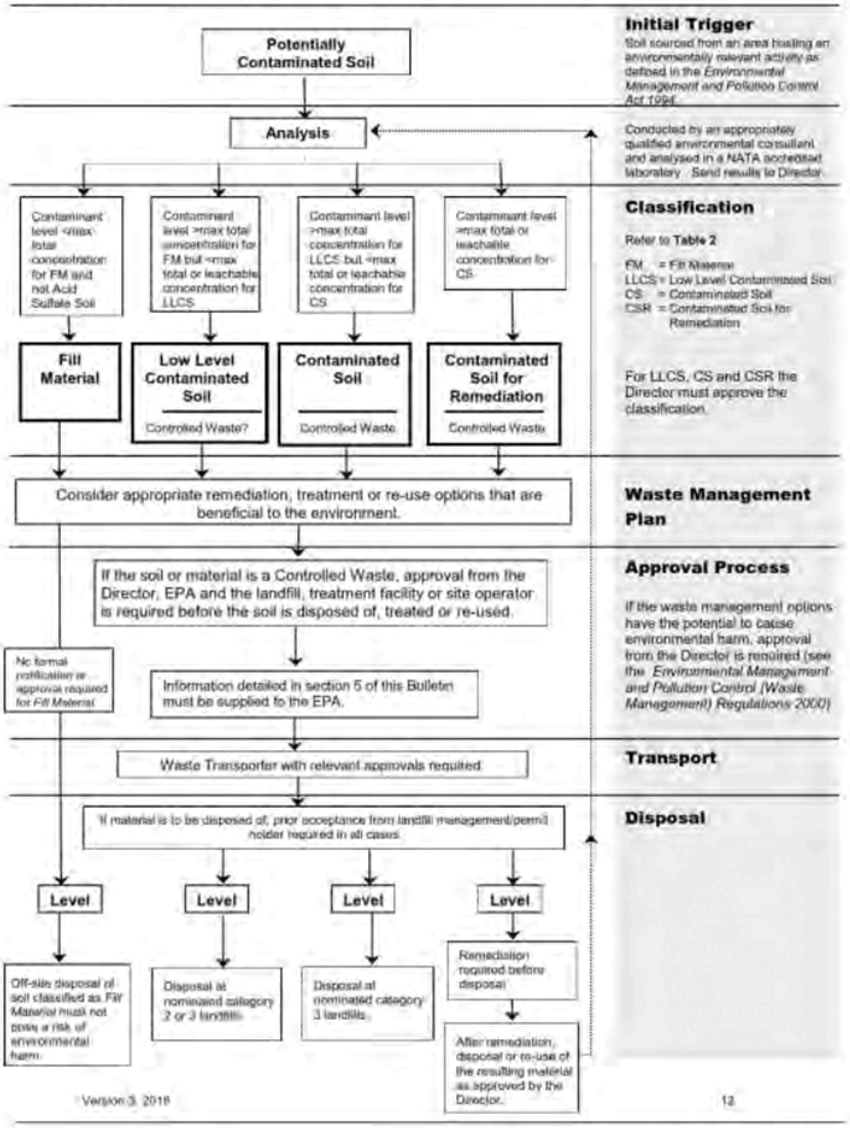
Table 3. Potentially Contaminating Activities

Potentially Contaminating Activities	
Acid / alkali plant and formulation	Landfill sites, including on-site waste disposal and refuse pits
Ammunition manufacture and usage (e.g. shooting ranges)	Lime burner
Asbestos production, handling or disposal	Metal treatments (e.g. electroplating) and abrasive blasting
Asphalt/bitumen manufacturing	Metal smelting, refining or finishing
Battery manufacturing or recycling	Mining and extractive industries
Boat/ship building, marinas, slip ways and associated boat yards	Oil or gas production or refining
Boiler or kiln usage	Paint formulation and manufacture

Chemical manufacture and formulation (e.g. fertilisers, paints, pesticides, photography, plastics, solvents)	Pesticide manufacture and formulation sites
Dewatering of sediments	Petroleum product or oil storage
Disturbance of potential acid sulfate soils	Pharmaceutical manufacture and formulation
Drum conditioning works	Power stations
Dry cleaning establishments	Printing
Electrical transformers	Radio-active material usage (e.g. hospitals)
Ethanol production plant	Railway yards
Engine works	Scrap yards and recycling facilities
Explosives industries and usage sites	Sewage treatment plant
Fertiliser manufacturing plants	Sheep and cattle dips
Fill material imported onto a site from a potentially contaminated source (includes dredge spoil)	Sites of fires involving hazardous materials, including fire fighting foam use
Foundry Operations	Spray mixing sites (e.g. for orchards)
Gas works	Spray painting industries
Herbicide manufacture	Tanning and associated trades
Hospitals	Textile operations
Sites of incidents involving release of hazardous materials	Tyre manufacturing and retreading works
Industrial activities involving chemicals that may have spilt	Wood preservation and storage or cutting of treated timber
Iron and steel works	Wool scouring
Laboratories	

IB105

Figure 1 **Summary of Waste Management for Contaminated Soil.**



Appendix 6 Soil and Water Management Guideline Fact Sheets

Soil & Water Management on Large Building & Construction Sites

What is this?

Sediment and erosion control measures are typically required for subdivisions and larger sites. The construction of subdivisions involves breaking land into smaller lots and installation of related services (roads, water, sewerage, power etc.). Due to the scale of land clearance and excavation, subdivision construction activities can cause excessive erosion and sediment loads in runoff, compared with the disturbance of building single house lots.

Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will minimise erosion and control sediment run-off from your site, meet your legal requirements and help protect our waterways.

Fact Sheet 1

WHAT DO I NEED TO DO?

All works undertaken during subdivision construction are normally 'controlled' through the principle contractor and site manager. This means the risks of erosion can be readily managed through appropriate guidance and supervision. Compared with the allotment building phase where there are different building contractors and subcontractors present on any given allotment it is easier to manage erosion and prevent sediment runoff at the subdivision construction phase.

Submit a Soil and Water Management Plan:

Subdivisions or activities that create greater than 250 m^2 of ground disturbance may need to submit a drawn Soil and Water Management Plan (SWMP) to council as a requirement of their planning permit **(see Fact Sheet 3).**

On the SWMP clearly define and document who is responsible for maintaining the sediment and erosion control measures (installed during the subdivision phase) that will be used in the allotment building phase.

When designing subdivision works:

1) Ensure that the subdivision conforms to the natural limitations presented by the topography and the soil so as to reduce the potential for soil erosion.
2) Make sure that land clearing is only being undertaken in conjunction with the development of each stage.
3) Develop the site in increments of workable size such that adequate sediment and erosion control measures can be provided as the subdivision progresses. The smallest practical area of land should be exposed at any one period of time.
4) Coordinate the sediment and erosion control measures with the different subdivision construction phases.
5) Limit soil exposure to the shortest feasible period of time.
6) Keep removed topsoil for respreading over the developed area.
7) Retain and protect natural vegetation wherever practical.
8) Install larger sediment controls i.e. sediment basins if site conditions are suitable.
9) Manage wind-borne erosion.

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Soil and Water Management Guideline Sheets

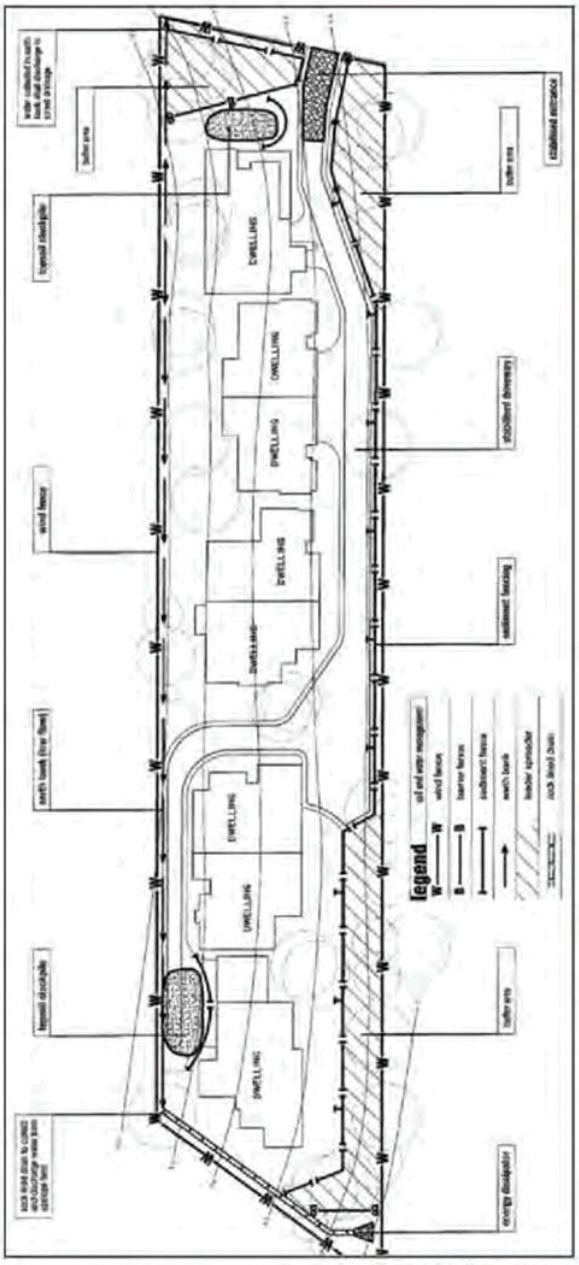

Figure 1A: SWMP for a subdivision

List of fact sheets

1. **Soil & Water Management on Large Building & Construction Sites**
2. Soil & Water Management on Standard Building & Construction Sites
3. Soil & Water Management Plans
4. Dispersive Soils – High Risk of Tunnel Erosion
5. Minimise Soil Disturbance
6. Preserve Vegetation
7. Divert Up-slope Water
8. Erosion Control Mats & Blankets
9. Protect Service Trenches & Stockpiles
10. Early Roof Drainage Connection
11. Scour Protection – Stormwater Pipe Outfalls & Check Dams
12. Stabilised Site Access
13. Wheel Wash
14. Sediment Fences & Fibre Rolls
15. Protection of Stormwater Pits
16. Manage Concrete, Brick & Tile Cutting
17. Sediment Basins
18. Dust Control
19. Site Revegetation

Remember:

Everyone working on building and construction sites has a responsibility to prevent pollution. If you do have an accident and pollution occurs you are required by law to notify the site supervisor. If the site supervisor cannot be contacted, workers should immediately notify the local council so they can work with you to minimise any harm to the environment.

Acknowledgement:

Figure 1A after Landcom 2004 "Soils & Construction Volume 1 Managing Urban Stormwater (4th edition)". Some of the text in this brochure has been obtained and modified from the Brisbane City Council 2008 "Subdivision and Development Guidelines".

Date of Issue: December 2008

Soil & Water Management on Standard Building & Construction Sites

What is this?

A general overview of sediment and erosion control measures that are typically required for single residential building lots including when certain control measures should be installed. Useful for planning and for determining what practices might be suitable for your site. For further details about each of the control measures mentioned go to the relevant fact sheet in the series.

Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will minimise erosion and control sediment run-off from your site, meet your legal requirements and help protect our waterways.

Fact Sheet 2

WHAT DO I NEED TO DO?

The timing of works and installation of control measures has a major influence on how effective soil and water management is in reducing on-site erosion and the amount of sediment that is carried off-site.

Before starting site works plan to:

1) Schedule earthworks in phases throughout the project so that the ground is disturbed for the shortest time possible **(see Fact Sheet 5).**
2) Avoid stripping and excavating until all necessary permits, licences and approvals have been obtained and you are ready to start work.
3) Install erosion and sediment control measures in accordance with an approved Soil and Water Management Plan (if required) **(see Fact Sheet 3).**

Install erosion and sediment control measures in sequence:

1) Choose a single, stabilised site access point **(see Fact Sheet 12).**
2) Install sediment fences or fibre rolls at the low end of the site to trap sediment **(see Fact Sheet 14).**
3) Divert up-slope catchment runoff around the site by installing a diversion drain and level spreader **(see Fact Sheet 7).**
4) Keep as much vegetation as possible to minimise soil erosion and reduce rainwater running across the site **(see Fact Sheet 6).**
5) Designate a location where topsoil and other excavation material will be stockpiled during building and construction. Provide suitable controls to prevent erosion **(see Fact Sheet 9).**
6) Stabilise areas of exposed soil with vegetation or erosion control blankets and mats **(see Fact Sheet 8).**
7) Protect the nearby stormwater system including any stormwater pits on and below the site from blocking up with sediment **(see Fact Sheet 15).**
8) Designate an appropriate location within the site where sediment-generating activities can be managed (e.g. wheel wash, brick cutting) **(see Fact Sheet 16).**

Once site works have commenced:

1) Monitor sediment and erosion control measures at least once a week and after each rainfall event.
2) Construct service trenches away from where water is likely to concentrate. Try not to have service trenches open any longer than necessary **(see Fact Sheet 9).**
3) Prevent clean rainwater running across the site by connecting downpipes to the stormwater system as soon as the roof is on the building frame **(see Fact Sheet 10).**

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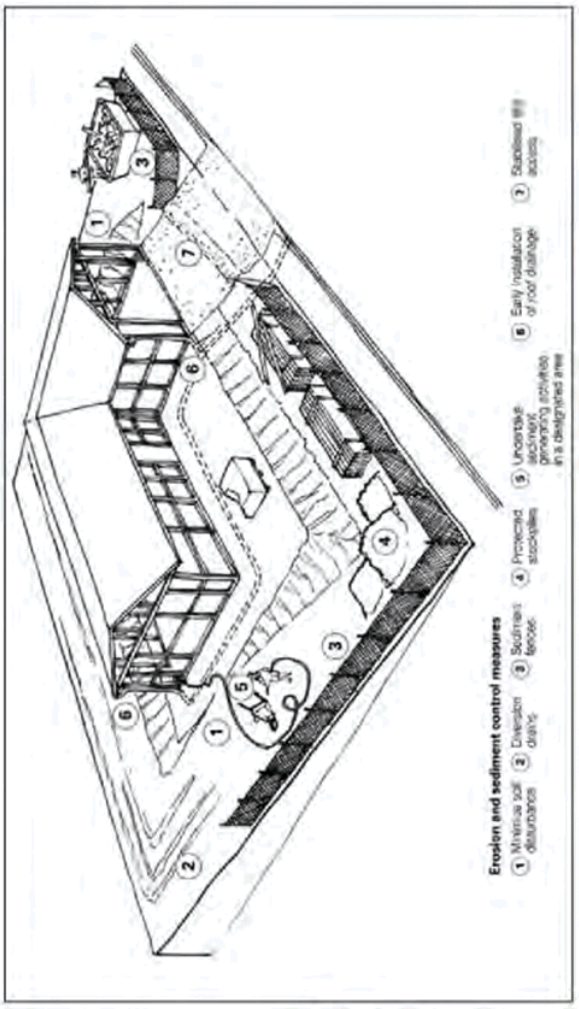

Figure 2A: Appropriate sediment and erosion control measures for single residential building site

List of fact sheets

1. Soil & Water Management on Large Building & Construction Sites
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16. Manage Concrete, Brick & Tile Cutting
17. Sediment Basins
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19. Site Revegetation

Remember:

Everyone working on building and construction sites has a responsibility to prevent pollution. If you do have an accident and pollution occurs you are required by law to notify the site supervisor. If the site supervisor cannot be contacted, workers should immediately notify the local council so they can work with you to minimise any harm to the environment.

Acknowledgement:

Figure 2A was kindly provided by South East Queensland Healthy Waterways Partnership and Brisbane City Council. Text in this brochure has been obtained and modified from the "Do It Right On Site" brochure series, kindly provided by the Southern Sydney Regional Organisation of Councils.

Date of issue: November 2008

Soil & Water Management Plans

What are these?

Soil and water management plans are specific site plans or drawings that detail sediment and erosion control measures on building and construction sites. The Soil and Water Management Plan (SWMP) shows the type, location, design, installation and maintenance schedule for all these measures and should be considered as the blueprint for controlling all anticipated erosion and for preventing sediment from leaving a site.

Subdivisions or activities that create greater than 250 m^2 of ground disturbance typically need to submit a SWMP to council with their building or development proposals prior to any site disturbance. Once approved by council, all building and construction works need to be conducted in accordance with the SWMP.

Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will minimise erosion and control sediment run-off from your site, meet your legal requirements and help protect our waterways.

Fact Sheet 3

WHAT DO I NEED TO DO?

Prepare a SWMP (see Figure 3A):

A SWMP can easily be developed by overlaying information on a copy of the engineering site drawings. The plan must detail the site development and all the systems intended to minimise erosion and trap sediment. On the SWMP show the following:

1) Date and author.
2) North point and scale.
3) Property boundaries.
4) General soil description.
5) Location and amount of ground disturbance.
6) Initial and final contours, location of watercourses, surface drainage and existing stormwater infrastructure.
7) Stormwater discharge point, if proposed.
8) Location of all proposed temporary drainage control measures.
9) Construction details (e.g. building or subdivision layout).
10) Location of vegetation to be retained and removed.
11) Location of stabilised site access.
12) Location of soil, sand or other material stockpiles.
13) Location and details of all proposed erosion control measures.
14) Location and details of all proposed sediment control measures.
15) A statement of who is responsible for establishing and maintaining all erosion and sediment control measures.
16) The installation sequence of the different sediment and erosion controls.
17) The maintenance program of the sediment and erosion controls.
18) The revegetation and rehabilitation program.

Note: Other details may be required depending on the specific requirements of the site, scale of the development and level of ground disturbance. Contact your local council for what information you are required to submit on your SWMP.

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Submit the SWMP to council for approval:

A SWMP may be a requirement of your planning or building permit. Ensure that the council has approved your SWMP; otherwise you may be in breach of your permit.

Implement the SWMP and update as needed:

1) Keep a copy of the council-approved SWMP at the site at all times.
2) Ensure that all on-ground workers understand the SWMP.
3) Implement, update and maintain the control measures shown in the SWMP.

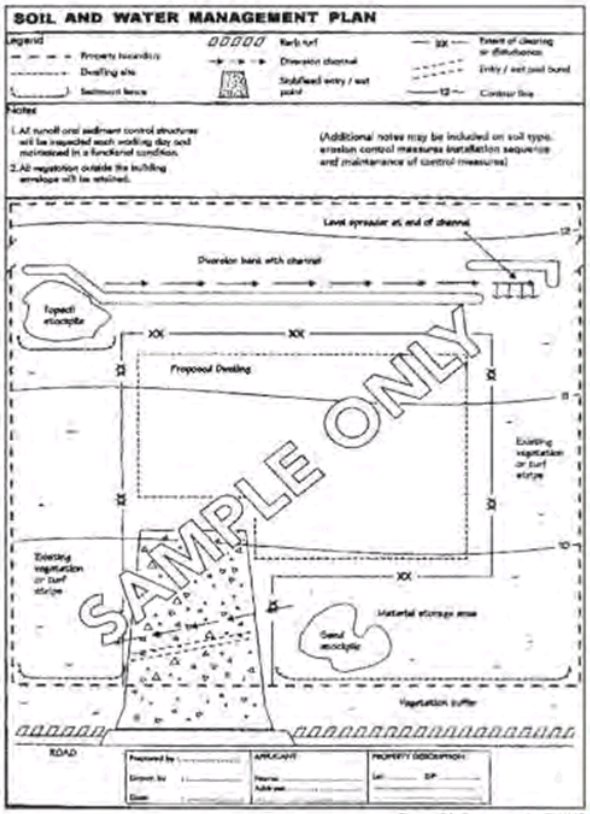

Figure 3A: Example of a SWMP

List of fact sheets

1. Soil & Water Management on Large Building & Construction Sites
2. Soil & Water Management on Standard Building & Construction Sites
3. **Soil & Water Management Plans**
4. Dispersive Soils – High Risk of Tunnel Erosion
5. Minimise Soil Disturbance
6. Preserve Vegetation
7. Divert Up-slope Water
8. Erosion Control Mats & Blankets
9. Protect Service Trenches & Stockpiles
10. Early Roof Drainage Connection
11. Scour Protection – Stormwater Pipe Outfalls & Check Dams
12. Stabilised Site Access
13. Wheel Wash
14. Sediment Fences & Fibre Rolls
15. Protection of Stormwater Pits
16. Manage Concrete, Brick & Tile Cutting
17. Sediment Basins
18. Dust Control
19. Site Revegetation

Remember:

Everyone working on building and construction sites has a responsibility to prevent pollution. If you do have an accident and pollution occurs you are required by law to notify the site supervisor. If the site supervisor cannot be contacted, workers should immediately notify the local council so they can work with you to minimise any harm to the environment.

Acknowledgement:

Figure 3A from Gold Coast City Council "Best Practice Guidelines for the Control of Stormwater Pollution from Building Sites". Text in this brochure has been obtained and modified from the "Do It Right On Site" brochure series, kindly provided by the Southern Sydney Regional Organisation of Councils.

Date of Issue: December 2008

Soil and Water Management Guideline Sheets

Minimise Soil Disturbance

What is it?

Minimise soil disturbance to the greatest extent practicable. Earthworks should be kept to a minimum and should be closely linked with the commencement of building and construction work. To minimise risks, preserve native topsoil and natural vegetation and implement suitable sediment and erosion control measures (see other fact sheets in this series). Areas of soil disturbance on slopes should be roughened and terraced to reduce erosion.

Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will minimise erosion from your site, meet your legal requirements and help protect our waterways.

Fact Sheet 5

WHAT DO I NEED TO DO?

Design considerations:

1) Avoid the need for earthworks by working with the natural contours of the site. Limit building or construction on steep inclines. On slopes choose a subfloor method that will minimise excavation.
2) Limit the area of soil disturbance (the excavation envelope) to the minimum required, i.e. the house only.
3) Identify suitable sediment and erosion control measures for the excavation envelope.
4) Staging works. Consider scheduling earthworks in phases throughout the project to reduce erosion potential and rehabilitate exposed areas quickly to reduce the amount of soil exposed at one time.
5) Retain as much stripped topsoil as possible for reuse during landscaping and site rehabilitation.

Before starting site works:

1) Ensure approval has been granted by council.
2) Identify vegetation, including grass buffers, around the construction site to preserve throughout the development. Mark this as a **No Go Area (see Fact Sheet 6)** on all work plans, including the Soil and Water Management Plan (if required) **(see Fact Sheet 3).**
3) Install sediment and erosion control measures.
4) Ensure the operators of earthmoving equipment are aware of the excavation envelope and where stockpiles will be located.

Once site works have commenced:

1) Ensure vegetation buffers are protected.
2) Carry out staged excavation and stabilisation (if applicable).
3) Maintain sediment and erosion control measures.
4) Stabilise soil stockpiles by placing sediment fences around their lower edges, cover with fabric, plastic or vegetation.
5) Restrict vehicles and equipment to designated areas.

Soil roughening: when using heavy machinery (i.e. non-wheeled vehicles) on exposed slopes.

Don't smoothly grade slopes with compacted soils. This will increase runoff, is hard to revegetate and is highly susceptible to soil erosion.

Don't track heavy machinery across the slope. The track marks will create furrows that water will flow down when it rains.

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Do track machinery (e.g. excavators) up and down the slope to create grooves from the wheels/or tracks that will catch seeds, fertilizer, and rainfall. The grooves will roughen the surface in a way that will slow runoff over the slope ***(see Figure 5A).***

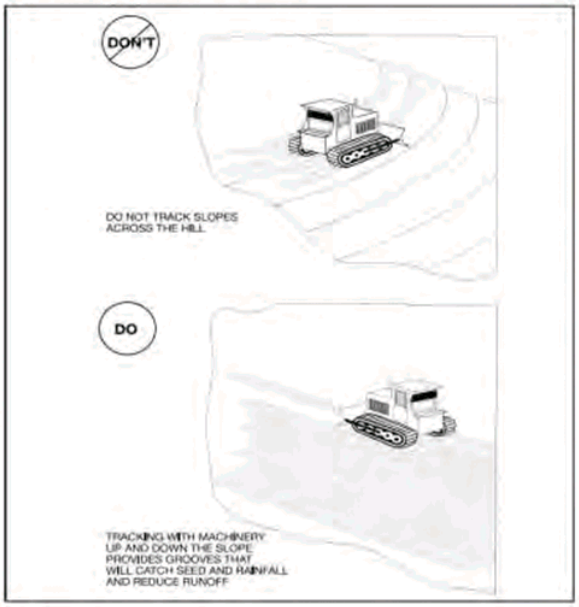

Figure 5A: *Avoid moving tracked vehicles across the slope unless the final pass involves tracking up and down the slope.*

Maintaining control measures:

If topsoil has been removed it will need to be replaced ***(see Figure 5B).***

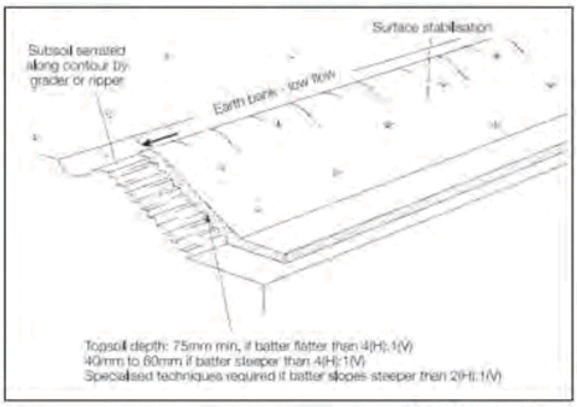

Figure 5B: *Replacing Topsoil*

List of fact sheets

1. Soil & Water Management on Large Building & Construction Sites
2. Soil & Water Management on Standard Building & Construction Sites
3. Soil & Water Management Plans
4. Dispersive Soils – High Risk of Tunnel Erosion
5. **Minimise Soil Disturbance**
6. Preserve Vegetation
7. Divert Up-slope Water
8. Erosion Control Mats & Blankets
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10. Early Roof Drainage Connection
11. Scour Protection – Stormwater Pipe Outfalls & Check Dams
12. Stabilised Site Access
13. Wheel Wash
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Acknowledgement:

Figure 5A after California Regional Water Quality Control Board 1999 *"Erosion & Sediment Control Field Manual"*. Figure 5B from Landcom 2004 *"Soils & Construction Volume I Managing Urban Stormwater (4th edition)"*. Text in this brochure has been obtained and modified from the *"Do It Right On Site"* brochure series, kindly provided by the Southern Sydney Regional Organisation of Councils.

Date of Issue: December 2008

Divert Up-slope Water

What is it?

Design surface drainage up-slope of building and construction sites to divert runoff away from the site. Where practical and particularly where stormwater runoff from more than 0.5 hectares feeds into the work site, divert up-slope water around the disturbed or active work area.

Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will minimise erosion from your site, meet your legal requirements and help protect our waterways.

Fact Sheet 7

WHAT DO I NEED TO DO?

Before starting site works:

Look at the site plans to identify site areas where stormwater can be diverted around the disturbed or active work area. Stormwater can be diverted with the use of small diversion drains. Note that the stormwater must not be diverted onto adjacent properties; instead it must discharge the work site at a legal point of discharge. Diversion drains need to be properly designed to ensure that they can convey water without overflowing or accumulating sediment. Document the diversion drains on your Soil and Water Management Plan (if required) **(see Fact Sheet 3).** Ensure workers on-site are aware of the need to maintain the diversion drains. Do not dig diversion drains on dispersive soils **(see Fact Sheet 4)**, instead build soil berms.

Installing the control measures:

Diversion drains: A diversion drain is a channel constructed on the high side of a site to divert surface runoff from rainwater that would otherwise flow down onto the disturbed or active work area.

1) The channel should be about 150 mm deep with a curved shape.
2) Place the excavated soil from the channel on the down-slope side to increase the diversion drain's capacity.

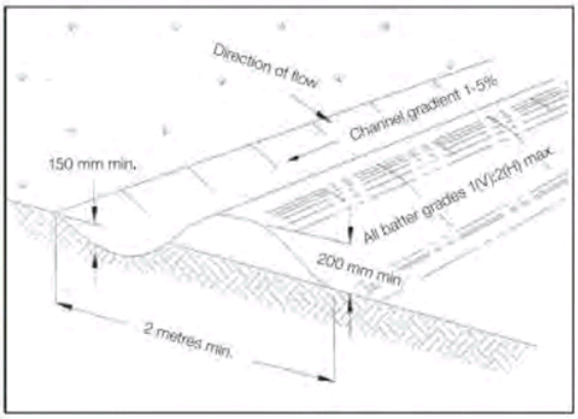

Figure 7A: Example of a diversion drain

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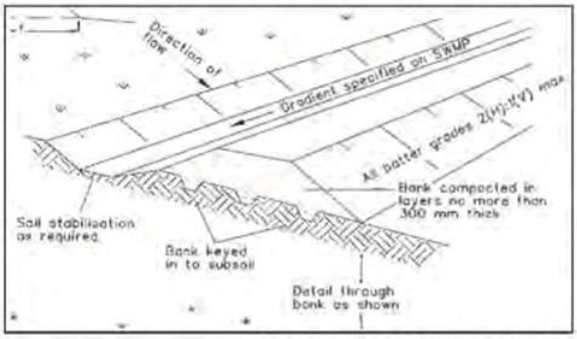

Figure 7B: Example of a diversion drain for high flow

3) The diversion drain should divert flows to a stable drainage line to ensure that the channel does not itself cause erosion where it discharges.
4) The diversion drain should be kept clean and free of plantings and mulch as this will lead to the deposition of sediment that obstructs water flow and causes water to breach the channel and create unwanted erosion.

Level spreader: Level spreaders are generally used at the outlet of diversion channels. A level spreader is a wide, level overflow sill built across a slope. It allows even spread of water flow so velocities are reduced and soil erosion is avoided. This should only be constructed to release water to areas where the:

1) Water flow will not become concentrated.
2) Soil is stabilised and the site is not within the path of construction activities.
3) Ground remains well-vegetated.
4) Discharged water flow will be slow moving.

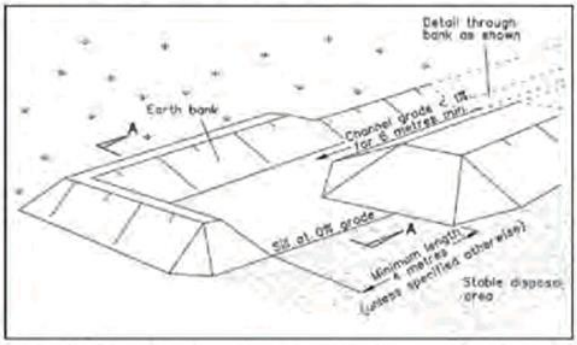

Figure 7C: Example of a level spreader used to release minor concentrated flows as sheet flow

In some cases such as on steep slopes or where there are high flow velocities, a grass or geotextile fabric lined channel may be required to return the diverted flow to the stormwater system or a stable drainage line.

Maintaining the control measures:

Check diversion drains, level spreaders and discharge areas for signs of erosion.

List of fact sheets

1. Soil & Water Management on Large Building & Construction Sites
2. Soil & Water Management on Standard Building & Construction Sites
3. Soil & Water Management Plans
4. Dispersive Soils – High Risk of Tunnel Erosion
5. Minimise Soil Disturbance
6. Preserve Vegetation
7. **Divert Up-slope Water**
8. Erosion Control Mats & Blankets
9. Protect Service Trenches & Stockpiles
10. Early Roof Drainage Connection
11. Scour Protection – Stormwater Pipe Outfalls & Check Dams
12. Stabilised Site Access
13. Wheel Wash
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17. Sediment Basins
18. Dust Control
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Acknowledgement:

Text in this brochure has been obtained and modified from the "*Do It Right On Site*" brochure series, kindly provided by the Southern Sydney Regional Organisation of Councils. Figures 7A, 7B & 7C from Landcom 2004 '*Soils & Construction Volume1 Managing Urban Stormwater (4th edition)*'.

Date of Issue: December 2008

Erosion Control Mats & Blankets

What are these?

Erosion mats and blankets are used as a soil cover and a protective barrier for vegetation establishment. They are applied on soils with a high erosion risk, on steep sites or for site rehabilitation. When applied correctly, they are one of the most effective and practical means of controlling runoff and erosion on disturbed land prior to vegetation establishment.

Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will minimise erosion from your site, meet your legal requirements and help protect our waterways.

Fact Sheet 8

WHAT DO I NEED TO DO?

Before starting site works:

Identify where erosion is likely to occur i.e. areas of bare soil, especially on slopes steeper than 3:1 or when there is a delay in building and construction work or site rehabilitation. Select erosion control mats or erosion control blankets.

Erosion control mats: are heavier, synthetic and non-degradable, they are designed to add stability to soils and are often filled with topsoil and vegetated when installed. Erosion control mats are suitable on slopes and in channel-lining applications.

Erosion control blankets: are light-weight and open-weave made from mulch, straw and wood fibre and held together by natural or synthetic netting. They are used for establishing and reinforcing vegetation. Their application depends on the blanket materials. Synthetic netting and wood fibre is stronger and can be used on steeper slopes compared to jute and straw blankets, which rapidly degrade and are more suitable for flatter areas. Check with suppliers of erosion control blankets about the applications of their different products.

Erosion control blankets can be used in conjunction with soil seeding, preventing the seed washing away and erosion of the prepared seedbed. Once established, the vegetation provides permanent erosion control.

Document erosion control mats and blankets on your Soil and Water Management Plan (if required) **(see Fact Sheet 3).**

Installing the control measures:

Erosion control mats should be installed immediately on exposed soils, while erosion control blankets should be fitted on newly seeded or landscaped areas. **See Figures 8A and 8B** for their installation guidelines.

Maintaining the control measures:

Close inspection after rainfall events and major runoff occurrences is essential. Check for damage due to water running under the mat or blanket or if it has been displaced by wind. Restabilise with anchor pins or wooden spikes. If significant erosion has occurred repair the fabric. Grading and reseeding may also be necessary. Continue inspections until vegetation is firmly established.

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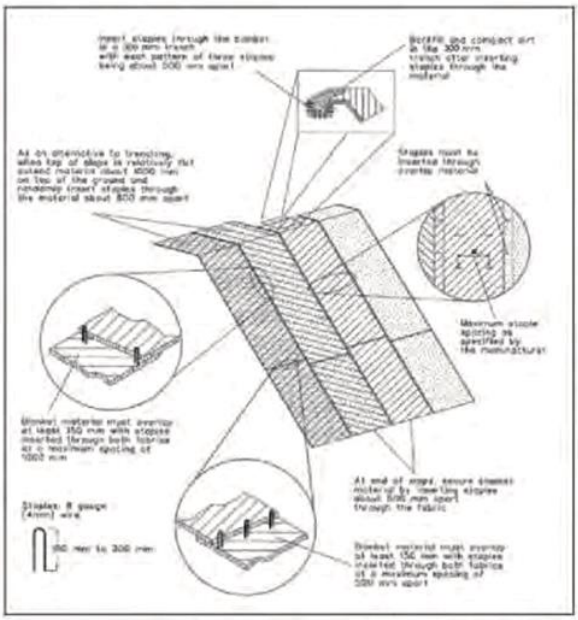

Figure 8A: Installation of an erosion control blanket on a hillside.

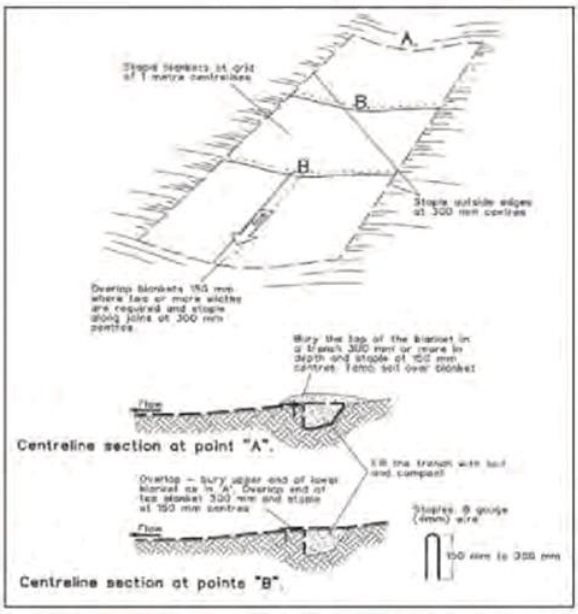

Figure 8B: Erosion control mat used to line a channel.

List of fact sheets

1. Soil & Water Management on Large Building & Construction Sites
2. Soil & Water Management on Standard Building & Construction Sites
3. Soil & Water Management Plans
4. Dispersive Soils – High Risk of Tunnel Erosion
5. Minimise Soil Disturbance
6. Preserve Vegetation
7. Divert Up-slope Water
8. **Erosion Control Mats & Blankets**
9. Protect Service Trenches & Stockpiles
10. Early Roof Drainage Connection
11. Scour Protection – Stormwater Pipe Outfalls & Check Dams
12. Stabilised Site Access
13. Wheel Wash
14. Sediment Fences & Fibre Rolls
15. Protection of Stormwater Pits
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Acknowledgement:

Figures 8A & 8B from Landcom 2004 *"Soils & Construction Volume I Managing Urban Stormwater (4th edition)"*

Date of Issue: December 2008

Protect Service Trenches & Stockpiles

What is it?

When excavated, service trenches can concentrate runoff and cause rapid soil erosion. This fact sheet discusses methods to install service trenches in a manner that does not cause soil erosion.

Temporary stockpiles are at risk of being washed or blown away. This fact sheet discusses proper on-site storage of materials such as sand, gravel, topsoil, mulch and woodchips.

Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will minimise erosion from your site, meet your legal requirements and help protect our waterways.

Fact Sheet 9

WHAT DO I NEED TO DO?

Before starting site works:

Service trenches: if your site has fine soil, protection measures may be needed. Decide where the service trenches will need to go and document them on your Soil and Water Management Plan (if required) **(see Fact Sheet 3)**. Ideally they should be away from areas where water flow is likely to concentrate. Where possible coordinate the various service connections so a single trench can be used and quickly backfilled. Also try scheduling the work when rainfall is low. Be aware if you have dispersive soil **(see Fact Sheet 4)**.

Stockpiles: avoid stockpile loss and stormwater pollution by limiting the amount of material on-site and remove all materials when work is complete.

Identify a protected storage area for building material stockpiles away from on-site drainage or stormwater flow paths. Place control measures such as diversion drains up-slope or sediment fences down-slope. Cover the stockpiles with fabric, plastic or a temporary grass cover. Drivers delivering stockpile material should always use the protected storage area as the drop-off. Document your storage area on the Soil and Water Management Plan (if required) **(see Fact Sheet 3)** and ensure staff are aware of its importance.

Note: Don't stockpile sediment or building materials (sand, gravel, mulch) on roadways or within drainage areas.

Installing the control measures:

Service trenches:

1) Remove and store vegetated topsoil so it can be replaced after works to provide immediate erosion protection.
2) Place the soil on the uphill side of trenches to divert water flow away from the trench line. Temporary bunds can be used.
3) The trench should be open for the shortest time practicable and avoid opening them when the risk of rainfall is high.
4) Once completed, backfill trench with subsoil and compact.
5) Replace top soil, level and top up to account for soil settling.
6) If trenches are on steep slopes, install earthbanks along the backfill surface at 6 metre intervals to divert flows and prevent erosion.
7) Excess soil should be used or disposed of in such a way that it does not create a wind or water erosion hazard.

Stockpiles:

1) Locate stockpiles at least 5 metres from stormwater flow paths, roads and hazard areas.
2) Place on gently sloping ground (not level areas which tend to be overland low paths) as a low, flat, elongated mound.

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3) Stockpiles should preferably be less than 1.5 metres high.
4) Construct an earth bank on the up-slope side to divert runoff around the stockpile and install a sediment fence 1–2 metres down-slope of the stockpile. The height of the sediment fence should be equal to the stockpile height and the length equal to the stockpile length at the base.
5) Stockpiled materials should be covered during windy conditions, rain or unattended periods. Topsoil stockpiles left for extended periods should be revegetated.

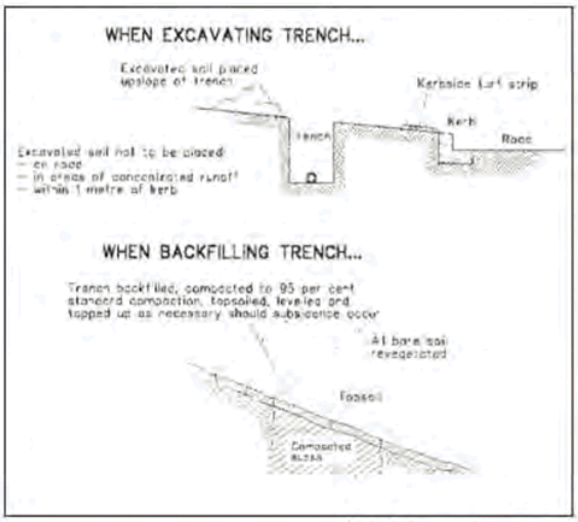

Figure 9A: Example of a service trench

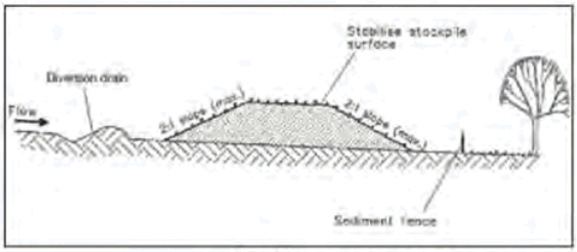

Figure 9B: Keep building materials in protected stockpiles

Maintaining the control measures:

Service trenches: if they fill with water, pump water evenly over a stabilised vegetated area that will filter out the suspended clays. If this is not possible, add a small amount of gypsum to the water and allow the suspended clays to settle before pumping the water out.

Stockpiles: should be covered and checked regularly. Sediment and erosion controls (diversion drains and sediment fences) associated with stockpiles also need to be monitored and maintained.

List of fact sheets

1. Soil & Water Management on Large Building & Construction Sites
2. Soil & Water Management on Standard Building & Construction Sites
3. Soil & Water Management Plans
4. Dispersive Soils – High Risk of Tunnel Erosion
5. Minimise Soil Disturbance
6. Preserve Vegetation
7. Divert Up-slope Water
8. Erosion Control Mats & Blankets
9. **Protect Service Trenches & Stockpiles**
10. Early Roof Drainage Connection
11. Scour Protection – Stormwater Pipe Outfalls & Check Dams
12. Stabilised Site Access
13. Wheel Wash
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Acknowledgement:

Text in this brochure has been obtained and modified from the *"Do It Right On Site"* brochure series, kindly provided by the Southern Sydney Regional Organisation of Councils. Figure 9A from the NSW Department of Housing as in Hobart Regional Councils *Guidelines for Soil & Water Management 1999*. Figure 9B from Landcom 2004 *"Soils & Construction Volume I Managing Urban Stormwater (4th edition)"*.

Date of Issue: December 2008

Scour Protection – Stormwater Pipe Outfalls & Check Dams

What is this?

At stormwater pipe outfalls or along open drainage channels use rocks, vegetation, or other materials to break up concentrated flows, reduce the velocity of flows to non-erosive rates and to stabilise the outflow point.

Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will minimise erosion from your site, meet your legal requirements and help protect our waterways.

Fact Sheet 11

WHAT DO I NEED TO DO?

Before starting site works:

Stormwater pipe outfalls: should be located in areas where there is a low potential for soil erosion (e.g. areas of naturally occurring rock). If this is not possible, create a hard rock scour protector **(see Figure 11A).** If the pipe is highly visible (e.g. along a creek-side walking trail), natural rock and vegetation placement can conceal the outfall. If the outfall becomes council infrastructure, appropriate design approvals are required.

Check dams: are semi-pervious (typically loose rock) dam constructions that are placed in a series along open drainage channels to detain and reduce the velocity of stormwater runoff. They are particularly useful on gently sloping channels up to 10% (10.1) grade, but only effective for draining small areas of land (less than 4 hectares). If high flows are anticipated it may be necessary to line the entire base of the drainage channel with rocks.

Check dams can be temporarily used until a drainage channel has become revegetated. Alternatively, check dams can be a permanent feature if water detention is required. However, the drainage channel must still be able to effectively convey water.

Don't place check dams in channels that are already grass-lined, unless erosion is expected.

Don't construct check dams using sediment fences or straw bales.

Installing the control measures:

Stormwater pipe outfalls:

1) Fill material needs to be compacted to the density of the surrounding undisturbed material.
2) Place geotextile fabric over fill material.
3) Ensure that the rock work used for scour protection conforms to the required limits for water flow energy dissipation. (Ensure that the underlying geotextile does not sustain serious damage during the rock work phase.)
4) Repair any damage to geotextile areas with patches of geotextile (ensuring a 300 mm overlap with surrounding intact fabric).

Note: If low water flow has been determined for the stormwater pipe outfall, leave gaps in the rock work and plant into cuts in the geotextile.

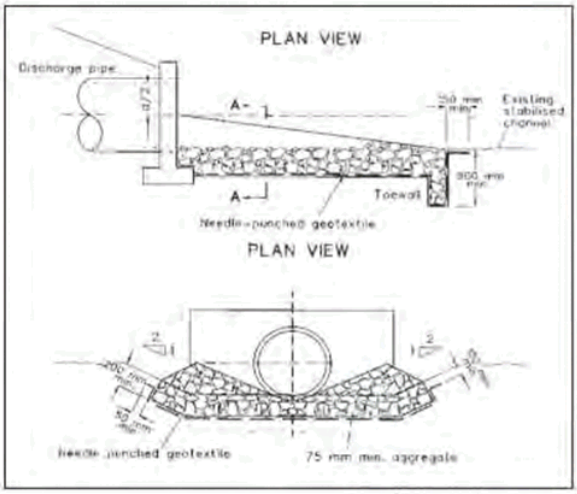

Figure 11A: Hard lock scour protector

Check dams: these are appropriate for small channels with low flows that are susceptible to erosion (for larger channels or higher flows, specialist design may be required). A number of check dams will probably need to be built.

1) Excavate a shallow (200 mm) trench perpendicular to the drainage channel.
2) Construct the dam from aggregate (washed sand/gravel), placed in sandbags (for easy deconstruction). Place bags within the trench and build up the dam wall.
3) Ensure that the height of the dam spillway is less than 1 metre above the base of the drainage channel.
4) Ensure the dam height and spillway height does not dramatically impede water conveyance.
5) Space individual check dams so the toe of the upstream dam is level with the spillway of the next downstream dam. Otherwise extend downstream toe to provide erosion protection.
6) Check dams require regular maintenance as accumulated sediment needs to be removed, to prevent it becoming resuspended during subsequent storms.

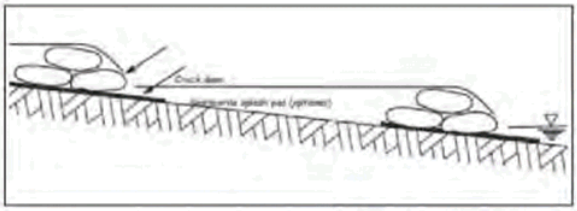

Figure 11B: Example of a check dam

List of fact sheets

1. Soil & Water Management on Large Building & Construction Sites
2. Soil & Water Management on Standard Building & Construction Sites
3. Soil & Water Management Plans
4. Dispersive Soils – High Risk of Tunnel Erosion
5. Minimise Soil Disturbance
6. Preserve Vegetation
7. Divert Up-slope Water
8. Erosion Control Mats & Blankets
9. Protect Service Trenches & Stockpiles
10. Early Roof Drainage Connection
11. **Scour Protection – Stormwater Pipe Outfalls & Check Dams**
12. Stabilised Site Access
13. Wheel Wash
14. Sediment Fences & Fibre Rolls
15. Protection of Stormwater Pits
16. Manage Concrete, Brick & Tile Cutting
17. Sediment Basins
18. Dust Control
19. Site Revegetation

Remember:

Everyone working on building and construction sites has a responsibility to prevent pollution. If you do have an accident and pollution occurs you are required by law to notify the site supervisor. If the site supervisor cannot be contacted, workers should immediately notify the local council so they can work with you to minimise any harm to the environment.

Acknowledgement:

Figure 11A from Landcom 2004 *"Soils and Construction Volume 1 Managing Urban Stormwater (4th edition)"*. Figure 11B from South East Queensland Healthy Waterways partnership 2006 *"Best Practice Guidelines for the Control of Stormwater Pollution from Building Sites."* Text in this brochure has been obtained and modified from the *"Do It Right On Site"* brochure series, kindly provided by the Southern Sydney Regional Organisation of Councils.

Date of issue: December 2009

Stabilised Site Access

What is it?

A stabilised site access is a single entry/exit point for building and construction sites that is designed to reduce the tracking of sediment off-site. It provides a clean, dry surface for vehicles to enter and unload during all weather conditions without destroying vegetation or carrying large amounts of sediment onto paved road surfaces.

Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will control sediment run-off from your site, meet your legal requirements and help protect our waterways.

Fact Sheet 12

WHAT DO I NEED TO DO?

Before starting site works:

Identify the best location to place the stabilised site access – ideally it should be in an elevated position with little or no water flowing to it from up-slope and away from any down-slope stormwater pits. All deliveries should be able to be made through this point. Document it on your Soil and Water Management Plan (if required) **(see Fact Sheet 3)** and ensure on-site staff are aware of its importance.

Installing the control measures:

The recommended construction method for the stabilised site access is laying down 200 mm of aggregate or recycled concrete greater than 40 mm in size (crushed sandstone is not suitable). Where the site access slopes toward the road, a diversion hump should be installed across the stabilised area to direct stormwater runoff to the side where it can be filtered by a sediment fence. If the construction process enables it, a permanent driveway can be laid and used as the access point.

Stabilised site access:

1) Strip at least 150 mm of topsoil, level area and stockpile in the space available.
2) Compact infill.
3) Cover the area with geotextile.
4) Construct a 200 mm thick pad over geotextile using aggregate at least 40 mm in size, ideally from kerb to building.
5) Construct a trafficable diversion hump immediately within the boundary to divert water to a sediment fence or other sediment control measure.

Note: On larger sites cattle grids or shaker grids can also be installed at the access point. These allow the wheels to turn a couple of times and shake off excess sediment. If sediment is still being tracked off-site then a wheel wash should be installed **(see Fact Sheet 13)**.

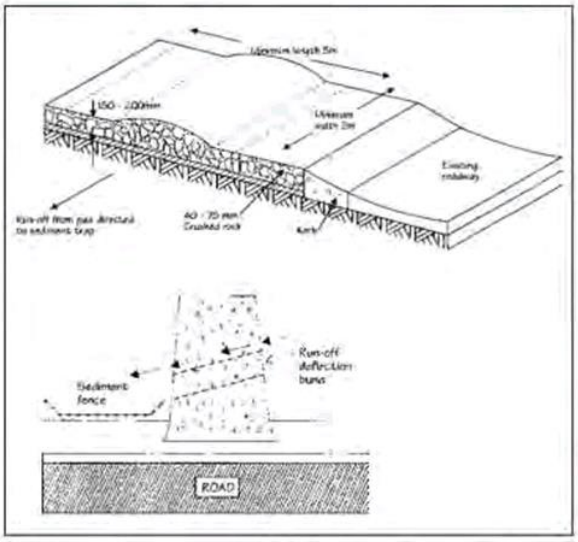

Figure I 2A: Stabilised site access for building sites only

Maintaining the control measures:

As vehicles use the stabilised site access they will slowly compact the gravel or rock. When it becomes too compacted the voids between the rock and gravel disappear and the stabilised site access will no longer trap mud and dirt.

Monitor the surface of the stabilised site access and ensure that it drains to the sediment fence or other sediment control measures. Add new gravel or rock as needed. Roads should be inspected for any sediment that has escaped the site at the end of each day and swept up if necessary. This should also be done whenever rain looks likely.

List of fact sheets

1. Soil & Water Management on Large Building & Construction Sites
2. Soil & Water Management on Standard Building & Construction Sites
3. Soil & Water Management Plans
4. Dispersive Soils – High Risk of Tunnel Erosion
5. Minimise Soil Disturbance
6. Preserve Vegetation
7. Divert Up-slope Water
8. Erosion Control Mats & Blankets
9. Protect Service Trenches & Stockpiles
10. Early Roof Drainage Connection
11. Scour Protection – Stormwater Pipe Outfalls & Check Dams
12. **Stabilised Site Access**
13. Wheel Wash
14. Sediment Fences & Fibre Rolls
15. Protection of Stormwater Pits
16. Manage Concrete, Brick & Tile Cutting
17. Sediment Basins
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Acknowledgement:

Figure I2A and text in this brochure has been obtained and modified from the "Do It Right On Site" brochure series, kindly provided by the Southern Sydney Regional Organisation of Councils.

Date of Issue: December 2008

Wheel Wash

What is it?

A wheel wash reduces the amount of sediment transported onto paved roads by vehicles.

They should be installed on larger building and construction sites or when the stabilised site access is not preventing sediment from being tracked off the site.

Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will control sediment run-off from your site, meet your legal requirements and help protect our waterways.

Fact Sheet 13

WHAT DO I NEED TO DO?

Installing the control measures:

1) Identify the best location to place the wheel wash. It should be incorporated with the stabilised site access **(see Fact Sheet 12).**
2) Construct a pad by evenly spreading a 200 mm layer of coarse aggregate or recycled concrete greater than 40 mm in size (crushed sandstone is not suitable) at a minimum depth of 300 mm.
3) Install a wash rack that is suitable for the anticipated traffic and weight loads.
4) The water used to wash the wheels of the vehicles shall not be discharged into stormwater system at any time. Provide a drainage channel that will convey the runoff from the wash area to a suitable on-site sediment control measure i.e. sediment basin **(see Fact Sheet 17)**, sediment settling tank, or a flat vegetated area.
5) Ensure that the drainage channel used to transport the sediment to the sediment control measure is of adequate size and proper gradient to carry the wash runoff.
6) Make sure that the sediment control measure is also of adequate size.
7) Use hoses with automatic shutoff nozzles to prevent hoses from being left on.
8) Require all employees, subcontractors and others that leave the site with mud or dirt caked tyres and undercarriages to use the wash facilities.
9) If weeds and plant disease are an issue for your site refer to *"Tasmanian Washdown Guidelines for Weed and Disease Control 2004"* from the Tasmanian Department of Primary Industries and Water, Forestry Tasmania and the Agricultural Contractors Association of Tasmania.

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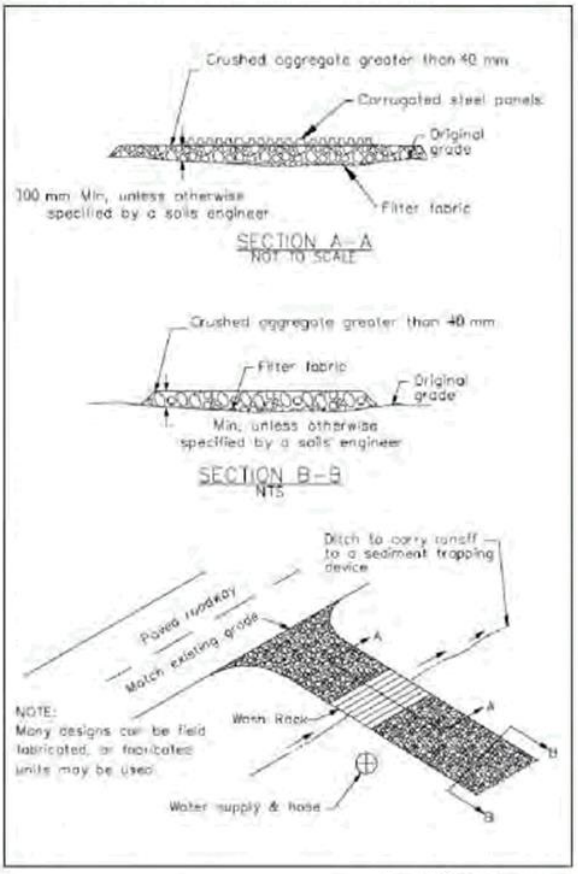

Figure 13A: Wheel wash design

Maintaining the control measures:

The wheel wash should be inspected weekly and after a major rainfall event. Remove accumulated sediment from the wash rack to maintain system performance. This sediment should be collected and may need to be disposed to landfill.

List of fact sheets

1. Soil & Water Management on Large Building & Construction Sites
2. Soil & Water Management on Standard Building & Construction Sites
3. Soil & Water Management Plans
4. Dispersive Soils – High Risk of Tunnel Erosion
5. Minimise Soil Disturbance
6. Preserve Vegetation
7. Divert Up-slope Water
8. Erosion Control Mats & Blankets
9. Protect Service Trenches & Stockpiles
10. Early Roof Drainage Connection
11. Scour Protection – Stormwater Pipe Outfalls & Check Dams
12. Stabilised Site Access
13. **Wheel Wash**
14. Sediment Fences & Fibre Rolls
15. Protection of Stormwater Pits
16. Manage Concrete, Brick & Tile Cutting
17. Sediment Basins
18. Dust Control
19. Site Revegetation

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Acknowledgement:

Figure 13A after California Stormwater Quality Association 2003 *'California Stormwater BMP Handbook Construction'*

Date of issue: December 2008

Sediment Fences & Fibre Rolls

What are these?

Sediment fences and fibre rolls are sediment control measures installed across slopes or along the parameter of building and construction sites. Fibre rolls are a range of organic products (coconut fibre, straw, flax) that are rolled into large diameter logs. Sediment fences are vertical barriers made from woven geotextile that are held in place by star pickets and a backfilled trench.

Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will control sediment run-off from your site, meet your legal requirements and help protect our waterways.

Fact Sheet 14

WHAT DO I NEED TO DO?

Fibre Rolls: are log-like products commonly consisting of biodegradable fibres. They vary from biodegradable rolled coir (coconut fibre) and hessian socks filled with straw or mulch, to non-biodegradable geotextile tubes filled with mulch or straw. Biodegradable fibre rolls can be left permanently onsite to assist stabilisation and will support vegetative growth if left in place.

Sediment fences: are a commonly used sediment control measure constructed from heavy-duty geotextile. Although a sediment fence looks like shade cloth it is very different (shade cloth is not appropriate because it cannot slow water flow enough to adequately pond water up-slope of the fence and allow sediment to settle under gravity).

Before starting site works:

Identify drainage flow pathways that will intercept runoff from the site. Decide whether to use fibre rolls or sediment fences. Use fibre rolls at the base of an embankment, on slopes that are exposed, or on vegetated slopes where vegetation is failing to control erosion. Sediment fences should be used on small drainage areas and placed down-slope of potential areas of erosion. Document these measures on your Soil and Water Management Plan (if required) **(see Fact Sheet 3).**

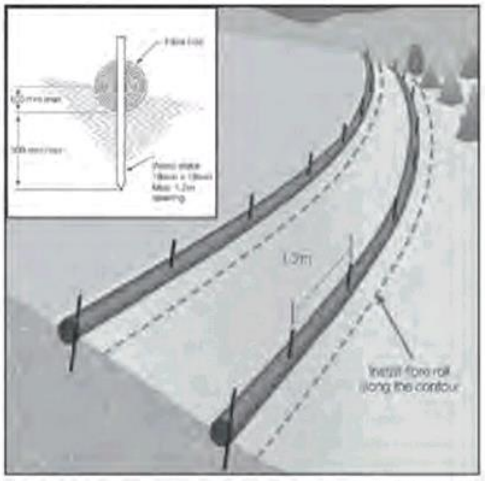


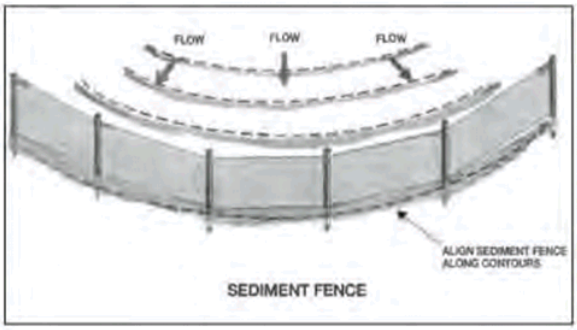
Figure 14A: Installation of fibre rolls

Installing the control measures:

Sediment control measures need to be in place prior to the start of site works. They can be altered after ground disturbance activities and if the site's drainage patterns change.

Installing fibre rolls:

1) Find a suitable installation site (if on a slope, place parallel to contours).
2) Remove large rocks and debris, and prepare a shallow concave trench (50–100 mm deep) to inset the fibre roll. (**Note**: Place excavated material on the upside of the fibre roll to prevent undercutting.)
3) Place the fibre roll in a shallow trench and stake through the fibre roll every 30 cm.
4) Place further stakes on both sides of the fibre roll to within 2 m from the end of the roll.



SEDIMENT FENCE

Installing sediment fences:

1) Survey and mark out location of sediment fence, ensure it is parallel to the contours of the site.
2) Dig a 150 mm trench immediately above the proposed fence line.
3) Place the bottom of the fabric to the base of the trench and run fabric up the down-slope side of the trench.
4) Backfill the trench and compact to secure anchorage of the fabric.
5) Drive 1.5 m star pickets into ground, 2 m apart to support the sediment fence fabric. Tension and fasten fabric to pickets using UV stabilised zip ties or wire ties.
6) Join sections of fabric at a support post with a 2 m overlap.
7) Angle the ends of the sediment fence upslope to reduce scouring.

Don't place sediment fences across creeks or major drainage lines.

Maintaining the control measures:

Fibre rolls and sediment fences should be checked regularly, especially after every rain event and cleaned or repaired. For sediment fences check that all the pickets and the bottom of the fence are secure and that there are no tears in the fabric.

List of fact sheets

1. Soil & Water Management on Large Building & Construction Sites
2. Soil & Water Management on Standard Building & Construction Sites
3. Soil & Water Management Plans
4. Dispersive Soils – High Risk of Tunnel Erosion
5. Minimise Soil Disturbance
6. Preserve Vegetation
7. Divert Up-slope Water
8. Erosion Control Mats & Blankets
9. Protect Service Trenches & Stockpiles
10. Early Roof Drainage Connection
11. Scour Protection – Stormwater Pipe Outfalls & Check Dams
12. Stabilised Site Access
13. Wheel Wash
14. **Sediment Fences & Fibre Rolls**
15. Protection of Stormwater Pits
16. Manage Concrete, Brick & Tile Cutting
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18. Dust Control
19. Site Revegetation

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Acknowledgement:

Figures 14A and 14B after California Regional Water Quality Control Board 1999 *"Erosion & Sediment Control Field Manual"*.

Date of Issue: December 2018

Protection of Stormwater Pits

What is it?

Protect the stormwater system from blocking with sediment and building materials by placing control measures around or inside any stormwater pits on and below the site. Stormwater pit protection is an important last resort sediment control measure that should be used in conjunction with other on-site practices..

Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will control sediment run-off from your site, meet your legal requirements and help protect our waterways.

Fact Sheet 15

WHAT DO I NEED TO DO?

Before starting site works:

Identify any stormwater pits and drains on and below the site. Plan the layout of the work site so that any wash-down areas and tile or brick cutting areas are not near them. Clearly mark all the stormwater pits and drains on the site plan and choose appropriate methods that will protect them. Install these sediment control measures before site work commences. Document them on your Soil and Water Management Plan (if required) **(see Fact Sheet 3)** and ensure staff are aware of its importance.

Note: the placement of sediment control measures on road reserves (i.e. off the work site) will normally require approval from the owner of the road, i.e. council or the Department of Infrastructure, Energy and Resources (DIER).

Installing the control measures:

There are a range of sediment control measures to protect stormwater pits including, sediment fence traps, filter socks and stormwater pit traps. Those that collect sediment above the stormwater pit are easier to clean but have low storage capacity compared to controls that are installed inside the stormwater pits. Place cones around controls in the gutters or on roads to prevent vehicles damaging them.

Sediment fence trap: these are sediment fences staked around the stormwater pit to trap sediment. Fabric must be partially buried so that water and sediment does not just flow underneath. The more space between the fence and the pit, the more chance of sediment settling and the greater the capacity of the trap **(see Figure 15A).**

Filter socks: are woven tubes filled with compost or bioremediation media that separate sediment, hydrocarbons, nutrients and heavy metals from site runoff. Filter socks are more effective than sandbags or geotextile sausages filled with gravel. Filter socks are able to treat runoff at higher flow rates with significantly less ponding.

Filter socks can be installed in the kerb and gutter below the work site, while longer socks can be used as a barrier around the stormwater pit **(see Figure 15B).**

Stormwater pit traps: are baskets, trays, bags or screens placed just below the entrance of the stormwater pit. They prevent sediment from entering the stormwater system. Fine mesh or fabric filters should be used to capture sediment **(see Figure 15C).**

Maintaining the control measures:

All sediment control measures should be inspected, especially after rainfall events and cleaned regularly to maintain effectiveness and prevent bypass. The built up material can be re-stockpiled and used on-site (if it is not contaminated), or otherwise disposed to landfill.

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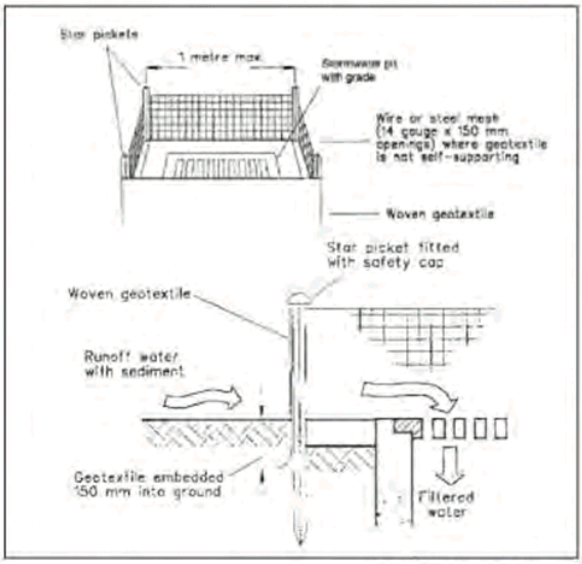

Figure 15A: A sediment fence trap

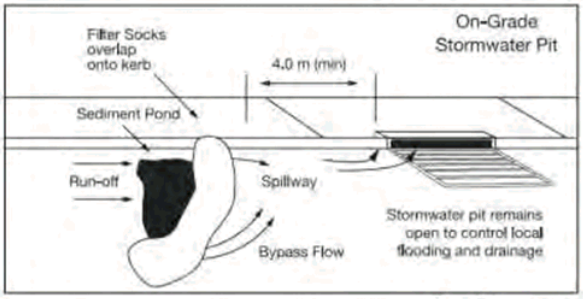

Figure 15B: A filter sock

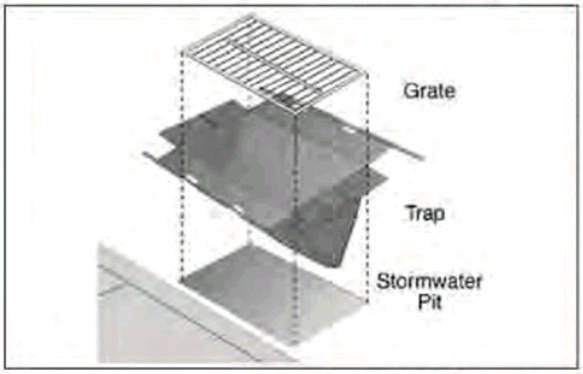

Figure 15C: Stormwater pit trap

List of fact sheets

1. Soil & Water Management on Large Building & Construction Sites
2. Soil & Water Management on Standard Building & Construction Sites
3. Soil & Water Management Plans
4. Dispersive Soils – High Risk of Tunnel Erosion
5. Minimise Soil Disturbance
6. Preserve Vegetation
7. Divert Up-slope Water
8. Erosion Control Mats & Blankets
9. Protect Service Trenches & Stockpiles
10. Early Roof Drainage Connection
11. Scour Protection – Stormwater Pipe Outfalls & Check Dams
12. Stabilised Site Access
13. Wheel Wash
14. Sediment Fences & Fibre Rolls
15. **Protection of Stormwater Pits**
16. Manage Concrete, Brick & Tile Cutting
17. Sediment Basins
18. Dust Control
19. Site Revegetation

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Acknowledgement:

Figure 15A from Landcom 2004 "*Soils & Construction Volume I Managing Urban Stormwater (4th edition)*". Figure 15B after South East Queensland Healthy Waterways Partnership 2006 "*Best Practice Guidelines for the Control of Stormwater Pollution from Building Sites*". Figure 15C after California Regional Water Quality Board 1999 "*Erosion & Sediment Control Field Manual*". Text in this brochure has been obtained and modified from the "*Do It Right On Site*" brochure series, kindly provided by the Southern Sydney Regional Organisation of Councils.

Date of Issue: December 2008

Protected Concrete, Brick & Tile Cutting

What is this?

Concreting, bricklaying, brick and tile cutting must be conducted in such a way that ensures no waste products enter the stormwater system. If washed into the stormwater system, brick and tile cutting, concrete and mortar slumes will harden and block stormwater pipes and potentially cause flooding. Cement also raises the pH of waterways making it alkaline which is deadly to aquatic animals.

Why is it important?

Sediment generated from building and construction activities can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will control sediment run-off from your site, meet your legal requirements and help protect our waterways.

Fact Sheet 16

WHAT DO I NEED TO DO?

Before starting site works:

Find a location on the site away from stormwater pits and drains to undertake these activities, including mixing cement and mortar. This area should be large enough to contain all excess water, residues and waste.

Designate where associated building materials should be stockpiled, as this typically determines where this activity will occur. If the nature of the job requires cutting in a location close to stormwater pits or drains such as cutting a footpath then controls need to be put in place to ensure that no material enters the stormwater system. Identify site requirements and list them on the Soil and Water Management Plan (if required) **(see Fact Sheet 3)** before starting site works.

Installing the control measures:

The designated brick or tile cutting area should have a diversion channel up-slope and sediment collection devices such as a sediment fence below it. If cutting in an area near a stormwater pit, use temporary collection devices such as filter socks, bunding or skirts suitably installed to direct the slurry onto a land area where it can soak into the earth. If this is not possible and the slurry is likely to flow to the stormwater system, filtering will be required. There are filtration systems available that work in the brick cutting machine with built in slurry containment systems, while for the kerb and gutter there are filter socks and for stormwater pits insert traps can be used **(see Fact Sheet 15)**. The filtered water must not be cloudy when discharged to the stormwater system. Install a series of filtration systems for best results.

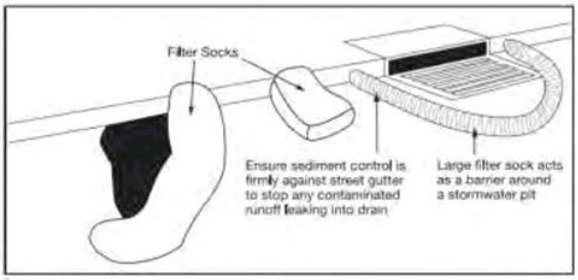

Figure 16A: Installing a series of filtration systems

When equipment is washed down, use a designated wash-down area on-site e.g. wheel wash **(see Fact Sheet 13)**. Waste concrete slurry can be safely disposed of by tipping small amounts into plastic or geotextile-lined ditches **(see Figure 16C)**. This will enable the water to evaporate or soak in to the earth and the solids can then be disposed to landfill or reused as clean fill in construction or as road base.

Maintaining the control measures:

All sediment control measures will require regular cleaning to maintain effectiveness and over time may need to be replaced. Remove the built up sediment and check for holes, other breaks, clogging and blockages in the control measures.

Shovel or vacuum concrete, brick or tile cutting slurry to an area well away from the stormwater system. **Do not** hose down. If there is no designated disposal area, place slurry into a 40 gallon drum that is half full of water. Solid materials will settle to the bottom of the drum for later disposal and the water can be reused when concreting.

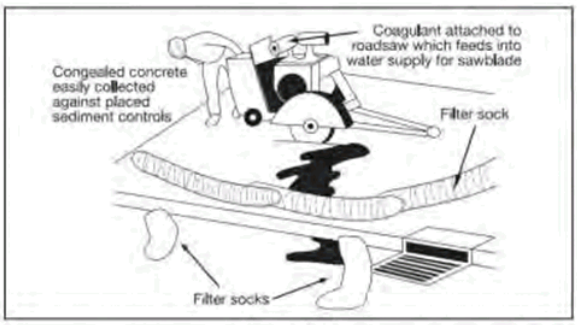

Figure 16B: Aerosolair concrete slurry disposal method

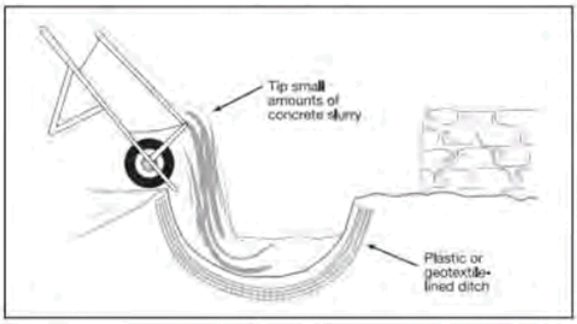

Figure 16C: Dumping concrete slurry into a lined ditch

List of fact sheets

1. Soil & Water Management on Large Building & Construction Sites
2. Soil & Water Management on Standard Building & Construction Sites
3. Soil & Water Management Plans
4. Dispersive Soils – High Risk of Tunnel Erosion
5. Minimise Soil Disturbance
6. Preserve Vegetation
7. Divert Up-slope Water
8. Erosion Control Mats & Blankets
9. Protect Service Trenches & Stockpiles
10. Early Roof Drainage Connection
11. Scour Protection – Stormwater Pipe Outfalls & Check Dams
12. Stabilised Site Access
13. Wheel Wash
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Acknowledgement:

Figures 16A, 16B and 16C after NSW Department of Conservation 2004 *"Environmental Best Management Practice Guideline for Concrete Contractors"*. Text in this brochure has been obtained and modified from the "Do It Right On Site" brochure series, kindly provided by the Southern Sydney Regional Organisation of Councils.

Date of Issue: December 2008

Sediment Basins

What is it?

Sediment basins are dams or ponds that capture sediment runoff from building and construction sites. They allow sediment to settle out and sink rather than be transported away with the runoff.
Sediment basins are formed by constructing an embankment of compacted soil at the lowest downstream point on the site and installing an outlet structure and overflow spillway. They are one of the most useful and cost-effective measures for treating sediment-laden runoff.

Why is it important?

Sediment generated from building and construction activities can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will control sediment run-off from your site, meet your legal requirements and help protect our waterways.

Fact Sheet 17

WHAT DO I NEED TO DO?

Before starting site works:

Sediment basins are typically required on large construction sites and subdivisions, or in areas of high seasonal rainfall. Sediment basins by no means trap all the sediment from a site. Therefore, sediment basins should be used in conjunction with other sediment and erosion control measures. Sediment basins should be constructed as a first step in any land disturbing activity and remain functional for as long as possible, ideally until the area contributing sediment is stabilised. Document the sediment basin on the Soil and Water Management Plan (if required) **(see Fact Sheet 3).** Detail on the plan how the basin will be maintained and decommissioned (if it is not a permanent on-site feature). Ensure that on-ground staff are aware of the need to maintain the sediment basin.

Design considerations:

Sediment basins require a considerable area to be effective. The two major factors determining the size of the basin are the settling velocity of the sediment and design flows in regards to rainfall. Sediment basins should be designed to cater for peak flow runoff from a design storm having an average reoccurrence interval of 10 years.

Sediment basins need to be positioned so if failure occurs they will not cause damage or nuisance to property, people or the environment. **Do not** install sediment basins on major drainage pathways. Locate sediment basins off-line and up-stream of the stormwater system, natural and constructed water bodies.

Preferably construct basins at the lowest downstream point to intercept most of the runoff from the site. Access for machinery to remove sediment is crucial, as is an area designated for stockpiling the removed sediment so it can dry out (preferably with this water seeping back into the basin). The dried sediment can eventually be reused or disposed to landfill.

Installing the control measures:

For suitable sediment basin design refer to the procedures in Chapter 4 of the *Water Sensitive Urban Design – Engineering Procedures for Stormwater Management in Southern Tasmania*, available from the Derwent Estuary Program web page:
http://www.derwentestuary.org.au/file.php?id=145

Note: For larger sediment basins a civil engineer can be used. They can provide detailed drawings to follow construction. It is essential that the engineer review/check the specifications of the proposed sediment basin to ensure it is correctly sized and down-stream risks are addressed in the event of basin failure. Sediment basins over one megalitre may require a dams permit.

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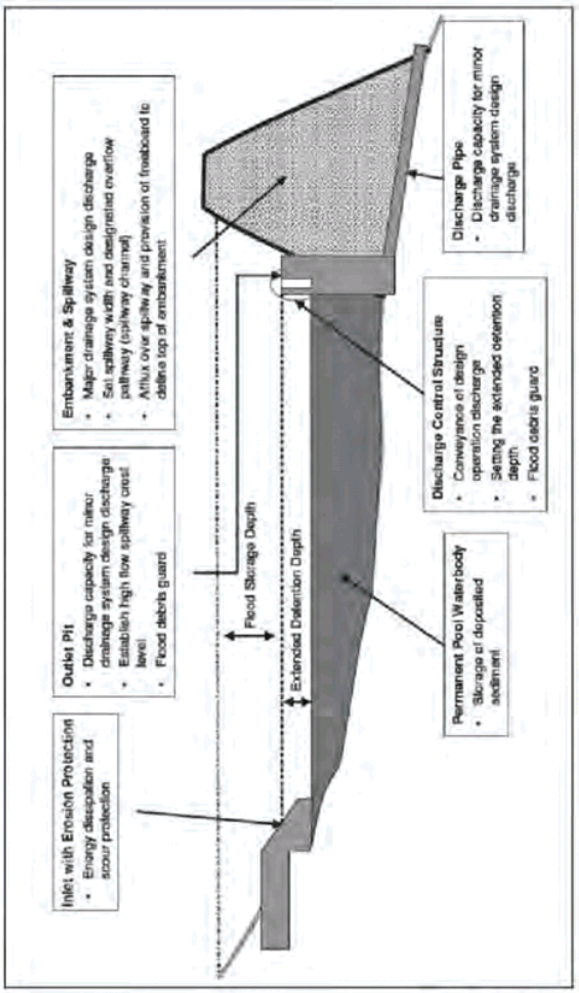

Figure 17A: Sediment basin

Maintaining the control measures:

Sediment basins require regular inspection, especially after rain events and should be cleaned when more than half full of sediment. Litter and debris should be removed whenever observed in the sediment basin. If the water within the basin is cloudy and never clears, apply gypsum to allow the sediment to settle out.

List of fact sheets

1. Soil & Water Management on Large Building & Construction Sites
2. Soil & Water Management on Standard Building & Construction Sites
3. Soil & Water Management Plans
4. Dispersive Soils – High Risk of Tunnel Erosion
5. Minimise Soil Disturbance
6. Preserve Vegetation
7. Divert Up-slope Water
8. Erosion Control Mats & Blankets
9. Protect Service Trenches & Stockpiles
10. Early Roof Drainage Connection
11. Scour Protection – Stormwater Pipe Outfalls & Check Dams
12. Stabilised Site Access
13. Wheel Wash
14. Sediment Fences & Fibre Rolls
15. Protection of Stormwater Pits
16. Manage Concrete, Brick & Tile Cutting
17. **Sediment Basins**
18. Dust Control
19. Site Revegetation

Remember:

Everyone working on building and construction sites has a responsibility to prevent pollution. If you do have an accident and pollution occurs you are required by law to notify the site supervisor. If the site supervisor cannot be contacted, workers should immediately notify the local council so they can work with you to minimise any harm to the environment.

Acknowledgement:

Figure 17A from Derwent Estuary Program 2006 *'Water Sensitive Urban Design – Engineering Procedures for Stormwater Management in Southern Tasmania'*

Date of issue: December 2009

Dust Control

What is it?

Minimise the amount of dust (soil, building materials and residues) generated by wind erosion on building and construction sites. Research shows that average dust emission rates of over 2.5 tonnes per hectare per month occur on sites which have no dust control measures in place. The control measures discussed can be used on any building or construction site where dust may be generated and where dust may cause on or off-site damage.

Why is it important?

Sediment generated from wind erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will minimise wind erosion from your site, meet your legal requirements and help protect our waterways.

Fact Sheet 18

WHAT DO I NEED TO DO?

Before starting site works:

Good site planning can eliminate dust being a problem.

1) Assess the dust potential of your site. Dust generating activities include major soil disturbances or heavy construction activity, such as clearing, excavation, demolition, cutting concrete or excessive vehicle traffic.
2) Decide upon dust control measures. A number of methods can be used to control dust from a site. The developer or builder will have to determine which practices are suitable based on specific site and weather conditions.
3) Document dust control measures on your Soil and Water Management Plan (if required) **(see Fact Sheet 3)** and ensure everyone working on the site understands them.

Installing the control measures:

These control measures will help to reduce the amount of soil and building materials loose on the site and therefore the dust that can be generated.

1) Stage works and disturb only small areas of the site at a time.
2) Maintain as much vegetation as possible. Existing trees and shrubs act as wind breaks, slowing wind velocities and provide coverage to surface soils.
3) Install constructed wind barriers if there is high risk of dust generation. Wind fences divert the wind up and over the site. Ensure that it is semi-permeable otherwise down-wind turbulence can make erosion worse.
4) Dampen the site slightly with a light application of water during excavation or when dust is being raised (be careful to only moisten ground surface, do not wet it to the point of creating mud).
5) Apply mulch to recently disturbed areas. Mulch can reduce wind erosion by 80%.
6) Where vegetative cover and mulching cannot be used (i.e. on site roads and entrances) apply rocks and stones.
7) For large open areas deep ploughing (tillage) brings soil clods to the surface where they rest on top of the dust, preventing it from becoming airborne.
8) Install a wheel wash where vehicles and/or equipment exit the site. Alternatively, a stabilised site access can be used **(see Fact Sheet 12)**.

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9) Cover sand and soil stockpiles with fabric, plastic or vegetation.
10) Ensure that relevant equipment and machinery have dust suppressors fitted.

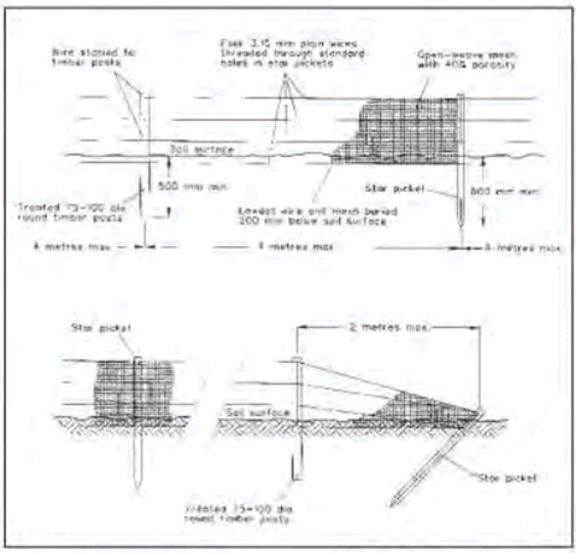

Figure 18A Installation of a wind fence

Maintaining the control measures:

Dust control measures involving the application of water require more monitoring than structural or vegetative controls to remain effective. If structural controls are used, they should be inspected for deterioration on a regular basis to ensure that they are still achieving their intended purpose.

List of fact sheets

1. Soil & Water Management on Large Building & Construction Sites
2. Soil & Water Management on Standard Building & Construction Sites
3. Soil & Water Management Plans
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19. Site Revegetation

Remember:

Everyone working on building and construction sites has a responsibility to prevent pollution. If you do have an accident and pollution occurs you are required by law to notify the site supervisor. If the site supervisor cannot be contacted, workers should immediately notify the local council so they can work with you to minimise any harm to the environment.

Acknowledgement:

Figure 18A from Landcom 2004 *"Soils & Construction Volume I Managing Urban Stormwater (4th edition)"*. Text in this brochure has been obtained and modified from the *"Do It Right On Site"* brochure series, kindly provided by the Southern Sydney Regional Organisation of Councils.

Date of Issue: December 2008

Appendix 7 Soil Tracking From

Date	Soil origin (grid block)	Stockpile ID	Stockpile location (grid block)	Soil description (colour, texture, moisture, odour, staining)	Samples collected	Laboratory analysis (list lab tests)	Final soil classification Fill, Level 1, Level 2, Level 3, Level 4	Final destination	Notes	Logged by

Appendix 8 Site Induction Completion Acknowledgement Sign-in Form

Site Induction Sign-in Form

Site Induction Completion Acknowledgement Sign-in Page for 48-52 New Town Road, New Town Tasmania

By signing this form you acknowledge that you have been informed of the contents of the CMP and the responsibilities relating to the following issues: site contamination status; potential health impacts for site workers associated with site contamination, potential environmental impacts associated with site contamination, how to reduce the risks to human health and the environment, and main documentation related to upholding the CMP

Date	Name	Company	Signature	Date	Name	Company	Signature

Site Induction Sign-in Form

Date	Name	Company	Signature	Date	Name	Company	Signature

MIDSON
traffic
pty ltd

The House Family Office

48-52 New Town Rd, New Town
Traffic Impact Assessment

October 2025

CELEBRATING 15 YEARS
2008 - 2023

Contents

1. Introduction 4
1.1 Background 4
1.2 Traffic Impact Assessment (TIA) 4
1.3 Statement of Qualification and Experience 4
1.4 Project Scope 5
1.5 Subject Site 5
1.6 Reference Resources 6
2. Existing Conditions 7
2.1 Transport Network 7
2.2 Public Transport 9
2.3 Road Safety Performance 9
3. Proposed Development 12
3.1 Development Proposal 12
4. Traffic Impacts 14
4.1 Trip Generation 14
4.2 Trip Assignment 15
4.3 Access Impacts 16
4.4 Access Design 17
4.5 Sight Distance 23
4.6 Pedestrian Impacts 24
4.7 Commercial Vehicles 24
4.8 Road Safety Impacts 25
5. Parking Assessment 26
5.1 Parking Provision 26
5.2 Theoretical Parking Demand 27
5.3 Planning Scheme Requirements 29
5.4 On-Street Parking 32
5.5 Accessible Parking 34
5.6 Motorcycle Parking 34

5.7 Bicycle Parking 34
5.8 Car Parking Layout 36
5.9 Commercial Vehicles 41
6. Conclusions 42

Figure Index

Figure 1 Subject Site & Surrounding Road Network 6
Figure 2 New Town Road Weekday Hourly Flow 7
Figure 3 New Town Road 8
Figure 4 Clare Street 9
Figure 5 New Town Road Crash Locations 11
Figure 6 Proposed Development Plans – Ground Floor 13
Figure 7 Proposed Development Plans – Lower Ground Floor 13
Figure 8 Pedestrian Sight Distance Requirements 18
Figure 9 Pedestrian Sight Triangle Provision 19
Figure 10 Ramp Long Section 20
Figure 11 Access Location Assessment 22
Figure 12 MRV Swept Paths at Clare St Access 25
Figure 13 Lower Ground Floor Parking Layout 27
Figure 14 B85 Vehicle Swept Path – On-Site Turning 38
Figure 15 Intersection Swept Paths 39
Figure 16 SRV & MRV Swept Path Assessment 41

Table Index

Table 1 Planning Scheme SISD Requirements 23
Table 2 Bicycle Parking Requirements 36

1. Introduction

1.1 Background

Midson Traffic were engaged by The House Family Office to prepare a traffic impact assessment for a proposed residential development consisting of 61 units (combination of short-term accommodation and residential) with communal facilities and amenities at 48-52 New Town Road, New Town.

1.2 Traffic Impact Assessment (TIA)

A traffic impact assessment (TIA) is a process of compiling and analysing information on the impacts that a specific development proposal is likely to have on the operation of roads and transport networks. A TIA should not only include general impacts relating to traffic management, but should also consider specific impacts on all road users, including on-road public transport, pedestrians, cyclists and heavy vehicles.

This TIA has been prepared in accordance with the Department of State Growth (DSG) publication, *Traffic Impact Assessment Guidelines*, August 2020. This TIA has also been prepared with reference to the Austroads publication, *Guide to Traffic Management,* Part 12: *Integrated Transport Assessments for Developments*, 2020.

Land use developments generate traffic movements as people move to, from and within a development. Without a clear understanding of the type of traffic movements (including cars, pedestrians, trucks, etc), the scale of their movements, timing, duration and location, there is a risk that this traffic movement may contribute to safety issues, unforeseen congestion or other problems where the development connects to the road system or elsewhere on the road network. A TIA attempts to forecast these movements and their impact on the surrounding transport network.

A TIA is not a promotional exercise undertaken on behalf of a developer; a TIA must provide an impartial and objective description of the impacts and traffic effects of a proposed development. A full and detailed assessment of how vehicle and person movements to and from a development site might affect existing road and pedestrian networks is required. An objective consideration of the traffic impact of a proposal is vital to enable planning decisions to be based upon the principles of sustainable development.

This TIA also addresses the relevant clauses of Code E5.0, Code E6.0, *Parking and Access Code,* of the Hobart Interim Planning Scheme, 2015.

1.3 Statement of Qualification and Experience

This TIA has been prepared by an experienced and qualified traffic engineer in accordance with the requirements of Council's Planning Scheme and The Department of State Growth's, *Traffic Impact Assessment Guidelines*, August 2020, as well as Council's requirements.

The TIA was prepared by Keith Midson. Keith's experience and qualifications are briefly outlined as follows:

- 29 years professional experience in traffic engineering and transport planning.
- Master of Transport, Monash University, 2006

- Master of Traffic, Monash University, 2004
- Bachelor of Civil Engineering, University of Tasmania, 1995
- Engineers Australia: Fellow (FIEAust); Engineering Executive (EngExec)

1.4 Project Scope

The project scope of this TIA is outlined as follows:

- Review of the existing road environment in the vicinity of the site and the traffic conditions on the road network.
- Provision of information on the proposed development with regards to traffic movements and activity.
- Identification of the traffic generation potential of the proposal with respect to the surrounding road network in terms of road network capacity.
- Review of the parking requirements of the proposed development. Assessment of this parking supply with Planning Scheme requirements.
- Traffic implications of the proposal with respect to the external road network in terms of traffic efficiency and road safety.

1.5 Subject Site

The subject site is located at 48-52 New Town Road, New Town. The site is currently a vacant lot and was previously a commercial site that contained a television station broadcasting and office facility that has been demolished.

The subject site and surrounding road network is shown in Figure 1.

Figure 1 Subject Site & Surrounding Road Network



Image Source: LIST Map, DPIPWE

1.6 Reference Resources

The following references were used in the preparation of this TIA:

- Hobart Interim Planning Scheme, 2021 (Planning Scheme)
- Austroads, *Guide to Traffic Management,* Part 12: *Integrated Transport Assessments for Developments*, 2020
- Austroads, Guide to Road Design, Part 4A: Unsignalised and Signalised Intersections, 2021
- Department of State Growth, *Traffic Impact Assessment Guidelines*, 2020
- *Transport for NSW, Guide to Transport Impact Assessment*, 2024 (TfNSW Guide)
- Australian Standards, AS2890.1, *Off-Street Parking*, 2004 (AS2890.1)

2. Existing Conditions

2.1 Transport Network

For the purposes of this report, the transport network consists of New Town Road, Warragul Avenue and Clare Street. Other roads such as Augusta Road, Seymour Street, Archer Street and Stoke Street were considered in the context of the surrounding road network but were not examined in detail.

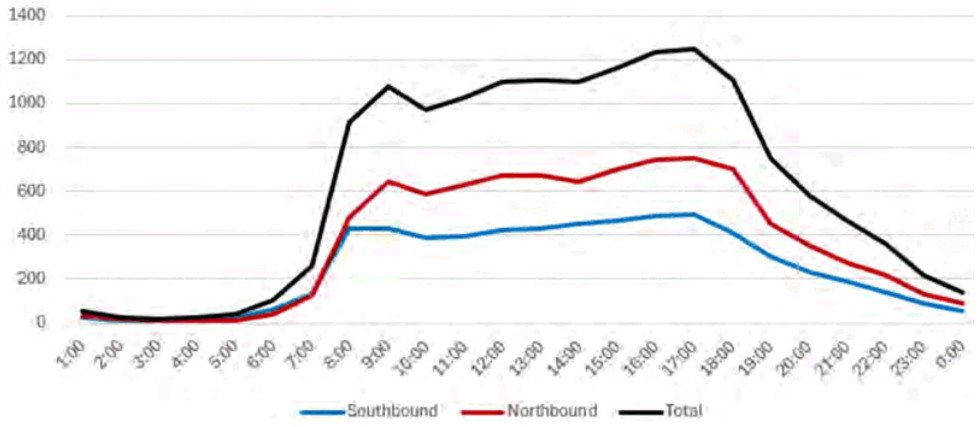
2.1.1 New Town Road

New Town Road connects between Elizabeth Street in North Hobart and Main Road in Moonah. It is a major collector road that provides connectivity between Hobart and the northern suburbs. New Town Road has a posted speed limit of 50-km/h. It carries approximately 15,100 vehicles per day with peak flows of approximately 1,200 vehicles per hour near the subject site[1]. The hourly weekday flows on New Town Road are shown in Figure 2.

Adjacent to the subject site, New Town Road has a sealed pavement width of 13.5 metres. On-street parking is permitted on both sides of the road. A central undedicated turn lane facility has been installed, with a traffic island located adjacent to the subject site.

New Town Road adjacent to the subject site is shown in Figure 3.

Figure 2 New Town Road Weekday Hourly Flow



[1] Department of State Growth SCATS traffic signal data, New Town Road/ Argyle Street intersection, June 2025

Figure 3 New Town Road



2.1.2 Warragul Avenue

Warragul Avenue is a short cul-de-sac that connects to New Town Road at a T-junction opposite the subject site. It is approximately 70 metres long and provides access to a small number of residential dwellings along its length. It carries a low volume, in the order of 50 to 100 vehicles per day.

2.1.3 Clare Street

Clare Street connects between Pedder Street and Augusta Road and provides a minor collector road function through a predominantly residential catchment area.

Clare Street carries approximately 3,000 vehicles per day. The general urban speed limit of 50-km/h is applicable to Clare Street. At its southern end, Clare Street connects to Augusta Road at a T-junction with Augusta Road having priority.

Clare Street adjacent to the subject site's access is shown in Figure 4.

Figure 4 Clare Street



2.2 Public Transport

Metro Tasmania operates high frequency bus services along New Town Road (including routes 500, 501, 503, 504, 510, 511, 512, 513, 520, 522, 605, 722, and X42). The bus routes combined on the New Town Road corridor are known as Metro's 'Turn Up and Go' service where buses have a frequency of less than 10-minute intervals during normal business hours (7:0am to 7:00pm).

A northbound bus stop is located adjacent to the site at the northern end of the New Town Road frontage. A southbound bus stop is also located opposite the site on New Town Road.

2.3 Road Safety Performance

Crash data can provide valuable information on the road safety performance of a road network. Existing road safety deficiencies can be highlighted through the examination of crash data, which can assist in determining whether traffic generation from the proposed development may exacerbate any identified issues.

Crash data was obtained from the Department of State Growth for a 5+ year period between 1st January 2019 and 30th October 2024 for New Town Road

The findings of the crash data is summarised as follows:

New Town Road

- A total of 19 crashes were reported during this time.
- Severity. 1 crash involved serious injury; 3 crashes involved minor injury; 15 crashes resulted in property damage only.

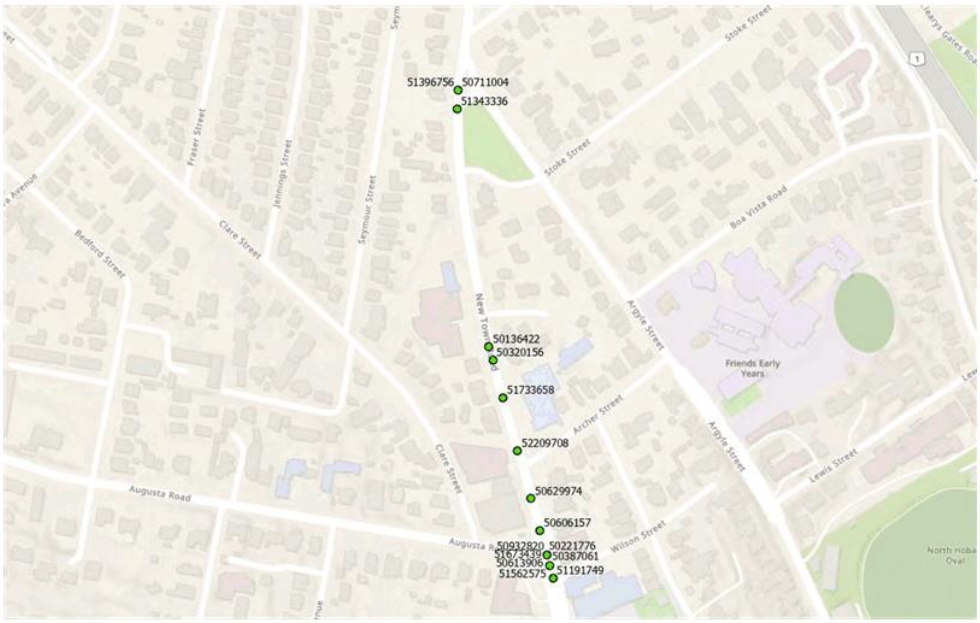
- Day of week. 6 crashes were reported on Mondays; 4 crashes were reported on Saturdays; 2 crashes were reported on Tuesdays, Wednesdays, Fridays and Sundays; 1 crash was reported on a Thursday.
- Time of day. Afternoon crashes were dominant, with 17 crashes reported between 12:00pm and 6:00pm. 1 crash was reported at 2:00am and 1 crash was reported at 9:51pm. No crashes were reported between 7:00am and 12:00pm.
- Crash types. No crash trends were noted by crash type. 4 crashes involved a 'rear-end' collision; 2 crashes involved a parked car; various other single occurrence crash types were noted.
- Crash locations. Crashes were more prevalent to the south of the subject site. 8 crashes were reported at the Augusta Road intersection; 2 crashes were reported at the Argyle Street intersection; 1 crash was reported at the Wilson Street intersection; 8 crashes were reported at midblock locations. The crash locations are shown in Figure 5.
- Vulnerable road users. 2 crashes involved pedestrians. One crash occurred at the intersection of Augusta Road and New Town Road resulting in minor injury, the other crash was reported at the Argyle Street/ New Town Road intersection resulting in serious injury.

Clare Street

- A total of 8 crashes were reported during this time.
- Severity. 1 crash involved minor injury; 1 crash involved first aid at the scene; 6 crashes involved property damage only.
- Day of week. 2 crashes were reported on Tuesdays, Fridays and Saturdays; 1 crash was reported on a Wednesday and a Thursday; no crashes were reported on Mondays or Sundays.
- Time of day. All crashes were reported between 12:00pm and 9:20pm. Afternoon crashes were dominant with 7 crashes reported between 12:00pm and 5:00pm.
- Crash types. 2 crashes involved 'cross-traffic' collisions; 2 crashes involved 'U-turn' collisions; various other crash types with no clear crash trend.
- Crash locations. 4 crashes were reported at the Augusta Road/ Clare Street junction; 1 crash was reported in an off-road location adjacent to the subject site; 3 crashes were reported at midblock locations.
- Vulnerable road users. No crashes involved vulnerable road users.

The crash data does not indicate that there are any specific road safety issues in New Town Road or Clare Street that would be exacerbated by traffic generated by the proposed development.

Figure 5 New Town Road Crash Locations



Source: Department of State Growth

3. Proposed Development

3.1 Development Proposal

The proposed development involves the construction of a residential unit building comprising of the following key components across five levels (lower ground floor to level 3):

- 38 short stay apartments
- 23 residential units total
  - → 11 x 1-bedroom units
  - → 8 x 2-bedroom units
  - → 4 x 3-bedroom units
- 67 on-site car parking spaces located on the lower ground floor accessed via New Town Road. This includes 2 disabled spaces, plus 4 motorcycle spaces.
- Porte cochere drop-off/ pick-up area accessed via New Town Road. The porte cochere provides short term parking for approximately 3 spaces.
- Service vehicle access via Clare Street to hardstand area with vehicle turning facilities.
- Shared wellness areas, including swimming pools, sauna, gymnasium, fitness areas and multipurpose room (operating as a commercial tenancy).
- Ground floor Café with floor area of 137m^2.
- Ground floor communal lounge area.
- Consulting rooms (approximately 100m^2 commercial tenancy on lower ground floor).
- Village green and communal landscape areas.

The proposed development plans associated with access and parking are shown in Figure 6 and Figure 7.

Figure 6 Proposed Development Plans – Ground Floor



Figure 7 Proposed Development Plans – Lower Ground Floor



4. Traffic Impacts

4.1 Trip Generation

Traffic generation rates have been sourced from the *TfNSW Guide to Transport Impact Assessment* (2024), which supersedes the *Guide to Traffic Generating Developments* (RMS, 2002). The *TfNSW Guide* recommends the use of contemporary trip generation rates that reflect the local context, availability of public transport, and land use mix.

Traffic generation rates were sourced from the TfNSW Guide. The proposed development is classified as 'medium density residential dwellings' under the TfNSW Guide. Medium density residential is defined as 'a building containing at least two but less than 20 dwellings, with a typical net residential density of 30 to 60 dwellings per hectare'. The residential units and short stay apartments have been assumed to generate equivalent traffic on the basis of similar use.

The TfNSW Guide recommends the following traffic generation rate for medium density residential dwellings (regional areas):

- AM peak 0.41 trips per unit per hour = 25 vehicles per hour
- PM peak 0.60 trips per unit per hour = 37 vehicles per hour
- Daily trips 3.67 trips per unit per day = 224 vehicles per day

The café component of the development is considered to be ancillary to the residential component as it is intended to provide for residents. It is likely that guests will visit the café component when visiting residents and therefore the potential traffic generation of the café has been assessed.

The TfNSW Guide recommends a generation rate of 60 trips per 100m^2 of floor area per day, with a peak of 5 trips per 100m^2 per hour. This equates to a traffic generation of 90 vehicles per day with a peak of 8 vehicles per hour. Assuming 50% of the trips are ancillary to the development (ie. Trips associated with residents walking from their unit within the site) then the external traffic generation is 45 vehicles per day with a peak of 4 vehicles per hour.

The proposed development includes a fitness and wellness centre of approximately 400 m² gross floor area. Under the TfNSW Guide to Traffic Impact Assessment (2024), comparable facilities are categorised under *recreation and fitness centres* or *health and wellness studios*. The Guide notes that traffic generation should be adjusted to reflect the size of the facility, its membership model, and whether it primarily serves on-site residents or a broader external clientele.

In this instance, the fitness and wellness centre is intended to operate as a low-intensity, appointment-based facility with a strong focus on residents and short-stay guests of the complex. External membership is expected to be limited and managed by pre-booking. Accordingly, a conservative external generation rate of 25 vehicle trips per 100 m² GFA per day, with a peak-hour rate of 2 trips per 100 m², has been adopted—equivalent to the lower bound of the range identified in the TfNSW Guide for small recreation facilities in mixed-use contexts.

Applying this rate to the 400 m² centre results in a total generation of approximately 100 vehicle trips per day, with a peak of 8 vehicles per hour. Given that around 50% of these trips are expected to be internal (generated by residents or visitors already within the site), the external traffic generation is estimated at 50 vehicle trips per day, with a peak of 4 vehicles per hour.

The total traffic generation of the proposed development is therefore 369 vehicles per day with a peak of 33 vehicles per hour during the AM peak and 45 vehicles per hour during the PM peak.

In addition to the traffic generation associated with the residential component of the development, service vehicles will also access the site via Clare Street. This includes waste collection and general loading requirements associated with the site. This would account for approximately several trips per day at the Clare Street access.

4.2 Trip Assignment

At the New Town frontage of the site the traffic generation will be split across the car park access and porte cochere accesses. The porte cochere accesses will be utilised for pick-up and drop-off activities. The car park access will only be utilised for residents of the development.

At the New Town Road frontage, site traffic will be split between the porte cochere (short-stay pick-up/ drop-off) and the car-park access (residents/ guests). External café patrons are expected to use nearby on-street spaces, while service vehicles use Clare Street (several movements per day).Note that traffic generated by external guest of the café is likely to occur as on-street parking in the surrounding road network (or local walking trips).

4.2.1 Assumptions for Trip Assignment

- Café external demand: 45 vpd, 4 vph (kerbside).
- Fitness centre total: 100 vpd, 8 vph; of this, ~50 vpd, 4 vph external (kerbside) with the remainder internal (residents/guests).
- Service vehicles (Clare St): ~6 vpd across the day (non-peak periods).

4.2.2 Resulting Site Movements at New Town Rd Accesses

- Porte cochere: 36 vehicles per day; AM peak 2 vph, PM peak 4 vph
- Car-park access: 232 vehicles per day; AM peak 23 vph, PM peak 33 vph

4.3 Access Impacts

The proposed development provides the following access arrangements:

- Car park access on New Town Road to service the lower ground floor car park.
- Porte cochere accesses on New Town Road. This provides a one-way system that provides separated entry and exit access.
- Service vehicle access in Clare Street.

4.3.1 Number of Accesses

The Acceptable Solution A2 of Clause E5.6.2 of the Planning Scheme states "*No more than one access providing both entry and exit, or two accesses providing separate entry and exit, to roads in an area subject to a speed limit of 60km/h or less*".

The proposed development provides a total of 4 accesses that service the overall site. Three accesses are provided on the New Town Road frontage, comprising of a ramp access to the lower ground car park and two accesses for the porte cochere access. Clare Street provides a service vehicle access.

The access arrangements therefore do not satisfy the requirements of Acceptable Solution A2 of Clause E5.6.2 of the Planning Scheme. The Performance Criteria P2 of Clause E5.6.2 of the Planning Scheme states:

> *"For roads in an area subject to a speed limit of 60km/h or less, accesses and junctions must be safe and not unreasonably impact on the efficiency of the road, having regard to:*
>
> *(a) the nature and frequency of the traffic generated by the use;*
>
> *(b) the nature of the road;*
>
> *(c) the speed limit and traffic flow of the road;*
>
> *(d) any alternative access to a road;*
>
> *(e) the need for the access or junction;*
>
> *(f) any traffic impact assessment; and*
>
> *(g) any written advice received from the road authority".*

The following is relevant to the proposed development:

a. Nature and frequency of traffic generated. The traffic generation will be residential in nature, consistent with the general nature of traffic in the surrounding network. The peak traffic generation will be 45 vehicles per hour, which represents an average of less than one vehicle movement every 1.3 minutes.

b. Nature of road. New Town Road is a major collector road that provides access to residential and commercial frontages along its length through the New Town area.

c. Speed limit and traffic flow. The general urban speed limit of 50-km/h is applicable to New Town Road. It carries a traffic volume of approximately 15,100 vehicles per day near the subject site.

d. Alternative access. The Clare Street access provides access for service vehicles, which effectively separates commercial and residential traffic, providing safety benefits for the access arrangements.

e. Need for access. The accesses are required to service various components of the proposed development. The separation of commercial traffic, pick-up/ drop-off traffic and car park traffic provides a safe and efficient access configuration commensurate with the scale of the proposed development.

f. Traffic impact assessment. The report documents the findings of a traffic impact assessment.

g. Road authority advice. Council (as road authority) requires a TIA to be prepared to assess the potential impacts of the access arrangements on the road network.

Based on the above assessment the proposed access arrangements associated with the development satisfy the requirements of Performance Criteria P2 of Clause E5.6.2 of the Planning Scheme.

4.4 Access Design

The Acceptable Solution A1(a) of Clause E6.7.2 of the Planning Scheme states "*the location, sight distance, width and gradient of an access must be designed and constructed to comply with section 3 – "Access Facilities to Off-street Parking Areas and Queuing Areas" of AS/NZS 2890.1:2004 Parking Facilities Part 1: Off-street car parking*".

Each of the accesses are assessed in the following sections.

4.4.1 Clare Street Service Vehicle Access

The Clare Street service vehicle access will be utilised by commercial vehicles and therefore the requirements of AS2890.1 are not applicable. The assessment of the Clare Street access is therefore undertaken in Section 4.7 and Section 5.9.

4.4.2 New Town Road Car Park Access

Access width

AS2890.1 classifies the access as a Category 1 access (Class 1A parking accessing 25-100 spaces fronting onto a local road). Category 1 accesses requires a minimum width of 3.0 metres. The available width is 6.5 metres thus complying with AS2890.1 requirements.

Access location

AS2890.1 provides guidelines for the location of access in relation to existing road junctions. The car park access is not located in an area that is in conflict with any existing intersections.

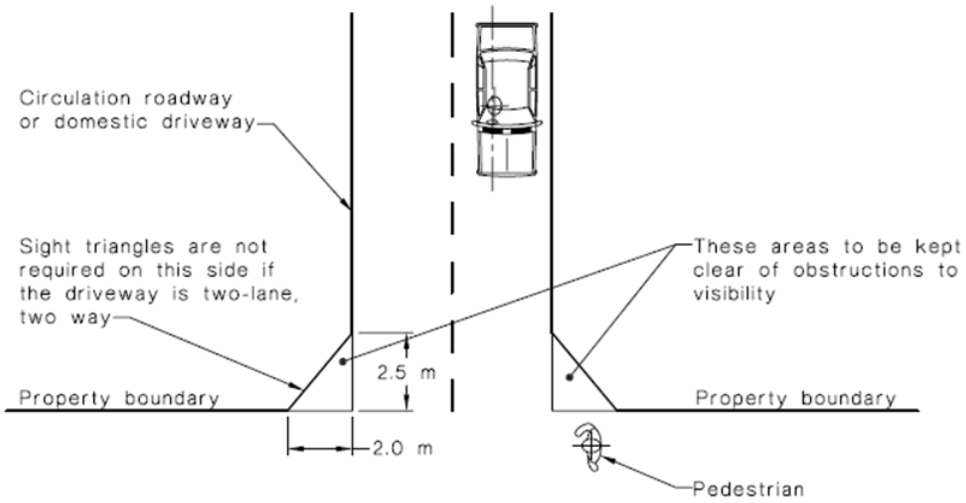
Sight distance

AS2890.1 requires a minimum sight distance provision of 45 metres for a frontage road of 50-km/h. The available sight distance exceeds 45 metres along New Town Road from the access, thus complying with AS2890.1 requirements (note that the available sight distance also complies with Planning Scheme requirements as documented in Section 4.5).

Pedestrian Sight Distance

AS2890.1 specifies a pedestrian sight triangle provision at driveway accesses that connect adjacent to a footpath. This is reproduced in Figure 8.

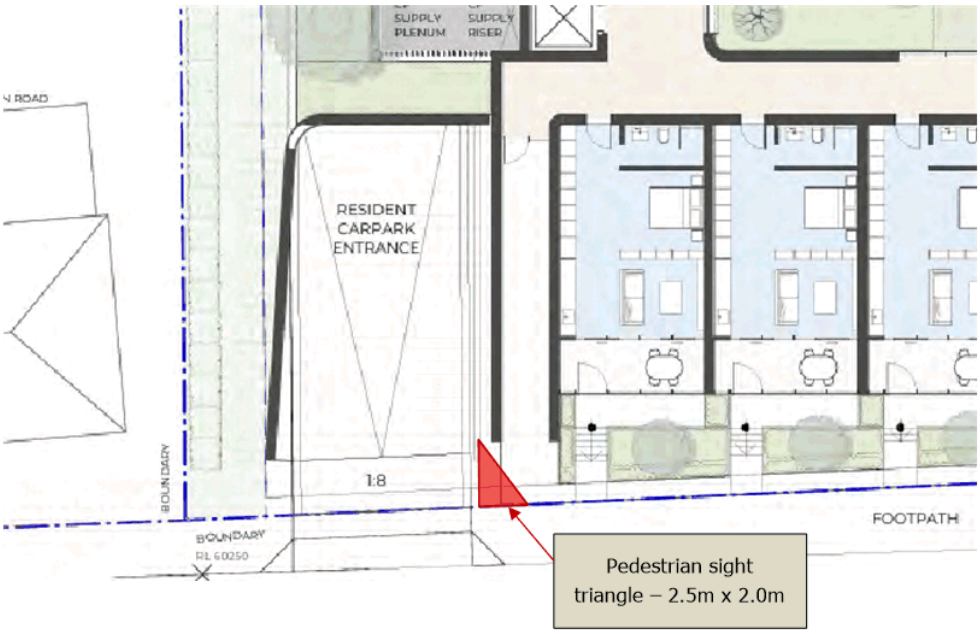
Figure 8 Pedestrian Sight Distance Requirements



In this case the provision of a sight triangle on the departure side of the ramp is required in order to comply with AS2890.1 requirements.

A compliant sight triangle is provided, as shown in Figure 9.

Figure 9 Pedestrian Sight Triangle Provision



Gradient

Section 2.5.3(b) of AS2890.1 states the following regarding the maximum grade of straight ramps:

i. Longer than 20 metres – 1 in 5 (20%) maximum.

ii. Up to 20 metres long – 1 in 4 (25%) maximum. The allowable 20 m maximum length shall include any parts of the grade change transitions at each end that exceed 1 in 5 (20%).

The ramp grade into the car park consists of the following elements:

- Footpath 1.78m grade 1:50 (0.02%)
- Behind footpath 4.13m grade 1: 8 (12.5%)
- Long section 21.1m grade 1:5 (20.0%)
- Transition 2.0m grade 1:10 (10%)
- Car park - grade level (~0.0%)

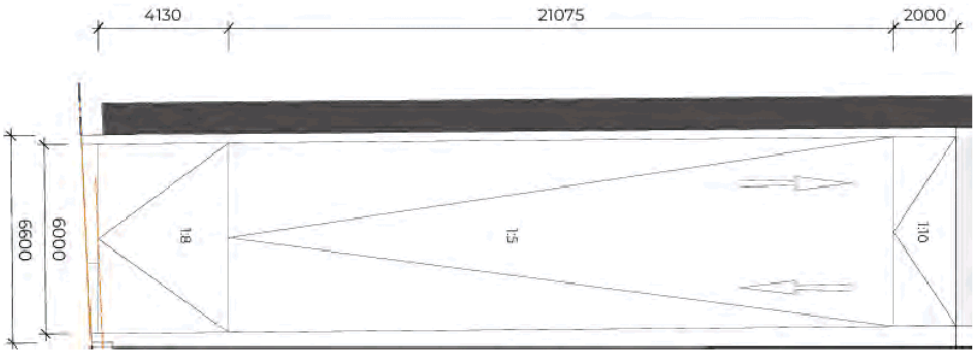
The long section of the access ramp to the car park is shown in Figure 10.

The long section grade of 20% over 21.1m complies with AS2890.1 requirements for ramps longer than 20 metres. However, the initial section grade of 12.5% over 4.13m exceeds the 5% maximum specified for the first 6 metres of an access.

The ramp grades do not comply with the prescriptive requirements of AS2890.1. However, the design is constrained by the significant level difference between New Town Road and the basement car park level, and the available horizontal distance within the site. A compliant design would require approximately 29.2m total length to achieve the necessary level change, which exceeds the available site area.

The access design therefore does not satisfy the requirements of Acceptable Solution A1 of Clause E6.7.2 of the Planning Scheme.

Figure 10 Ramp Long Section



The access design does not satisfy Acceptable Solution A1(a) of Clause E6.7.2 due to gradient non-compliance. The Performance Criteria P1 of Clause E6.7.2 of the Planning Scheme states:

> *"Design of vehicle access points must be safe, efficient and convenient, having regard to all of the following:*
>
> *(a) avoidance of conflicts between users including vehicles, cyclists and pedestrians;*
>
> *(b) avoidance of unreasonable interference with the flow of traffic on adjoining roads;*
>
> *(c) suitability for the type and volume of traffic likely to be generated by the use or development;*
>
> *(d) ease of accessibility and recognition for users".*

The following is relevant with respect to the ramp grade design:

a. Avoidance of conflicts between users including vehicles, cyclists and pedestrians. The access design effectively separates different user types:

- → Pedestrian access to the building is separated from vehicular access, eliminating pedestrian-vehicle conflicts at the access point.
- → A compliant 2.5m x 2.0m pedestrian sight triangle is provided at the access departure point in accordance with AS2890.1 requirements.
- → The 6.5m access width exceeds minimum requirements, providing adequate clearance for vehicle movements.
- → Service vehicles use a separate access via Clare Street, avoiding conflicts with residential traffic.

b. Avoidance of unreasonable interference with the flow of traffic on adjoining roads. The access minimizes impact on New Town Road traffic:

- → Low traffic generation of 45 vehicles per hour (PM peak) represents less than one vehicle movement every 1.3 minutes.
- → Available sight distance exceeds 80m in both directions, meeting Planning Scheme requirements for 50 km/h roads.
- → Access location does not conflict with existing intersections or road infrastructure
- → Residential traffic characteristics are predictable and compatible with the surrounding road environment.

c. Suitability for the type and volume of traffic likely to be generated. Despite gradient non-compliance, the access remains suitable for its intended use:

- → Regular users will develop familiarity with access characteristics, reducing associated safety risks.
- → Low traffic generation is manageable within the access configuration.
- → Access is designed for passenger vehicles which have adequate capability for the proposed gradients.
- → The maximum grade of 20% is not exceeded within the ramp design, thus the use of the ramp is considered reasonable and appropriate for the design vehicles that will utilise the access.

d. Ease of accessibility and recognition for users. The access provides appropriate accessibility and clarity:

- → Clear sight lines allow drivers to assess the full access configuration upon approach.
- → Adequate width provides tolerance for driver manoeuvring.
- → Geometric design follows accepted engineering principles with appropriate transitions.
- → Access function is clearly distinguished from other site accesses (porte cochere and service access).

The gradient non-compliance results from site constraints where the significant level difference between New Town Road and the basement car park cannot be accommodated within the available horizontal distance using compliant gradients. The design represents an appropriate engineering solution that achieves the performance objectives of safe, efficient and convenient access within the physical limitations of the site.

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4.4.3 New Town Road Porte Cochere Access

The porte cochere access will function as a one-way link with separate entry and exit provided on New Town Road. The drive through section of the porte cochere access is separated from the pedestrian area adjacent to the building access with bollards.

Access width

AS2890.1 classifies the access as a Category 1 access (Class 1A parking accessing less than 25 spaces fronting onto a local road). Category 1 accesses requires a minimum width of 3.0 metres. The width of the accesses complies with this requirement (noting the one-way flow of the access).

Access location

AS2890.1 provides guidelines for the location of access in relation to existing road junctions. The porte cochere entry access is located opposite the existing Warragul Avenue junction. The requirements of AS2890.1 access driveway prohibited locations is reproduced for the junction in Figure 11 (shown as red lines). A Category 1 access cannot be located between the red lines shown in Figure 11. It can be seen that the access (highlighted in orange) does not conflict with this requirement.

Figure 11 Access Location Assessment



Sight distance

AS2890.1 requires a minimum sight distance provision of 45 metres for a frontage road of 50-km/h. The available sight distance exceeds 45 metres along New Town Road from the access, thus complying with AS2890.1 requirements (note that the available sight distance also complies with Planning Scheme requirements as documented in Section 4.5).

Gradient

Section 2.5.3(b) of AS2890.1 states the following regarding the maximum grade of straight ramps:

i. Longer than 20 metres – 1 in 5 (20%) maximum.

ii. Up to 20 metres long – 1 in 4 (25%) maximum. The allowable 20 m maximum length shall include any parts of the grade change transitions at each end that exceed 1 in 5 (20%).

The maximum grade of the ramp servicing the porte cochere is 9.5% thus complying with AS2890.1 requirements.

4.4.4 Access Summary

The porte cochere access fronting onto New Town Road satisfy the requirements of Acceptable Solution A1(a) of Clause E6.7.2 of the Planning Scheme.

The basement car park access fronting onto New town Road satisfies the requirements of Performance Criteria P1 of Clause E6.7.2 of the Planning Scheme.

4.5 Sight Distance

Acceptable Solution A1 of E5.6.4 of the Planning Scheme states "*Sight distances at an access or junction must comply with the Safe Intersection Sight Distance shown in Table E5.1*". The requirements of Table E5.1 are reproduced in Table 1.

Table 1 Planning Scheme SISD Requirements

Vehicle Speed	Safe Intersection Sight Distance in metres, for speed limit of:	
km/h	60 km/h or less	Greater than 60 km/h
50	80	90
60	105	115
70	130	140
80	165	175
90		210
100		250
110		290

The requirements of Table E5.1 for a vehicle speed of 50-km/h in a speed limit of 60-km/h or less is 80 metres.

The available sight distance exceeds 80 metres in both directions from each access location, noting that cars parked on-street near the access can partially obscure available sight distance, but these are not considered permanent obstructions.

The available sight distance at each access therefore complies with the requirements of Acceptable Solution A1 of Clause E5.6.4 of the Planning Scheme.

4.6 Pedestrian Impacts

A relatively high standard of pedestrian infrastructure is provided in New Town Road connecting to the site. Existing pedestrian infrastructure in the surrounding road network near the subject site consists of footpaths on both sides of the road.

4.7 Commercial Vehicles

The access fronting onto Clare Street will provide access for service vehicles. The Acceptable Solution A1(b) of Clause E6.7.2 of the Planning Scheme states:

> *"Design of vehicle access points must comply with all of the following: in the case of commercial vehicle access; the location, sight distance, geometry and gradient of an access must be designed and constructed to comply with all access driveway provisions in section 3 "Access Driveways and Circulation Roadways" of AS2890.2 - 2002 Parking facilities Part 2: Off-street commercial vehicle facilities".*

AS2890.2 requires the design of the access to a service area to be dependent on the maximum size of vehicle likely to utilise the facility; the frequency of use; and whether the frontage road is a major or minor road.

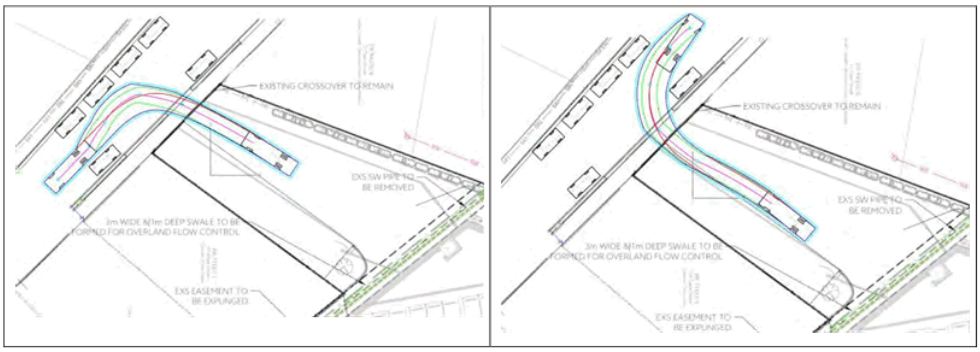
The Clare Street access will facilitate vehicles up to an 8.8-metre service vehicle (medium rigid vehicle, MRV).

Clare Street is classified as a minor road. This requires a minimum access width (single lane/ two-way access) of 3.5 metres. The provided access width of 5.5 metres complies with this requirement.

The maximum allowable grades of roadways for MRV access is 15.4%. The roadway grade is well below this requirement.

AS2890.2 requires that the access design not infringe the boundaries of the roadway. Swept paths of a MRV vehicle are provided in Figure 12 demonstrating compliance with AS2890.2 requirements (note that B85 on-street parked cars have been included in the swept path to demonstrate available road widths for manoeuvring).

Figure 12 MRV Swept Paths at Clare St Access



Based on the above assessment, the Clare Street access satisfies the requirements of AS2890.2 and therefore satisfies the requirements of Acceptable Solution A1(b) of Clause E6.7.2 of the Planning Scheme.

4.8 Road Safety Impacts

The proposed development was assessed against key road safety considerations. Road safety predominantly relates to the access conditions for all road users. The following points are relevant for the proposed development:

- Pedestrian access to the site is separated from the vehicular access at New Town Road.
- Access conditions at New Town Road and Clare Street are considered safe in terms of the speed environment and sight distance provision.
- There is sufficient spare capacity in New Town Road, Clare Street and the surrounding road network to absorb the predicted increase in peak hour traffic generated from the proposed development. No change to the level of service of the road network would be expected as a result of the development.
- The crash history in the surrounding road network near the subject site does not indicate that there are any existing road safety issues that may be exacerbated by the increased traffic generated by the proposed development.

5. Parking Assessment

5.1 Parking Provision

The proposed development provides a total of 67 on-site car parking spaces located on the lower ground floor accessed via New Town Road. This includes 2 disabled spaces. A total of 4 motorcycle parking spaces are provided in the lower ground floor car parking area. The ground level porte cochere has a pick-up and drop-off area for three car spaces. The total on-site parking provision is therefore 70 spaces.

The breakdown of parking provision is summarised as follows:

- Residential 35 spaces
- Visitor (residential) 2 spaces
- Visitor (accessible) 2 spaces
- Visitor (drop-off/ pick-up) 3 spaces (ground floor)
- Short stay accommodation 25 spaces
- Staff 3 spaces
- TOTAL 70 spaces

The lower ground floor car parking layout and allocation of spaces is shown in Figure 13.

Figure 13 Lower Ground Floor Parking Layout



5.2 Theoretical Parking Demand

The TfNSW Guide was utilised for calculating the parking demands associated with the residential unit component of the proposed development. The TfNSW Guide is a nationally recognised reference for traffic generation and parking demands associated with developments (superseding the previous RMS Guide publication in November 2024).

5.2.1 Residential Parking Demand

The TfNSW Guide recommends the following parking provision for medium density residential developments:

Medium Density Residential Dwellings (Category 2)

- 0.7 spaces per 1-bedroom unit (7.7 spaces); plus
- 1.0 spaces per 2-bedroom unit (8.0 spaces); plus

- 1.6 spaces per 3-dedroom unit (6.4 spaces); plus
- 1 space per five units visitor parking (4.6 spaces)
- TOTAL – 27 spaces

5.2.2 Short Stay Accommodation Parking Demand

The short stay accommodation will require 1 space per unit plus 1 space per 2 employees. This is a requirement for 40 spaces (assuming 2 employees).

5.2.3 Fitness & Wellness Centre Parking Demand

For small-scale "gymnasiums / fitness centres", the TfNSW Guide recommends rates between 3.0–6.0 spaces per 100 m² GFA, depending on whether it was a large commercial facility or part of a mixed-use or residential complex. The TfNSW Guide encourages use of lower-end rates where patronage is primarily internal or pre-booked (e.g. hotel gyms, private wellness centres, physiotherapy-aligned studios).

Several local factors justify adopting a reduced effective rate of 2.0–3.0 spaces per 100 m²:

- The wellness centre is boutique and forms part of the residential and visitor-accommodation complex.
- It is accessible to residents and guests, with limited external membership.
- Typical usage is by appointment or low concurrent occupancy (e.g. small group classes or physiotherapy-led sessions).
- There is a high degree of internal trip capture — patrons already on-site.
- Public transport access along New Town Road and active transport connections further reduce private vehicle demand.

On this basis a rate of 3.0 spaces per 100m2 of GFA has been adopted, resulting in a parking demand of 12 spaces.

5.2.4 Café Parking Demand

The café component of the proposed development is designed to be ancillary to the residential component (ie. The café is designed to be for use by residents). It is likely that some external use of the café will occur and as such a 50% reduction factor has been applied (consistent with the traffic generation calculations).

The TfNSW Guide recommends a rate of 15 spaces for each 100m² of floor area or 1 space for each 3 seats, whichever is greater. This equates to an unrestrained parking demand of 23 spaces. Applying a 50% ancillary reduction factor results in a parking demand of 12 spaces.

It is noted that this parking rate is the same for 'restaurants' which typically have longer duration of stay customers resulting in lower turnover of parking spaces. The Tasmanian Planning Scheme (not currently adopted by Hobart City Council) makes a distinction between 'restaurant' and 'take away food premises. Take away food has a lower parking requirement of 1 space per 15 m^2 of floor area, which results in a requirement of 10 spaces for the proposed development.

There are numerous examples of cafes located in residential environments that do not provide parking or provide a nominal amount of parking. Some examples include:

- Picnic Basket, Taroona – approximately 150m^2 floor area, 10 spaces provided
- Giddy Up Foodstore, Sandy Bay – 75m^2 floor area, no parking provided
- The Lansdowne Café – approximately 60m^2 floor area, no parking provided

On this basis, and noting that the café component will be ancillary to the residential component, the lack of on-site parking for the café is considered appropriate and acceptable.

5.2.5 Total Parking Demand

The total parking demand is therefore likely to be 91 spaces. The provision of 70 on-site parking spaces (67 lower ground floor spaces and 3 porte cochere spaces) falls short of this demand by 21 spaces. The on-site parking will adequately cater for the residential and short-stay accommodation components of the development. The porte cochere will facilitate convenient drop-off and pick-up activities associated with short-stay accommodation and other components of the proposed development.

5.3 Planning Scheme Requirements

The Acceptable Solution A1 of Clause E6.6.1 of the Planning Scheme states "*The number of on-site car parking spaces must be no less than and no greater than the number specified in Table E6.1*".

Table E6.1 requires the following parking provision for the residential component of the development:

- Multiple dwellings, 1-bedroom 1 space per dwelling = 11 spaces
- Multiple dwellings, 2 or more bedrooms 2 spaces per dwelling = 24 spaces
- Visitor parking 1 space per 4 dwellings = 6 spaces
- TOTAL 41 spaces

The visitor accommodation component requires 1 space per unit, which is a requirement for 38 spaces.

Whilst the café component of the development is considered to be ancillary to the residential component (ie. It is designed to cater for residents of the proposed development), Table E6.1 requires the following parking provision:

- 15 spaces per 100m^2 23 spaces

The business and professional services component of the development requires 1 space per 30m^2 of floor area. The consulting rooms are approximately 100m^2, thereby requiring 4 spaces.

The fitness centre requires 4.5 spaces per 100m2 of floor area, thereby requiring 18 spaces.

The total parking requirements in accordance with Table E6.1 is therefore 122 spaces.

The total parking provision of 70 spaces (67 spaces in the lower ground level and 3 spaces in the porte cochere) does not satisfy the requirements of Table E6.1 and the Acceptable Solution A1 of Clause E6.6.1 of the Planning Scheme is not met, with a shortfall of 52 spaces.

The Performance Criteria P1 of Clause E6.6.1 of the Planning Scheme states:

> *"The number of on-site car parking spaces must be sufficient to meet the reasonable needs of users, having regard to all of the following:*
>
> *(a) car parking demand;*
>
> *(b) the availability of on-street and public car parking in the locality;*
>
> *(c) the availability and frequency of public transport within a 400m walking distance of the site;*
>
> *(d) the availability and likely use of other modes of transport;*
>
> *(e) the availability and suitability of alternative arrangements for car parking provision;*
>
> *(f) any reduction in car parking demand due to the sharing of car parking spaces by multiple uses, either because of variation of car parking demand over time or because of efficiencies gained from the consolidation of shared car parking spaces;*
>
> *(g) any car parking deficiency or surplus associated with the existing use of the land;*
>
> *(h) any credit which should be allowed for a car parking demand deemed to have been provided in association with a use which existed before the change of parking requirement, except in the case of substantial redevelopment of a site;*
>
> *(i) the appropriateness of a financial contribution in lieu of parking towards the cost of parking facilities or other transport facilities, where such facilities exist or are planned in the vicinity;*
>
> *(j) any verified prior payment of a financial contribution in lieu of parking for the land;*
>
> *(k) any relevant parking plan for the area adopted by Council;*
>
> *(l) the impact on the historic cultural heritage significance of the site if subject to the Local Heritage Code;*
>
> *(m) whether the provision of the parking would result in the loss, directly or indirectly, of one or more significant trees listed in the Significant Trees Code".*

The following is relevant with respect to the development proposal:

a. Car parking demand. The parking demand has been calculated to be 91 spaces. The provision of 70 spaces is a shortfall of 21 spaces. The on-site parking is designated for the residential and short-stay accommodation components of the proposed development, with commercial components relying on the availability of on-street parking or alternative transport modes (noting that the commercial components are mostly ancillary to the residential and short-stay accommodation components).

b. On-street parking. There is a relatively large pool of available parking in New Town Road and connecting streets in the surrounding area. Whilst this parking is typically in high demand, it is recommended that some short-term time restrictions be made to adjacent on-street parking to better accommodate short duration visits to the site. This is detailed in Section 5.4.

   The development's commercial components (wellness centre and consulting rooms) are designed primarily as ancillary facilities serving residents and short-stay accommodation guests. External use of these facilities will be occasional and limited, making on-street parking an appropriate solution for this demand.

   Specific considerations supporting on-street parking reliance:

   - → Wellness centre access control: The swimming pool, sauna, gymnasium and fitness areas operate as private facilities accessible only to residents and their guests through secure access systems, fundamentally limiting external patronage.
   - → Consulting rooms scale: The ~100m² consulting rooms represent a small-scale practice that will generate minimal external traffic, typically 10-15 appointments per day.
   - → Temporal distribution: External visits to consulting rooms occur throughout business hours rather than concentrated peaks, allowing efficient use of available on-street spaces with recommended 2-hour time limits.
   - → Walking accessibility: The site's location within an established residential area means many potential users of ancillary services can walk or cycle, reducing parking demand.
   - → Existing parking management: Implementation of 2-hour parking restrictions will optimise turnover of the 13 on-street spaces directly adjacent to the site, plus an additional 10-20 spaces available within 100m on Clare Street during business hours.

   The combination of limited external access to wellness facilities, small-scale consulting operations, and managed on-street parking supply provides adequate provision for the minimal external parking demand anticipated.

   As noted in Section 5.4, the unrestricted nature of existing kerbside parking results in full occupancy by commuter vehicles, meaning that any survey data would merely confirm a static condition of over-utilisation. The underlying constraint is therefore management-based rather than capacity-based, and implementation of time-restricted parking remains the appropriate mechanism to ensure turnover and availability for short-stay users of the proposed development.

c. Public transport. Metro Tasmania operate frequent bus services along New Town Road. Bus stops are located immediately adjacent and opposite the New Town Road frontage of the site.

d. Other modes of transport. The site is located near residential and commercial catchments. Walking and cycling modes of transport are likely to be utilised from New Town and North Hobart areas.

e. Alternative parking arrangements. Not applicable.

f. Shared parking. Not applicable.

g. Parking deficiency or surplus. Not applicable.

h. Parking credit. Not applicable.

i. Cash in lieu. Not applicable.

j. Payment of cash in lieu. Not known.

k. Parking plan. Not applicable.

l. Historic cultural heritage significance. Not applicable.

m. Significant trees code. Not applicable.

Based on the above assessment, the development meets the requirements of Performance Criteria P1 of Clause E6.6.1 of the Planning Scheme.

5.4 On-Street Parking

The design of the accesses on New Town Road will require minor modifications to the on-street parking along its frontage.

5.4.1 Existing Parking Supply and Utilization

Approximately 13 on-street parking spaces are available adjacent to the property frontage on New Town Road when considering the proposed access arrangements and existing bus stop location. Site observations indicate these spaces are typically fully occupied throughout business hours on weekdays due to commuter parking demands.

The high utilisation of on-street parking by commuters was the primary reason formal parking surveys were not conducted for this section of New Town Road, as the existing demand pattern is well-established and predictable.

5.4.2 Proposed Parking Management Measures

Bus stop relocation: An existing bus stop is located at the northern end of the frontage. It is recommended that the bus stop be relocated to between the porte cochere accesses. There is sufficient available space to accommodate the bus stop in this location. The relocation will result in improved sight distance at the porte cochere access for the majority of the time, with buses only parked for brief periods throughout the day. Preliminary discussions with Metro Tasmania indicate that relocation of the bus stop would not be an issue.

Time limit implementation: The frontage of the site along New Town Road currently has unrestricted parking (no time restrictions for parking duration). The introduction of short-term parking restrictions (such as 2-hour limits) in consultation with Hobart City Council would discourage all-day commuter parking and free up kerbside spaces for short-term visitor parking associated with the proposed development. This approach would optimise the utilisation of the existing 13 spaces to better serve the parking demands of the development while maintaining accessibility for legitimate short-term users.

Other nearby parking availability: Observations in Clare Street indicate that there are typically 10 to 20 on-street parking spaces available during business hours on weekdays within 100 metres of the subject site, providing additional parking capacity within reasonable walking distance.

The implementation of time-restricted parking along the New Town Road frontage represents an effective parking management solution that would provide adequate on-street parking capacity to supplement the on-site provision and address the calculated parking shortfall. The theoretical shortfall (21 spaces) is considered manageable through kerbside time-limit management on New Town Road and adjacent streets, rather than additional on-site supply, noting current unrestricted parking is fully occupied by long-stay commuters.

5.4.3 Practicality of On-Street Parking Surveys

Council has requested that on-street parking surveys be undertaken to demonstrate available capacity within the surrounding road network. In this instance, however, such surveys would not provide meaningful or representative data because the existing kerbside parking along New Town Road operates under *unrestricted* conditions and is almost entirely occupied by long-stay commuter vehicles throughout business hours. This pattern of utilisation is consistent on weekdays, with turnover extremely low and occupancy effectively reaching 100% from mid-morning until late afternoon.

Conducting formal occupancy surveys under these conditions would simply confirm the already-observed saturation, offering no practical insight into the capacity of the network to accommodate short-term parking associated with the proposed development. The issue is not a shortage of physical parking supply but rather its *management* – specifically, the absence of turnover-inducing time restrictions. Introducing short-term parking limits (for example, 1 or 2-hour time restricted zones) would immediately release capacity for residents, visitors and commercial customers by discouraging all-day commuter parking.

Similar outcomes have been documented in other mixed-use corridors within Hobart where the application of modest parking controls has substantially improved parking turnover without increasing the total number of spaces. Accordingly, the implementation of time-restricted parking along the site frontage and adjacent sections of New Town Road represents a far more effective and evidence-based measure than attempting to quantify existing occupancy that is known to be saturated.

In summary, parking surveys under current unrestricted conditions would not yield any new or useful data. Instead, the recommended parking-management approach – the introduction of 2-hour limits along the site frontage combined with the identified surplus of 10–20 available spaces in nearby Clare Street, provides a pragmatic and sustainable means of accommodating the small residual parking shortfall associated with the development.

5.5 Accessible Parking

The proposed development provides a total of 2 disabled parking spaces within the lower ground car parking area.

The Acceptable Solution A1 of Clause E6.6.2 of the Planning Scheme states:

"Car parking spaces provided for people with a disability must:

(a) satisfy the relevant provisions of the Building Code of Australia;

(b) be incorporated into the overall car park design;

(c) be located as close as practicable to the building entrance".

The National Construction Code provides the requirements for the number of disabled spaces. The Code classifies the building as a Class 2 building (multi-unit residential buildings). No disabled parking provision is required for Class 2. The commercial components of the development include the café, consulting rooms and wellness centre. These are classified as a 'Class 9b' building. This requires 1 disabled parking space for every 100 car parking spaces. This is a requirement for 1 disabled space, with 2 disabled spaces provided.

The Acceptable Solution A1 of Clause E6.6.2 of the Planning Scheme is met.

5.6 Motorcycle Parking

The proposed development provides a total of 4 motorcycle parking spaces in the lower ground level car park.

The Acceptable Solution A1 of Clause E6.6.3 of the Planning Scheme states "*The number of on-site motorcycle parking spaces provided must be at a rate of 1 space to each 20 car parking spaces after the first 19 car parking spaces except if bulky goods sales, (rounded to the nearest whole number). Where an existing use or development is extended or intensified, the additional number of motorcycle parking spaces provided must be calculated on the amount of extension or intensification, provided the existing number of motorcycle parking spaces is not reduced*".

This is a requirement for 3 motorcycle parking spaces. The provision of 4 motorcycle parking spaces therefore satisfies the requirements of Acceptable Solution A1 of Clause E6.6.3 of the Planning Scheme.

5.7 Bicycle Parking

On-site bicycle parking is provided in the lower ground car parking area in the form of a dedicated compound. The bicycle parking will service the overall site, with provision for the residential units as well as the commercial components of the development.

The Acceptable Solution A1 of Clause E6.6.4 of the Planning Scheme states "*The number of on-site bicycle parking spaces provided must be no less than the number specified in Table E6.2*".

The requirements of Table E6.2 are summarised in Table 2. The proposed development provides a total of more than 30 bicycle parking spaces within a dedicated area within the car park. The bicycle parking provision exceeds the minimum requirements of Table E6.2 and therefore Satisfies the requirements of Acceptable Solution A1 of Clause E6.6.4 of the Planning Scheme.

Table 2 Bicycle Parking Requirements

Use	Floor area/ Unit	Employee Requirement	Visitor Requirement	TOTAL Bicycle Spaces
Café	137 m^2	1 for each 100m2 = 1 space	Minimum 2 spaces = 2 spaces	3 bicycle spaces
Consulting rooms	~100 m^2	1 for each 250m^2 after first 250m^2 = 0 spaces	1 for each 1,000m^2 if greater than 1,000m^2 = 0 spaces	0 bicycle spaces
Wellness centre	~400 m^2	1 for each 250m^2 after first 250m^2 = 1 space	1 for each 1,000m^2 if greater than 1,000m^2 = 0 spaces	1 bicycle space
Short-stay accommodation	38 units	1 for each 40 rooms = 1 space	1 for each 30 rooms = 1 space	2 bicycle spaces
Residential dwellings	23 units	No requirement	No requirement	0 spaces
TOTAL		3 spaces	3 spaces	6 bicycle spaces

5.8 Car Parking Layout

The Acceptable Solution A1 of Clause E6.7.5 of the Planning Scheme states "*The layout of car parking spaces, access aisles, circulation roadways and ramps must be designed and constructed to comply with section 2 "Design of Parking Modules, Circulation Roadways and Ramps" of AS/NZS 2890.1:2004 Parking Facilities Part 1: Off-street car parking and must have sufficient headroom to comply with clause 5.3 "Headroom" of the same Standard*".

The on-site car parking is defined as a 'residential property' under AS2890.1 as it comprises three or more domestic units (three proposed units and the existing dwelling) and the car park provides access to predominantly residential parking. The assessment of the requirements of AS2890.1 are set out in the following sections.

5.8.1 Car Parking Dimensions

For residential parking spaces (User Class 1A), Australian Standards, AS2890.1 requires the following dimensions for 90-degree parking spaces:

- Space width 2.4 metres
- Space length 5.4 metres
- Aisle width 5.8 metres

All parking spaces comply with the minimum AS2890.1 dimensional requirements (noting that the aisle widths are 6.1 metres).

5.8.2 Access and Ramp Assessment

The assessment of the access width and ramp were conducted in Section 4.4.2. The access width complies with AS2890.1 requirements. The ramp gradients do not comply with the prescriptive requirements of AS2890.1, with the initial 4.13m section at 12.5% exceeding the 5% maximum for the first 6 meters of access.

However, the access design satisfies Performance Criteria P1 of Clause E6.7.2 of the Planning Scheme, providing safe, efficient and convenient access appropriate for the intended residential use within the physical constraints of the site.

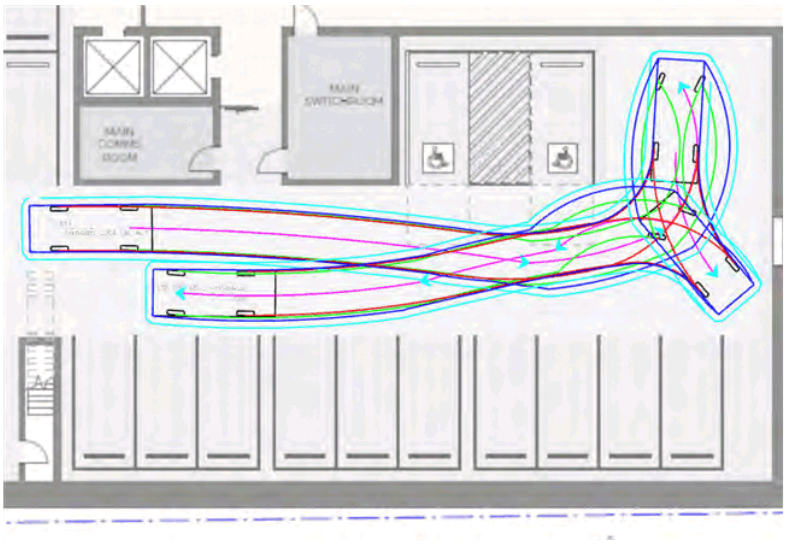
5.8.3 Height Clearance

AS2890.1 requires a minimum height clearance of 2.2 metres. The available height clearance satisfies this requirement within the car parking area.

5.8.4 Forward Entry and Exit

The car park has been designed with a circulation that facilitates forward entry and exit even when all parking spaces are fully occupied. A turning area is also provided at the northeastern aisle of the car park to facilitate on-site turning as shown in Figure 14.

Figure 14 B85 Vehicle Swept Path – On-Site Turning



5.8.5 Internal Manoeuvring

AS2890.1 requires that in areas in which it is necessary for two vehicles to pass one another shall be designed for a B85 vehicle to pass a B99 vehicle. In both cases areas shall be checked using single turn swept path templates for the B99 vehicle and the B85 vehicle.

The swept path assessment of the key intersection areas of the car park are shown in Figure 15.

Figure 15 Intersection Swept Paths



It can be seen that key intersection and corner areas cannot permit the simultaneous passage of a B99 and B85 vehicle. This is a common situation in basement car parks where the area is constrained. The low speed and low volume environment results in a safe environment for users, with the occasional requirement for vehicles to stop whilst a vehicle travels in the opposing direction.

At the base of the ramp there is sufficient area for two vehicles (B99 and B85) to utilise the ramp simultaneously in opposing directions.

5.8.6 AS2890.1 Assessment Summary

The parking layout does not satisfy Acceptable Solution A1 of Clause E6.7.5 due to ramp gradient non-compliance.

The Performance Criteria P1 of Clause 6.7.5 of the Planning Scheme states "*The layout of car parking spaces, access aisles, circulation roadways and ramps must be safe and must ensure ease of access, egress and manoeuvring on-site*".

The following is relevant with respect to car park and ramp design:

Safe Access and Egress:

- The 6.5m access width provides adequate clearance for vehicle movements and driver error tolerance.
- Single-direction traffic flow eliminates conflicts on the ramp sections.
- Appropriate sight distance is maintained throughout the access route.
- Smooth geometric transitions between gradient changes allow controlled vehicle operation.

Convenient Manoeuvring:

- Parking space dimensions comply with AS2890.1 requirements.
- Forward entry and exit capability is provided through appropriate circulation design.
- Turning areas facilitate on-site manoeuvring without requiring reversing movements on public roads.
- The design accommodates the intended user class.

Operational Suitability:

- The layout serves the low-volume residential use appropriately.
- Regular users develop familiarity with the access characteristics, enhancing safety.
- Modern passenger vehicles have adequate capability for the proposed gradients.
- Emergency vehicle access is maintained.

The gradient non-compliance results from unavoidable site constraints where the significant level difference between street and basement levels cannot be accommodated with compliant gradients within the available site area (as documented in Section 4.4.2). The design achieves the performance objective of safe and convenient parking area layout within these physical limitations.

5.9 Commercial Vehicles

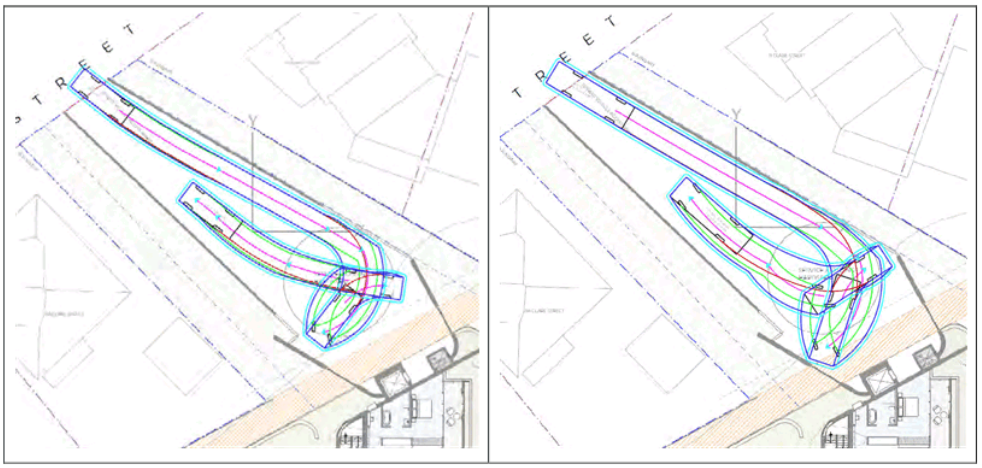
The Acceptable Solution A1 of Clause E6.7.13 states:

> *"Commercial vehicle facilities for loading, unloading or manoeuvring must be provided onsite in accordance with Australian Standard for Off-street Parking, Part 2 : Commercial. Vehicle Facilities AS 2890.2:2002, unless:*
>
> *(a) the delivery of all inward bound goods is by a single person from a vehicle parked in a dedicated loading zone within 50 m of the site;*
>
> *(b) the use is not primarily dependent on outward delivery of goods from the site".*

All commercial vehicles will access the site via the Clare Street access. A multi-purpose hard stand area is provided for waste collection and deliveries. The use of the access is expected to be infrequent.

The Clare Street access will facilitate vehicles up to an 8.8-metre service vehicle (medium rigid vehicle, MRV). Swept paths of a small rigid vehicle (SRV) and MRV are shown in Figure 16.

Figure 16 SRV & MRV Swept Path Assessment



The loading area provided within the access provides access to SRV and MRV vehicles and facilitates forward entry and exit at Clare Street.

The design therefore complies with the requirements of AS2890.2 and satisfies the requirements Acceptable Solution A1 of Clause E6.7.13 of the Planning Scheme.

6. Conclusions

This Traffic Impact Assessment has examined the traffic and parking implications of the proposed mixed-use development at 48–52 New Town Road, comprising 38 visitor-accommodation units, 23 multiple dwellings, commercial tenancies including a publicly accessible fitness and wellness centre and consulting rooms, and associated communal facilities.

The development is expected to generate approximately 369 vehicle movements per day, with peak-hour volumes of 33 vph (AM) and 45 vph (PM). These volumes are well within the capacity of New Town Road and Clare Street and will not materially affect intersection performance or road safety.

A total of 70 on-site parking spaces are provided against a Planning Scheme requirement of 122 spaces, representing a 52-space shortfall. This shortfall is driven primarily by the fitness/ wellness centre and consulting rooms. The reasonable needs of users can be met through kerbside time-limit management on New Town Road and adjacent streets, noting existing unrestricted parking is fully occupied by long-stay commuters; accordingly, formal on-street surveys would only confirm saturation and do not represent an effective planning tool in this context.

The trip assignment indicates a modest split between the porte-cochere (short-stay pick-up/drop-off) and the basement car-park access (residents/guests), with service vehicles using Clare Street. This configuration separates commercial/ servicing flows from residential access, improving operational safety. The Clare Street service access satisfies AS2890.2 and enables forward entry/exit for the design vehicles.

From an access performance perspective, the updated peak (45 vph PM peak) remains low for the frontage road; the E5.6.2:P2 criteria are satisfied given the nature and frequency of traffic, the 50-km/h environment, available sight distance, and the provision of separate accesses for car-park, porte-cochere, and servicing. The basement ramp gradients remain non-prescriptive under AS2890.1, but meet E6.7.2:P1 on performance grounds (safe, efficient, convenient) considering site constraints, adequate width and sight distance, and the predominantly regular user group.

Subject to implementing 2-hour kerbside limits along the site frontage (and acknowledging 10–20 spaces typically available within ~100 m on Clare Street during business hours), the residual shortfall from theoretical demand is practically accommodated without adverse off-site effects. On this basis, the parking and access outcomes are considered acceptable and the development is supported on traffic grounds.

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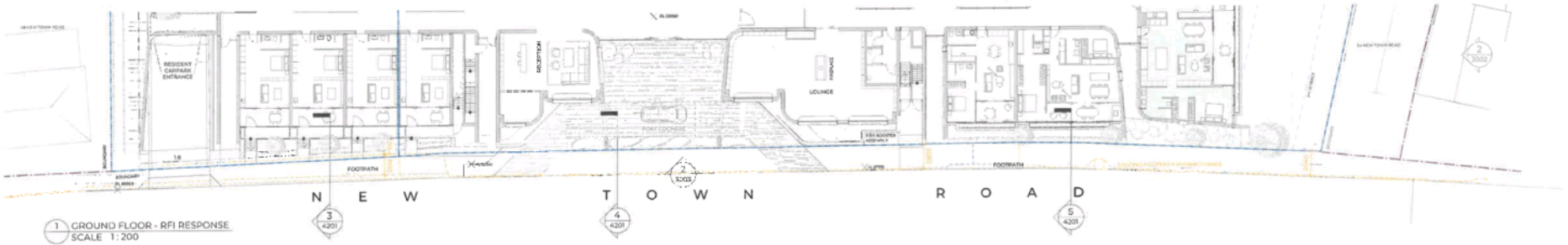
Document Status

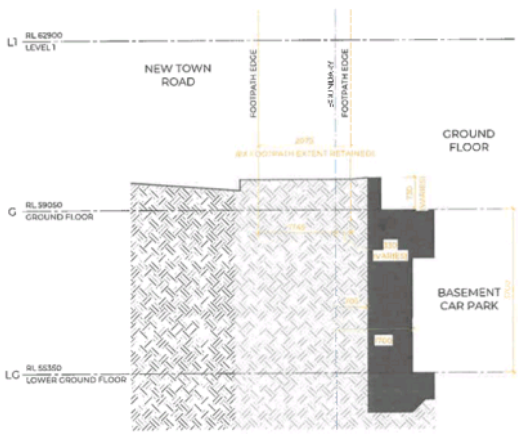
Revision	Author	Review	Date
0	Keith Midson	Zara Kacic-Midson	20 December 2024
1	Keith Midson	Zara Kacic-Midson	23 December 2024
2	Keith Midson	Zara Kacic-Midson	2 July 2025
3	Keith Midson	Zara Kacic-Midson	23 July 2025
4	Keith Midson	Zara Kacic-Midson	8 September 2025
5	Keith Midson	Zara Kacic-Midson	10 September 2025
6	Keith Midson	Zara Kacic-Midson	15 October 2025



1 GROUND FLOOR - RFI RESPONSE
SCALE 1:200



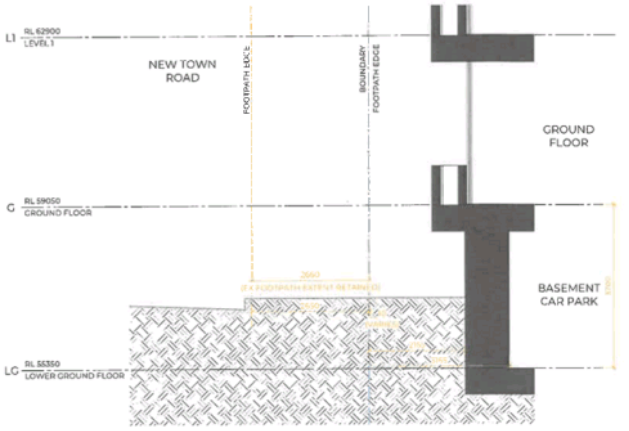
2 LOWER GROUND FLOOR - RFI RESPONSE
SCALE 1:200



3 NEW TOWN ROAD FOOTPATH SECTION - SOUTH
SCALE 1:50



4 NEW TOWN ROAD FOOTPATH SECTION - PORTE COCHERE
SCALE 1:50



5 NEW TOWN ROAD FOOTPATH SECTION - NORTH
SCALE 1:50

SCALE BAR
0 2.5 5 10 20m

Recent revision history

#	Status	Description	Date
A		BASEMENT REVISION	06/06/2025
B		COUNCIL RFI	17/09/25

Notes
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Contractor must verify all dimensions on site before commencing work or preparing shop drawings.
Do not scale drawings.

DEVELOPMENT APPLICATION NOT FOR CONSTRUCTION 06/06/25

Date generated: 17/09/2025 9:53:05 PM

LEGEND
BOUNDARY
FOOTPATH FROM SURVEY

GENERAL NOTES:

THIS DRAWING IS FOR COUNCIL ASSESSMENT PURPOSES ONLY, AND IS NOT FOR TENDER, CONSTRUCTION OR ANY OTHER PURPOSE. PROPOSED ARCHITECTURAL WORKS IS SUBJECT TO TO FURTHER REFINEMENT, DETAILED DESIGN DEVELOPMENT AND FURTHER SPECIALIST CONSULTANT ENGINEERING COORDINATION. LEVELS, BOUNDARIES AND BEARINGS DEPICTED ARE BASED ON SURVEY INFORMATION PROVIDED AND THEREFORE THE ACCURACY THERE OF IS SUBJECT TO THE VERACITY OF THAT INFORMATION.

ORIGIN OF SURVEY INFORMATION
PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 46187MD-3A
DATE: 29/7/2021

PDA SURVEYORS, ENGINEERS & PLANNERS
REFERENCE: 53691MD-1
DATE: 6/12/2024

Project: NEW TOWN RESIDENCES
Client: THE HOUSE FAMILY OFFICE

Issuer: W-B WOODS BAGOT
Project number: 121978
Size check: 25mm
Checked: AJ
Approved: JG
Sheet size: A1
Scale: As indicated

Sheet title: NTR FOOTPATH - RFI RESPONSE
Sheet number: DA - 4201
Revision: B
Status: DEVELOPMENT APPLICATION

DRAWING LIST	
DRAWING NUMBER	DRAWING TITLE
001	COVER SHEET
002	GENERAL NOTES
010	EXISTING SERVICES
020	CONCEPT STORMWATER & ACCESS's
021	OVERLAND FLOW PATHS & DETAILS
022	CONCEPT DRIVE 1 LONG SECTION
023	CONCEPT DRIVE 2 LONG SECTION
025	STORMWATER LONG SECTION 1
026	STORMWATER LONG SECTION 2
030	CONCEPT SEWER AND WATER
035	CONCEPT SEWER LONG SECTION 1
036	CONCEPT SEWER LONG SECTION 2
040	WATER METER DETAILS-1
050	SECTION PLAN
051	SECTIONS 1
052	SECTIONS 2
053	SECTIONS 3
054	SECTIONS 4

DRAFTING CHECK

CHANGES REQUIRED: YES ____ NO ____
APPLIES TO ALL DRG'S IN SET: YES ____ NO ____
NAME (PRINT): ____
SIGNATURE: ____
DATE: ____

DESIGN CHECK

CHANGES REQUIRED: YES ____ NO ____
APPLIES TO ALL DRG'S IN SET: YES ____ NO ____
NAME (PRINT): ____
SIGNATURE: ____
DATE: ____

XXXXX COUNCIL SUBMISSIONS - XXXXX/XXXXXX-X		
REV	DATE ISSUED	DESCRIPTION

TASWATER SUBMISSIONS - TWXXXXXX/XXXX-XXX		
REV	DATE ISSUED	DESCRIPTION

THE HOUSE FAMILY OFFICE
52 New Town Rd, New Town TAS
NEW TOWN RESIDENCES



LOCALITY MAP

PROJECT STATUS							
REV	DATE ISSUED	DRAWN BY	AMENDED BY	CHECKED BY	CLIENT SUBMISSION	COUNCIL SUBMISSION	TASWATER SUBMISSION
P1	11/12/2024	SC	-	MW	11/12/2024	-	-
P2	19/12/2024	SC	-	MW	19/12/2024	-	-
P3	09/01/2024	AK	-	MW	09/01/2024	-	-
P4	16/01/2025	AK	-	MW	16/01/2025	-	-
A	04/07/2025	SC		MW	04/07/2025	-	-
B	19/09/2025	SC	-	MW	19/09/2025	-	-
C	27/10/2025	SC	-	MW	27/10/2025	-	-

REV	AMENDMENTS	DRAWN	DATE	APPR.
-	---	-	-/-/--	-
-	---	-	-/-/--	-
C	LANDSCAPE WALLS ADDED, SECTION ADDED, USER ROAD FOOTPATH DIMENSIONED AND NOTED	SC	06/11/2025	MD
B	AMENDMENTS FOR HCC & TASWATER R/S	SC	19/09/2025	MD
A	FOR DEVELOPMENT APPROVAL	SC	04/07/2025	MD

DRAWING STATUS: FOR DEVELOPMENT APPROVAL
COORDINATE/ DATUM: PLANAR MGA2020
THIS SHEET MAY BE PRINTED USING COLOUR AND MAY BE INCOMPLETE IF COPIED

DESIGNED: SC | REVIEWED: MW/RP
DRAWN: SC | REVIEWED: MW/RP
JOB MANAGER: MATTHEW DENHOLM
ISSUED DATE: 06/11/2025

CLIENT:
PROJECT DESCRIPTION: THE HOUSE FAMILY OFFICE RESIDENTIAL DEVELOPMENT
ADDRESS: 48-52 NEW TOWN ROAD, NEW TOWN
DRAWING TITLE: COVER SHEET

PDA SURVEYORS, ENGINEERS & PLANNERS
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PHONE: +61 03 6234 3217
EMAIL: pda.hob@pda.com.au
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REGISTRATION NUMBER: -----

CONTRACT NO: ------
SCALE: 1: NTS
PAPER: (A3)
JOB NUMBER: 53851MD
DESCRIPTION: C
SHEET: 001
TOTAL SHEETS: C

DATE/TIME: Thursday, 6 November 2025 12:07:18 PM PLOTTED: STEVE CHAFFEY FILE LOCATION: S:\53851MD - EN - 52 NEW TOWN ROAD FTY LTD - 52 NEW TOWN ROAD\4-ENG\1-CAD\53851MD-ENG-SW.DWG

GENERAL NOTES:

1. NO ATTEMPT HAS BEEN MADE TO LOCATE ALL SERVICES. ONLY THOSE SERVICES CONSPICUOUS DURING FIELD SURVEYS ARE SHOWN. PRIOR TO ANY DEMOLITION, EXCAVATION OR CONSTRUCTION ON THE SITE, THE RELEVANT AUTHORITY(S) SHOULD BE CONTACTED FOR POSSIBLE LOCATION OF FURTHER UNDERGROUND SERVICE AND DETAILED LOCATIONS OF ALL SERVICES.
2. ALL DIMENSIONS AND LOT SIZES SUBJECT TO FINAL SURVEY.
3. REFER IPWEA - LGAT SPECIFICATIONS, TASMANIAN STANDARD DRAWINGS ISSUED - 03 DECEMBER 2020

   TSD-G01.v3 - TRENCH REINSTATEMENT FLEXIBLE PAVEMENTS
   TSD-G02.v3 - URBAN ROADS - TYPICAL SERVICE LOCATIONS
   TSD-R01.v3 - RURAL ROADS UNSEALED
   TSD-R02.v3 - RURAL ROADS SEALED
   TSD-R03.v3 - RURAL ROADS - TYPICAL DRIVEWAY ACCESS
   TSD-R04.v3 - RURAL ROADS - TYPICAL DRIVEWAY PROFILE
   TSD-R05.v3 - TRUCK ACCESS TO RURAL PROPERTIES 'TYPE A'
   TSD-R06.v3 - URBAN ROADS - TYPICAL SECTIONS & PAVEMENT WIDTHS
   TSD-R09.v3 - URBAN ROADS - DRIVEWAYS
   TSD-R11.v3 - URBAN ROADS - FOOTPATHS
   TSD-R12.v3 - SUB SOIL DRAINS - CONSTRUCTION DETAILS
   TSD-R13.v3 - SUBSOIL DRAINS PIT CONNECTION - TYPE FD
   TSD-R14.v3 - CONCRETE KERBS & CHANNELS DIMENSIONS
   TSD-R15.v3 - CONCRETE KERBS & CHANNELS CONSTRUCTION DETAILS
   TSD-R16.v3 - CONCRETE KERBS & CHANNELS VEHICULAR CROSSINGS
   TSD-R18.v3 - CONCRETE KERBS & CHANNELS ACCESS RAMPS
   TSD-R26.v3 - DELINEATORS
   TSD-R28.v3 - W-BEAM - INSTALLATION DETAILS
   TSD-SW01.v3 - PIPE INSTALLATION ANCHOR BLOCKS
   TSD-SW02.v3 - MANHOLES - 100-600 DIA. PIPES - GENERAL ARRANGEMENTS
   TSD-SW03.v3 - MANHOLES - 100-600 DIA. PIPES - BENCHING DETAILS
   TSD-SW09.v3 - SIDE ENTRY PITS - 'TYPE 3'
   TSD-SW11.v3 - SIDE ENTRY PITS - KERB TRANSITIONS
   TSD-SW15.v3 - STORMWATER - 'GP'
   TSD-SW17.v3 - OUTLET HEADWALLS 300 - 600 DIA PIPES
   TSD-SW25.v3 - STORMWATER PROPERTY CONNECTIONS TO MAINS
   TSD-SW26.v3 - SADDLE CONNECTION TO STORMWATER DRAIN
   TSD-SW27.v2 - REPAIRS/ NEW CONNECTION TO STORMWATER DRAIN
   TSD-SW28.v3 - GUIDELINES FOR SEDIMENT CONTROL
   TSD-RF04.v3 - NATURE STRIP DETAILS
4. CONSTRUCTION TO COMPLY WITH WSAA SEWERAGE CODE OF AUSTRALIA (MELBOURNE RETAIL WATER AGENCIES EDITION) - WSA 02-2014-3.1 v3 AND TASWATER SUPPLEMENT TO THE CODE.
5. ALL WORKS TO BE CONSTRUCTED IN ACCORDANCE WITH THE TASMANIAN SUBDIVISION GUIDELINES (VERSION 1.0 , DATED OCTOBER 2013) UNLESS OTHERWISE NOTED.
6. ALL CONNECTIONS TO EXISTING SEWER AND WATER MAINS TO BE CARRIED OUT BY TASWATER OR APPROVED CONTRACTOR AT DEVELOPER'S COST UNLESS APPROVED OTHERWISE.

SURVEY NOTES:

1.	DATUM:	MGA2020 & AHD
2.	PLANAR OR GRID:	PLANAR
3.	SITE CONTROL:	SPM 72
4.	SURVEYED BY:	PDA
5.	ACCURACY OF SURVEY:	0.02m
6.	ACCURACY/STATUS OF EXISTING & FUTURE PROPERTY BOUNDARIES:	1.0m

ROADS & STORMWATER NOTES:

1. ALL STORMWATER LOT CONNECTIONS TO BE DN150 UNLESS OTHERWISE NOTED.
2. ALL STORMWATER LINES DN300 PVC-U SN8 OR EQUIVALENT UNLESS NOTED OTHERWISE.
3. ALL FOOTPATHS TO BE N25 CONCRETE 100mm THICK, SL72 CENTRAL, 100 x 20 FCR BASE.
4. 2 x 65 DIA WEEPHOLES TO BE PLACED IN ALL STORMWATER SIDE ENTRY PITS AND MANHOLES WITH NO SUBSOIL DRAIN CONNECTIONS.
5. ALL STORMWATER BRANCHES TO TERMINATE AT PROPERTY BOUNDARIES WITH AN INSPECTION OPENING RAISED TO SURFACE WITH AN APPROVED COVER 1m INSIDE PROPERTY BOUNDARY.
6. ALL LOT CONNECTIONS TO BE CONSTRUCTED IN THE POSITION SHOWN UNLESS APPROVED BY THE SUPERINTENDENT.
7. FINAL POSITION AND WIDTH OF ALL DRAINAGE EASEMENTS IS TO BE DETERMINED FOLLOWING CONSTRUCTION.
8. EXTENT OF ROADWORKS SHOWN SHADED.
9. ALL FILL AREAS TO BE PLACED AND COMPACTED PRIOR TO TRENCH EXCAVATION.
10. PROVIDE TRAFFICABLE LIDS TO CONNECTIONS IN TRAFFICABLE AREAS INCLUDING DRIVEWAYS.
11. ALL DRIVEWAYS TO HAVE MAXIMUM GRADE 20% OUTSIDE LOT BOUNDARIES AND 25% INSIDE LOT BOUNDARIES AND CONSTRUCTED AS PER TSD-R09 V3.
12. PROVIDE MINIMUM 150mm CLEARANCE FROM TOP OF ROD EYES TO SURFACE COVER LID.

STORMWATER LONG SECTION NOTES:

1. ALL EXCAVATION OVER 1.5m IN DEPTH MUST BE CARRIED OUT IN ACCORDANCE WITH WORKPLACE SAFETY STANDARDS CODE OF PRACTICE FOR EXCAVATION WORK.
2. COMPACTED FCR BACKFILL UNDER ROADS & DRIVEWAYS.
3. ALL ANCHOR BLOCKS (CONCRETE BULKHEADS) ARE TO BE KEYED INTO UNDISTURBED, COMPETENT MATERIAL TO ENSURE THE MIGRATION OF BEDDING AND BACKFILL MATERIAL IS REDUCED AND THE INTEGRITY OF THE PIPE IS MAINTAINED.
4. TRENCHES >10% ARE TO HAVE CONTINUOUS DRAINAGE PATH INSTALLED TO ENSURE WATER THAT HAS MIGRATED INTO THE TRENCH IS CARRIED TO THE RETICULATED SYSTEM. REFER TSD-SW01.
5. ALL FILL TO BE PLACED & COMPACTED PRIOR TO TRENCH EXCAVATION.
6. FILL IN EXCESS OF 300mm DEPTH TO BE COMPACTED TO 95% STANDARD DENSITY (AS 1289E4.01) IN 150mm MAX LAYERS.
7. PROVIDE MINIMUM 150mm CLEARANCE FROM TOP OF ROD EYES TO SURFACE COVER LID.

NATURE STRIP NOTES:

1. APPLY 100mm THICK 20mm SCREENED LOAM TO NATURE STRIP & APPLY GRASS SEED AS PER TSD-RF04-v3.
2. NATURE STRIPS TO BE WATERED & MAINTAINED INCLUDING WEED REMOVAL & MOWING THROUGHOUT THE MAINTENANCE PERIOD.
3. FOR FILL BATTERS, BENCH AS SHOWN AND PLACE APPROVED FILL IN 300mm LAYERS COMPACTED TO 95% MAX DRY DENSITY. FILL TO BE PLACED & COMPACTED PRIOR TO TRENCH EXCAVATION.
4. MATERIAL TO BE PLACED AND COMPACTED UNIFORMLY IN LAYERS ACROSS THE EMBANKMENT NO GREATER THAN 300mm TO ACHIEVE 95% MDD. FOR FILL BATTERS, BENCH AS SHOWN.

ENGINEERED FILL NOTES:

1. FILL MATERIAL FOR NEW ROAD AND FILL EMBANKMENTS MUST NOT CONTAIN ORGANIC OR OTHER MATERIALS THAT DECOMPOSE OR OTHERWISE LEAD TO LONG TERM SETTLEMENT AND TO BE APPROVED BY SUPERINTENDENT BEFORE USE.
2. MATERIAL TO BE PLACED AND COMPACTED UNIFORMLY IN LAYERS UNDER NEW ROAD NO GREATER THAN 150mm TO ACHIEVE 98% MDD AND ACROSS ROAD EMBANKMENT NO GREATER THAN 300mm TO ACHIEVE 95% MDD. FOR FILL BATTERS, BENCH AS SHOWN.
3. ROAD EMBANKMENT TO BE FULLY CONSTRUCTED PRIOR TO TRENCHING FOR WATER AND SEWER SERVICES.
4. FILL TO BE PLACED & COMPACTED PRIOR TO TRENCH EXCAVATION.
5. SITE FILLING THAT EXCEEDS A DEPTH OF 300mm MUST BE PLACED IN ACCORDANCE WITH THE AS3798 GUIDELINES FOR COMMERCIAL AND RESIDENTIAL DEVELOPMENTS 1996. UPON COMPLETION OF THE WORKS THE CONTRACTORS GEOTECHNICAL ENGINEER MUST CONFIRM IN WRITING THAT THE WORKS HAVE BEEN CARRIED OUT IN ACCORDANCE WITH AS3798.

SEWER NOTES:

1. ALL SEWER MAINS TO BE DN150 PVC-U 'SN8' (SWJ) U.N.O.
2. CONNECTION TO EXISTING SEWER MAIN BY TASWATER AT DEVELOPER'S COST.
3. ALL SEWER WORKS MUST BE PRESSURE TESTED AND INSPECTED BY TASWATER PRIOR TO BACKFILL OR CONSTRUCTION OF MANHOLE BASES.
4. ALL SEWER LOT CONNECTIONS TO BE DN100 WITH SEWER INSPECTION OPENINGS (PROPERTY SEWER CONNECTION POINTS) TO SURFACE LEVEL AS PER STANDARD DRAWING MRWA-S-301 OF SEWERAGE CODE OF AUSTRALIA, PER TASWATER'S SUPPLEMENT TO THE CODE.
5. CONCRETE BULKHEADS MUST BE IN ACCORDANCE WITH MRWA-S-206.
6. INTERNAL DROP MANHOLE IN ACCORDANCE WITH MRWA-S-311.
7. ALL FILL AREAS TO BE PLACED AND COMPACTED PRIOR TO TRENCH EXCAVATION.
8. ALL FILLED AREAS OVER EXISTING SEWER MAINS TO BE DISCUSSED AND DETAIL APPROVED BY TASWATER PRIOR TO CONSTRUCTION.
9. THE CONTRACTOR SHALL NOT VARY THE POSITION OF ANY LOT CONNECTION WITHOUT PRIOR APPROVAL FROM THE SUPERINTENDENT.
10. PROVIDE MINIMUM 150mm CLEARANCE FROM TOP OF INSPECTION SHAFTS TO SURFACE COVER LID.
11. SEWER LOT CONNECTIONS TO BE A MAXIMUM OF 1.5m BELOW THE FINISHED SURFACE LEVEL OF THE LOT WHERE POSSIBLE.
12. PIPES TO BE SURVEYED PRIOR TO BACKFILLING.

SEWER LONG SECTION NOTES:

1. ALL EXCAVATION OVER 1.5m IN DEPTH MUST BE CARRIED OUT IN ACCORDANCE WITH WORKPLACE STANDARDS CODE OF PRACTICE FOR EXCAVATION WORK.
2. ALL ANCHOR BLOCKS (CONCRETE BULKHEADS) ARE TO BE KEYED INTO UNDISTURBED, COMPETENT MATERIAL TO ENSURE THE MIGRATION OF BEDDING AND BACKFILL MATERIAL IS REDUCED AND THE INTEGRITY OF THE PIPE IS MAINTAINED.
3. TRENCHES >15% ARE TO HAVE CONTINUOUS DRAINAGE PATH INSTALLED TO ENSURE WATER THAT HAS MIGRATED INTO THE TRENCH IS CARRIED TO THE RETICULATED SYSTEM. REFER SEW-1206, SEW-1207.
4. ALL FILL TO BE PLACED & COMPACTED PRIOR TO TRENCH EXCAVATION.
5. FILL IN EXCESS OF 300mm DEPTH TO BE COMPACTED TO 95% STANDARD DENSITY (AS 1289E4.01) IN 150mm MAX LAYERS.
6. PROVIDE MINIMUM 150mm CLEARANCE FROM TOP OF INSPECTION SHAFTS TO SURFACE COVER LID.
7. SEWER LOT CONNECTIONS TO BE A MAXIMUM OF 1.5m BELOW THE FINISHED SURFACE LEVEL OF THE LOT WHERE POSSIBLE.
8. TRENCHES STEEPER THAN 10% TO HAVE CEMENT STABILIZED FCR EMBEDMENT - REFER TO SEWER LONG SECTIONS.

WATER NOTES:

1. ALL WATER LOT CONNECTIONS TO BE DN25 PE100 PN16 PIPE (UNO) WITH AN INDIVIDUAL 20mm NOMINAL DIAMETER METER WITH INTEGRAL DUAL CHECK VALVE AND GATE VALVE WITHIN A PVC BOX AS PER TWS-W-0002 SERIES.
2. ALL DICL MUST HAVE A POLYETHELENE SLEEVE AS PER CITY WEST WATER APPROVED PRODUCTS CATALOGUE AND TO HAVE POLYETHYLENE WRAP PER AS3680.
3. THRUST BLOCK TO BE PROVIDED AT ALL BENDS, TEES & DEAD END AS PER MRWA-W-204.
4. ALL WATER WORKS MUST BE PRESSURE TESTED AND INSPECTED BY TASWATER PRIOR TO BACKFILL.
5. SUPPLY & INSTALL ROAD HYDRANT MARKERS IN ACCORDANCE WITH SECTION 8 OF THE INSTITUTE OF MUNICIPAL ENGINEERING AUSTRALIA'S TASMANIA DIVISION DOCUMENT TITLED "FIRE HYDRANT GUIDELINES".
6. MINIMUM COVER TO BE 600mm AND MAXIMUM 900mm UNDER TRAFFICABLE AREAS.
7. MAXIMUM ALLOWABLE JOINT DEFLECTION IS ¾ OF MANUFACTURERS MAXIMUM ALLOWABLE JOINT DEFLECTION HORIZONTALLY & VERTICALLY.
8. ALL FITTINGS TO BE COMPATIBLE WITH OPVC PN16 PIPEWORK, MINIMUM CLASS 16.
9. ALL FILL AREAS TO BE PLACED AND COMPACTED PRIOR TO TRENCH EXCAVATION.
10. FILL MATERIAL FOR NEW ROAD AND FILL EMBANKMENTS MUST NOT CONTAIN ORGANIC OR OTHER MATERIALS THAT DECOMPOSE OR OTHERWISE LEAD TO LONG TERM SETTLEMENT AND TO BE APPROVED BY SUPERINTENDENT BEFORE USE. MATERIAL TO BE PLACED AND COMPACTED UNIFORMLY IN LAYERS ACROSS THE EMBANKMENT NO GREATER THAN 300mm TO ACHIEVE 95% MDD. FOR FILL BATTERS, BENCH AS SHOWN. ROAD EMBANKMENT TO BE FULLY CONSTRUCTED PRIOR TO TRENCHING FOR WATER AND SEWER SERVICES.
11. METALLIC WARNING TAPE TO BE INSTALLED ABOVE WATER PIPES.
12. PIPES TO BE SURVEYED PRIOR TO BACKFILLING.

SWMP NOTES:

1. AREAS OF GROUND DISTURBANCE ARE SHOWN. WORKS TO BE CONFINED TO WITHIN THESE AREAS. CLEARING FOR WORKS TO BE LIMITED TO WITHIN 5 METRES FROM THE EDGE OF ANY ESSENTIAL CONSTRUCTION ACTIVITY. (REFER FACT SHEET 5: MINIMIZE SOIL DISTURBANCE).
2. ALL EXCAVATION IS TO COMPLY WITH "FACT SHEETS: SOIL & WATER MANAGEMENT FOR BUILDING & CONSTRUCTION SITES - 2008". THESE ARE AVAILABLE AT www.derwentestuary.org.au.
3. EXCAVATION TO BE CARRIED OUT OVER A MINIMUM TIME PERIOD. TOP SOIL TO BE STOCKPILED SEPARATELY AND SPREAD OVER BACKFILLED AREAS. SOIL TO BE STOCKPILED IN A NARROW CORRIDOR ON THE UPSTREAM SIDE OF ALL EXCAVATION. TEMPORARY CATCH DRAINS TO BE CONSTRUCTED ON THE UPSTREAM SIDE OF STOCKPILES AND EXCAVATED AREAS, DIRECTING RUNOFF TO EXISTING STORMWATER SYSTEM. (REFER FACT SHEET 9: PROTECT SERVICE TRENCHES & STOCKPILES).
4. SEDIMENT FENCES & FIBRE ROLLS TO BE USED ON THE DOWNSTREAM SIDE OF ALL STOCKPILES AND TO EXTENTS SHOWN ON THIS DRAWING. PREVENT ENTRY OF SILT TO EXISTING STORMWATER INLETS AND WATER COURSES DURING CONSTRUCTION. (REFER FACT SHEET 14: SEDIMENT FENCES & FIBRE ROLLS).
5. EVERY EFFORT TO BE MADE TO MINIMIZE SPREADING SEDIMENT ON TO SEALED AREAS WHEN VEHICLES LEAVE THE SITE, INCLUDING THE WASHING DOWN OF TYRES. (REFER FACT SHEET 13: WHEEL WASH).
6. NO TOPSOIL SHALL BE REMOVED FROM LAND OUTSIDE THE AREAS OF GROUND DISTURBANCE SHOWN.
7. ALL AREAS OF GROUND DISTURBANCE TO BE RE-VEGETATED
8. ALL STOCKPILES TO BE POSITIONED CLEAR OF WATER COURSES AND TO ENSURE THAT NO SILT RUNOFF CAN ENTER WATER COURSES.
9. DURING WINDY CONDITIONS AND/OR HOT WEATHER, WET DOWN EXPOSED SOIL SLIGHTLY & REGULARLY TO PREVENT DUST NUISANCE. (REFER FACT SHEET 18: DUST CONTROL).
10. PRIOR TO PRACTICAL COMPLETION OF EACH APPROVED CONSTRUCTION STAGE, ALL DISTRIBUTED SURFACES ON THE SITE, EXCEPT THE AREAS SET ASIDE FOR ROADWAYS & FOOTPATHS, MUST BE DRESSED TO A MINIMUM OF 50mm WITH:
    - APPROVED LOCAL STOCKPILED TOPSOIL
    - APPROVED WEED FREE IMPORTED TOPSOIL
    - RE-VEGETATED WITH LOCAL PLANTS & GRASSES AND STABILISED

WEED MANAGEMENT NOTES:

1. ALL AREAS WITHIN COMPLETED STAGES WHERE TOPSOIL HAS BEEN SPREAD SHOULD BE MONITORED FOR SERRATED TUSSOCK AND TREATED AS REQUIRED.
2. EQUIPMENT MOVEMENT SHOULD BE RESTRICTED TO THE DEVELOPMENT FOOTPRINT. NOTE: TRACKED EQUIPMENT MOVING ACROSS WEED INFESTED COUNCIL LAND HAS HIGH RISK OF PICKING UP WEED SEED AND/OR SPREADING TO COUNCIL LAND.
3. CONTINUE TO ENSURE WASH DOWN LEDGER IS SUBMITTED TO COUNCIL TO DEMONSTRATE WHEN EQUIPMENT IS CLEANED PRIOR TO MOVING OFF SITE.
4. SEDIMENT TRAP SHOULD BE MONITORED FOR EMERGING WEEDS AND SEDIMENT DEEP BURIED AT END OF EACH STAGE PARTICULARLY IF EQUIPMENT HAS BEEN MOVED OFF SITE AND WASH DOWN WILL NOT BE USED IN MID TO LONG TERM.
5. TRUCKS AND EQUIPMENT SHOULD BE CLEAN PRIOR TO COMING TO SITE IF THEY ARE TO LEAVE THE HARDENED SURFACE WHILE ON SITE. ANY VEHICLES/EQUIPMENT THAT LEAVE FORMED ROADS MUST BE CLEANED PRIOR TO LEAVING THE SITE AND A RECORD KEPT IN THE WASH DOWN LEDGER. HYGIENE MEASURES PRIOR TO LEAVING & ENTERING THE SITE TO COMPLY WITH THE TASMANIAN WASHDOWN GUIDELINES FOR WEED & DISEASE CONTROL.
6. THE WASH DOWN LEDGER DOCUMENTING LICENCE PLATE NUMBERS OF ALL VEHICLES, TRUCKS AND EQUIPMENT SHOULD BE SUBMITTED TO COUNCIL TWICE PER YEAR (AS A MINIMUM) TO DEMONSTRATE WHEN EQUIPMENT IS CLEANED/LEAVING THE SITE. WASH DOWN LEDGER MUST BE REGULARLY SUBMITTED TO COUNCIL.
7. CONFINE DISTURBANCE OF TOPSOIL AND EARTHWORK TO A MINIMUM CORRIDOR.
8. STRIP ROAD CORRIDORS FIRST, THEN CONFINE MOVEMENTS OF WORKS VEHICLES TO THE FUTURE ROAD CORRIDORS, WHERE POSSIBLE.
9. ESTABLISH A STABILISED ENTRANCE AND WASHDOWN AREA JUST INSIDE THE WORKS BOUNDARY, IN ACCORDANCE WITH DRAWING.
10. ALL VEHICLES LEAVING THE SITE TO BE CLEANED AND WASHED DOWN PRIOR TO EXIT.
11. PRIVATE VEHICLES SHOULD NOT BE PARKED WITHIN THE SITE.
12. STOCKPILE AREAS TO BE PLACED CLOSE TO THE SITE ENTRANCE WHERE POSSIBLE.
13. WARNING SIGNAGE IS TO BE PLACED AT THE VEHICLE WASHDOWN BAY STATING THE NEED FOR ALL VEHICLES TO WASHDOWN PRIOR TO LEAVING THE SITE.
14. ANY IMPORTED FILL MATERIALS MUST BE SOURCED FROM QUARRIES ABLE TO PROVIDE DOCUMENTATION AS TO THE WEEDS PRESENT ON THE SOURCE SITE IN ORDER TO MINIMISE THE INTRODUCTION OF NEW WEEDS AND PATHOGENS TO THE AREA.

REV	AMENDMENTS	DRAWN	DATE	APPR.
-	---	-	--/--/----	--
-	---	-	--/--/----	--
C	LANDSCAPE WALLS ADDED, SECTION ADDED, USER ROAD FOOTPATH DIMENSIONED AND NOTED	SC	09/11/2025	MD
B	AMENDMENTS FOR HOC & TASWATER FEI	SC	10/10/2025	MD
A	FOR DEVELOPMENT APPROVAL	SC	04/07/2025	MD

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DRAWING STATUS: FOR DEVELOPMENT APPROVAL
COORDINATE/ DATUM: PLANAR MGA2020

DESIGNED:	REVIEWED:
SC	MW/RP
DRAWN:	REVIEWED:
SC	MW/RP

JOB MANAGER: MATTHEW DENHOLM
ISSUED DATE: 06/11/2025

CLIENT:
PROJECT DESCRIPTION: THE HOUSE FAMILY OFFICE RESIDENTIAL DEVELOPMENT
ADDRESS: 48-52 NEW TOWN ROAD, NEW TOWN
DRAWING TITLE: GENERAL NOTES

PDA SURVEYORS, ENGINEERS & PLANNERS
127 Bathurst Street Hobart, Tasmania, 7000 PHONE: +61 03 6234 3217 EMAIL: pda.hbt@pda.com.au www.pda.com.au Also at: Kingston, Launceston & Burnie
REGISTRATION NUMBER: ----

CONTRACT NO	SCALE	PAPER
--	1: NTS	(A3)
JOB NUMBER	DISCIPLINE / SHEET	REVISION
53851MD	C 002	C

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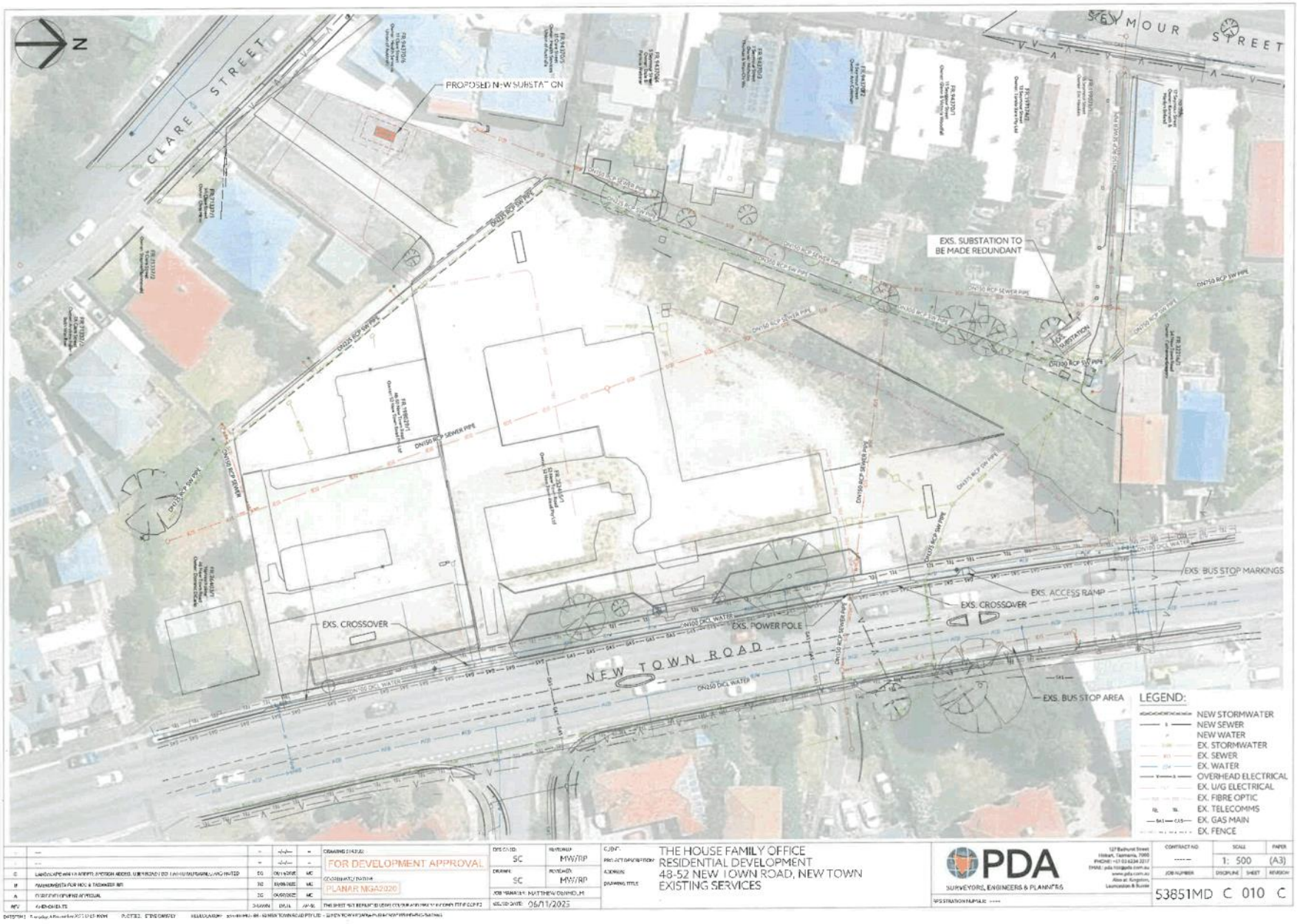
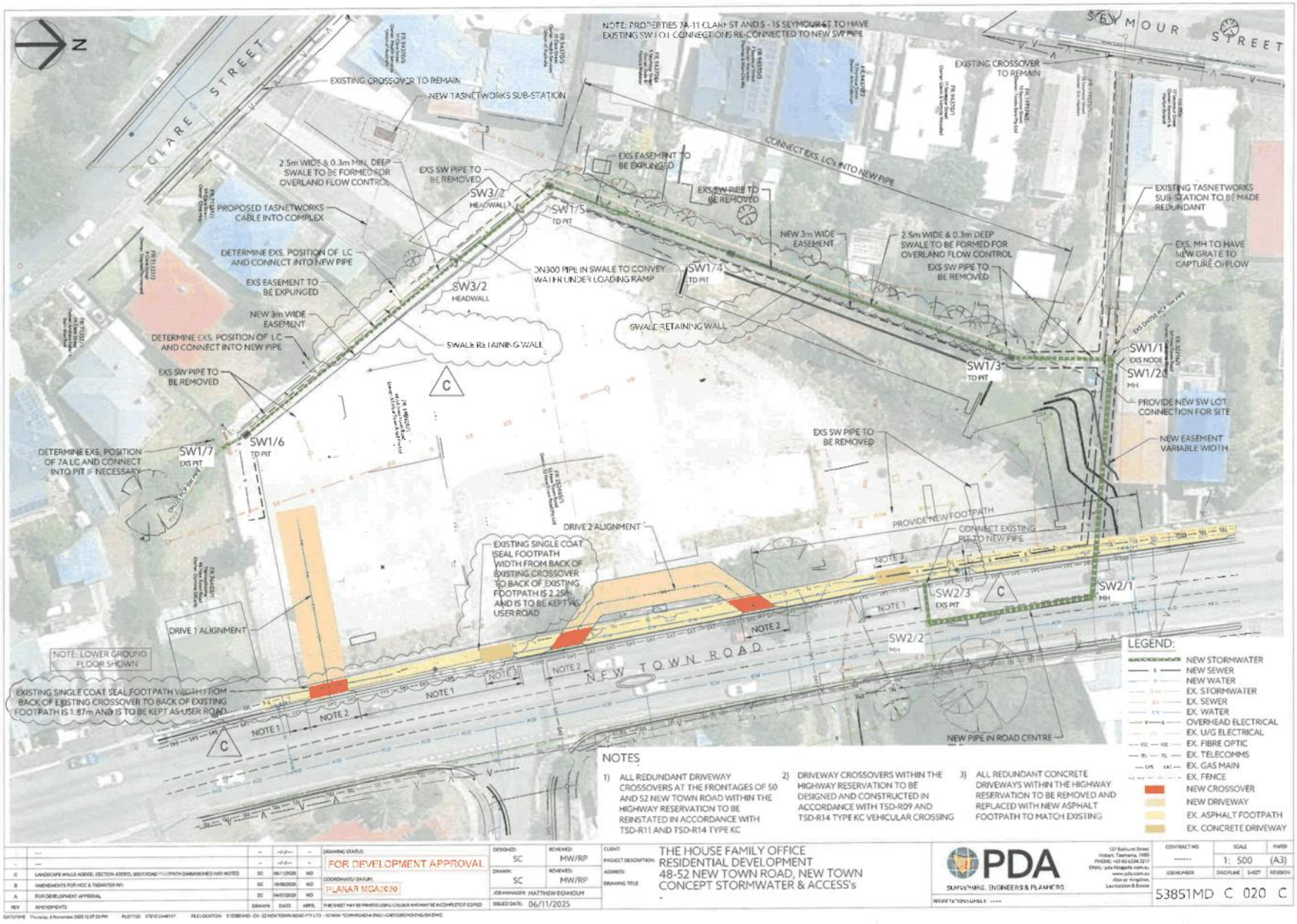
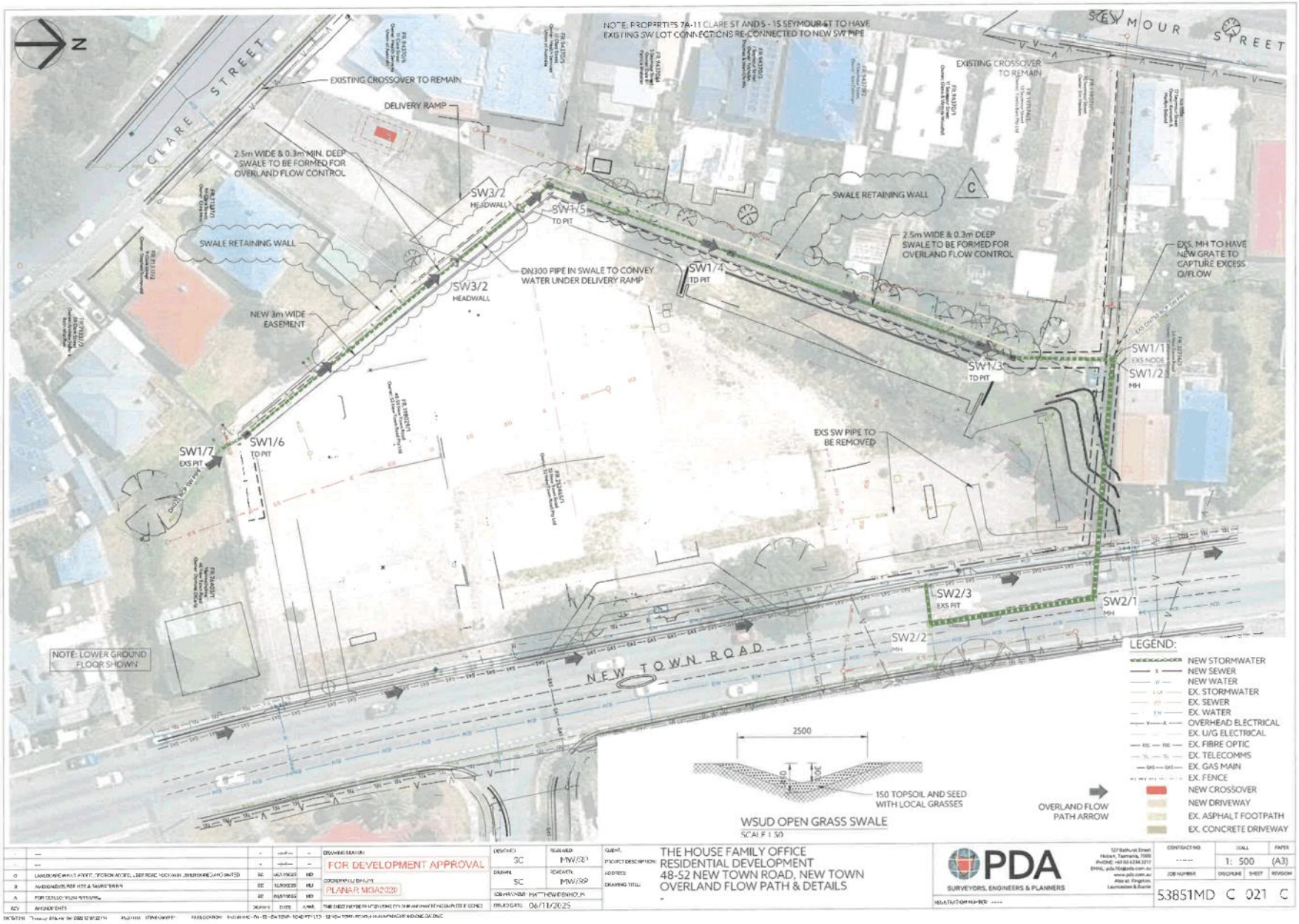

N
CLARE STREET
SEYMOUR STREET
PROPOSED NEW SUBSTATION
EXS. SUBSTATION TO BE MADE REDUNDANT
EXS. CROSSOVER
EXS. POWER POLE
EXS. ACCESS RAMP
EXS. BUS STOP MARKINGS
EXS. BUS STOP AREA
NEW TOWN ROAD
LEGEND:
NEW STORMWATER
NEW SEWER
NEW WATER
EX. STORMWATER
EX. SEWER
EX. WATER
OVERHEAD ELECTRICAL
EX. U/G ELECTRICAL
EX. FIBRE OPTIC
EX. TELECOMMS
EX. GAS MAIN
EX. FENCE
FOR DEVELOPMENT APPROVAL
PLANAR MGA2020
SC
MW/RP
SC
MW/RP
06/11/2025
THE HOUSE FAMILY OFFICE
RESIDENTIAL DEVELOPMENT
48-52 NEW TOWN ROAD, NEW TOWN
EXISTING SERVICES
PDA
SURVEYORS, ENGINEERS & PLANNERS
1: 500
(A3)
53851MD C 010 C


N
CLARE STREET
SEYMOUR STREET
NEW TOWN ROAD
NOTE: PROPERTIES 7A-11 CLARE ST AND 5 - 15 SEYMOUR ST TO HAVE EXISTING SW LOT CONNECTIONS RE-CONNECTED TO NEW SW PIPE
EXISTING CROSSOVER TO REMAIN
NEW TASNETWORKS SUB-STATION
2.5m WIDE & 0.3m MIN. DEEP SWALE TO BE FORMED FOR OVERLAND FLOW CONTROL
EXS SW PIPE TO BE REMOVED
SW3/2 HEADWALL
SW1/5 TD PIT
EXS EASEMENT TO BE EXPUNGED
CONNECT EXS. LC's INTO NEW PIPE
PROPOSED TASNETWORKS CABLE INTO COMPLEX
DETERMINE EXS. POSITION OF LC AND CONNECT INTO NEW PIPE
DN300 PIPE IN SWALE TO CONVEY WATER UNDER LOADING RAMP
SW1/4 TD PIT
NEW 3m WIDE EASEMENT
2.5m WIDE & 0.3m DEEP SWALE TO BE FORMED FOR OVERLAND FLOW CONTROL
EXISTING TASNETWORKS SUB-STATION TO BE MADE REDUNDANT
EXS. MH TO HAVE NEW GRATE TO CAPTURE O/FLOW
SWALE RETAINING WALL
SW1/3 TD PIT
SW1/1 EXS NODE
SW1/2 MH
PROVIDE NEW SW LOT CONNECTION FOR SITE
NEW EASEMENT VARIABLE WIDTH
DETERMINE EXS. POSITION OF 7A LC AND CONNECT INTO PIT IF NECESSARY
SW1/7 EXS PIT
SW1/6 TD PIT
DRIVE 2 ALIGNMENT
PROVIDE NEW FOOTPATH
CONNECT EXISTING PIT TO NEW PIPE
EXISTING SINGLE COAT SEAL FOOTPATH WIDTH FROM BACK OF EXISTING CROSSOVER TO BACK OF EXISTING FOOTPATH IS 2.25m AND IS TO BE KEPT AS USER ROAD
SW2/3 EXS PIT
SW2/1 MH
SW2/2 MH
DRIVE 1 ALIGNMENT
NOTE: LOWER GROUND FLOOR SHOWN
EXISTING SINGLE COAT SEAL FOOTPATH WIDTH FROM BACK OF EXISTING CROSSOVER TO BACK OF EXISTING FOOTPATH IS 1.87m AND IS TO BE KEPT AS USER ROAD
NEW PIPE IN ROAD CENTRE
NOTE 1
NOTE 2
NOTE 3
LEGEND:
NEW STORMWATER
NEW SEWER
NEW WATER
EX. STORMWATER
EX. SEWER
EX. WATER
OVERHEAD ELECTRICAL
EX. U/G ELECTRICAL
EX. FIBRE OPTIC
EX. TELECOMMS
EX. GAS MAIN
EX. FENCE
NEW CROSSOVER
NEW DRIVEWAY
EX. ASPHALT FOOTPATH
EX. CONCRETE DRIVEWAY
NOTES
1) ALL REDUNDANT DRIVEWAY CROSSOVERS AT THE FRONTAGES OF 50 AND 52 NEW TOWN ROAD WITHIN THE HIGHWAY RESERVATION TO BE REINSTATED IN ACCORDANCE WITH TSD-R11 AND TSD-R14 TYPE KC
2) DRIVEWAY CROSSOVERS WITHIN THE HIGHWAY RESERVATION TO BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH TSD-R09 AND TSD-R14 TYPE KC VEHICULAR CROSSING
3) ALL REDUNDANT CONCRETE DRIVEWAYS WITHIN THE HIGHWAY RESERVATION TO BE REMOVED AND REPLACED WITH NEW ASPHALT FOOTPATH TO MATCH EXISTING
FOR DEVELOPMENT APPROVAL
PLANAR MGA2020
DESIGNED: SC
DRAWN: SC
JOB MANAGER: MATTHEW DENHOLM
ISSUED DATE: 06/11/2025
REVIEWED: MW/RP
REVIEWED: MW/RP
CLIENT: THE HOUSE FAMILY OFFICE
PROJECT DESCRIPTION: RESIDENTIAL DEVELOPMENT
ADDRESS: 48-52 NEW TOWN ROAD, NEW TOWN
DRAWING TITLE: CONCEPT STORMWATER & ACCESS's
PDA
SURVEYORS, ENGINEERS & PLANNERS
CONTRACT NO.
SCALE 1: 500 (A3)
JOB NUMBER 53851MD
DISCIPLINE C
SHEET 020
REVISION C


N
CLARE STREET
SEYMOUR STREET
NEW TOWN ROAD
NOTE: PROPERTIES 7A-11 CLARE ST AND 5 - 15 SEYMOUR ST TO HAVE EXISTING SW LOT CONNECTIONS RE-CONNECTED TO NEW SW PIPE
EXISTING CROSSOVER TO REMAIN
DELIVERY RAMP
2.5m WIDE & 0.3m MIN. DEEP SWALE TO BE FORMED FOR OVERLAND FLOW CONTROL
SWALE RETAINING WALL
SW3/2 HEADWALL
SW1/5 TD PIT
DN300 PIPE IN SWALE TO CONVEY WATER UNDER DELIVERY RAMP
SW1/4 TD PIT
2.5m WIDE & 0.3m DEEP SWALE TO BE FORMED FOR OVERLAND FLOW CONTROL
EXS. MH TO HAVE NEW GRATE TO CAPTURE EXCESS O/FLOW
NEW 3m WIDE EASEMENT
SW1/3 TD PIT
SW1/1 EXS NODE
SW1/2 MH
SW1/7 EXS PIT
SW1/6 TD PIT
EXS SW PIPE TO BE REMOVED
SW2/3 EXS PIT
SW2/1 MH
SW2/2 MH
NOTE: LOWER GROUND FLOOR SHOWN
2500
150 TOPSOIL AND SEED WITH LOCAL GRASSES
WSUD OPEN GRASS SWALE
SCALE 1:50
OVERLAND FLOW PATH ARROW
LEGEND:
NEW STORMWATER
NEW SEWER
NEW WATER
EX. STORMWATER
EX. SEWER
EX. WATER
OVERHEAD ELECTRICAL
EX. U/G ELECTRICAL
EX. FIBRE OPTIC
EX. TELECOMMS
EX. GAS MAIN
EX. FENCE
NEW CROSSOVER
NEW DRIVEWAY
EX. ASPHALT FOOTPATH
EX. CONCRETE DRIVEWAY
FOR DEVELOPMENT APPROVAL
PLANNING
THE HOUSE FAMILY OFFICE
RESIDENTIAL DEVELOPMENT
48-52 NEW TOWN ROAD, NEW TOWN
OVERLAND FLOW PATH & DETAILS
PDA
SURVEYORS, ENGINEERS & PLANNERS
1: 500 (A3)
53851MD C 021 C

REFER TO TRAFFIC ENGINEER'S REPORT

REV	AMENDMENTS	DRAWN	DATE	APPR.
-	---		/ / -	-
-	---	-	-/-/--	-
C	LANDSCAPE WALLS ADDED SECTION ZOOM DESIGN/FOR FIRST - DIMENSIONED AND NOTED	SC	05/10/2025	MJ
B	AMENDMENTS FOR HCC & TASMANIA FIRE	SC	10/10/2025	MJ
A	1.0 DEVELOPMENT APPROVAL	SC	04/10/2025	MJ

DRAWING STATUS: FOR DEVELOPMENT APPROVAL

COORDINATE SYSTEM: PLANAR MGA2020

DESIGNED: SC | REV BY: MW/RF
DRAWN: SC | REV BY: MW/RF
JOB MANAGER: MATTHEW DENHOLM
ISSUED DATE: 06/11/2025

CLIENT:
PROJECT DESCRIPTION: THE HOUSE FAMILY OFFICE RESIDENTIAL DEVELOPMENT
ADDRESS: 48-52 NEW TOWN ROAD, NEW TOWN
DRAWING TITLE: CONCEPT DRIVE 1 LONG SECTION

PDA
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127 Bathurst Street
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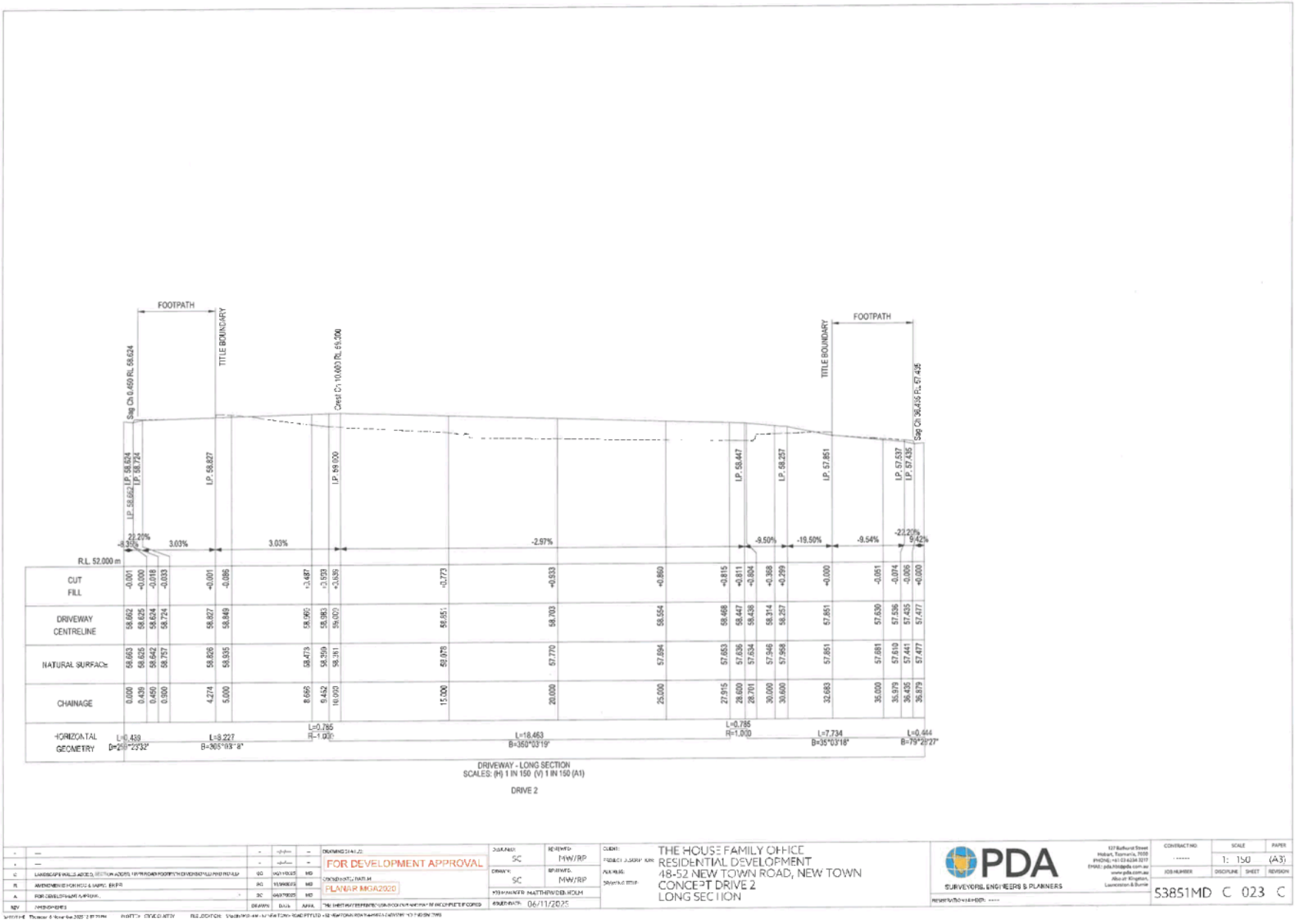
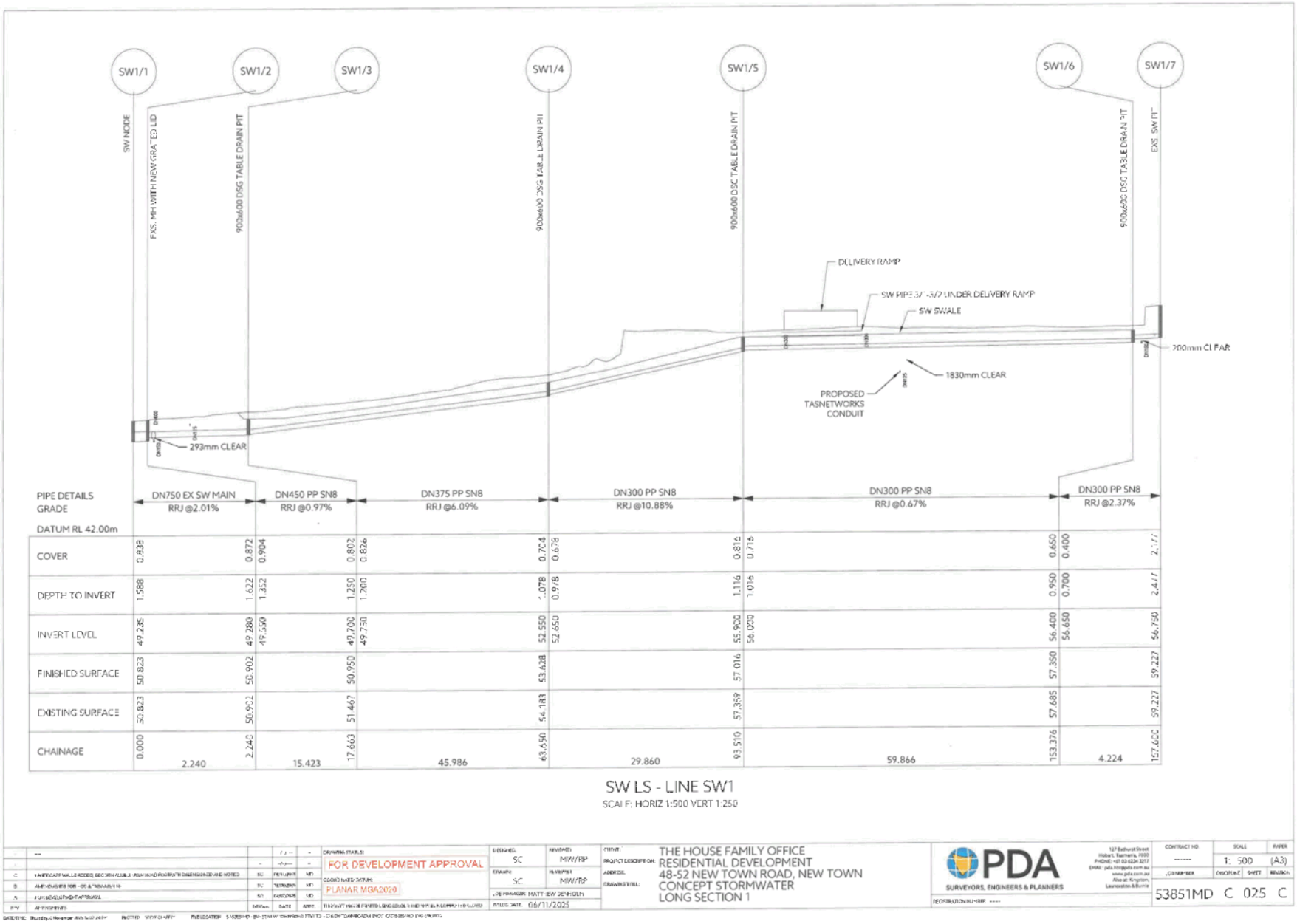
REGISTRATION NUMBER: ----

CONTRACT NO	SCALE	PAPER
------	1: 150	(A3)

JOB NUMBER	DISCIPLINE	SHEET	REVISION
53851MD	C	022	C

EXTENTIME: Thursday, 6 November 2025 12:10:23 PM PLOTTED: STEVE CHANEY RELOCATION: SUBSCRIPTION SERVICE/HOBART/DRAFTING TO - GENERATION/RESIDENTIAL DEVELOPMENT/HOBART/DWG

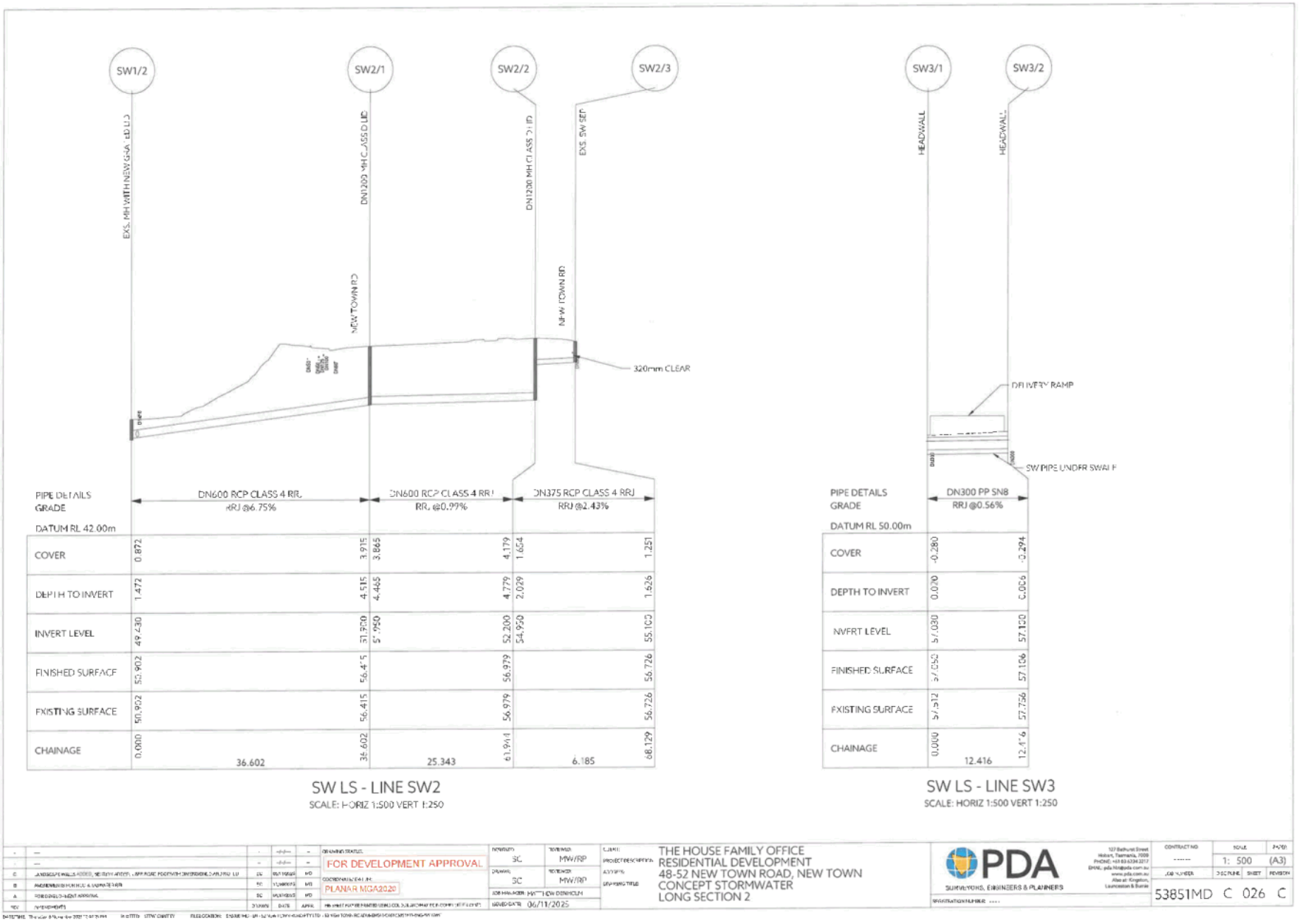

FOOTPATH
TITLE BOUNDARY
Sag Ch 0.450 RL 58.624
Crest Ch 10.000 RL 59.000
Sag Ch 36.435 RL 57.435
R.L. 52.000 m
CUT
FILL
DRIVEWAY CENTRELINE
NATURAL SURFACE
CHAINAGE
HORIZONTAL GEOMETRY
L=0.439 D=286°23'32"
L=8.227 B=305°03'8"
L=0.785 R=1.000
L=18.463 B=350°03'19"
L=0.785 R=1.000
L=7.734 B=35°03'18"
L=0.444 B=79°29'27"
DRIVEWAY - LONG SECTION
SCALES: (H) 1 IN 150 (V) 1 IN 150 (A1)
DRIVE 2
FOR DEVELOPMENT APPROVAL
PLANNING PERMIT
THE HOUSE FAMILY OFFICE
RESIDENTIAL DEVELOPMENT
48-52 NEW TOWN ROAD, NEW TOWN
CONCEPT DRIVE 2
LONG SECTION
PDA
SURVEYORS, ENGINEERS & PLANNERS
S3851MD C 023 C

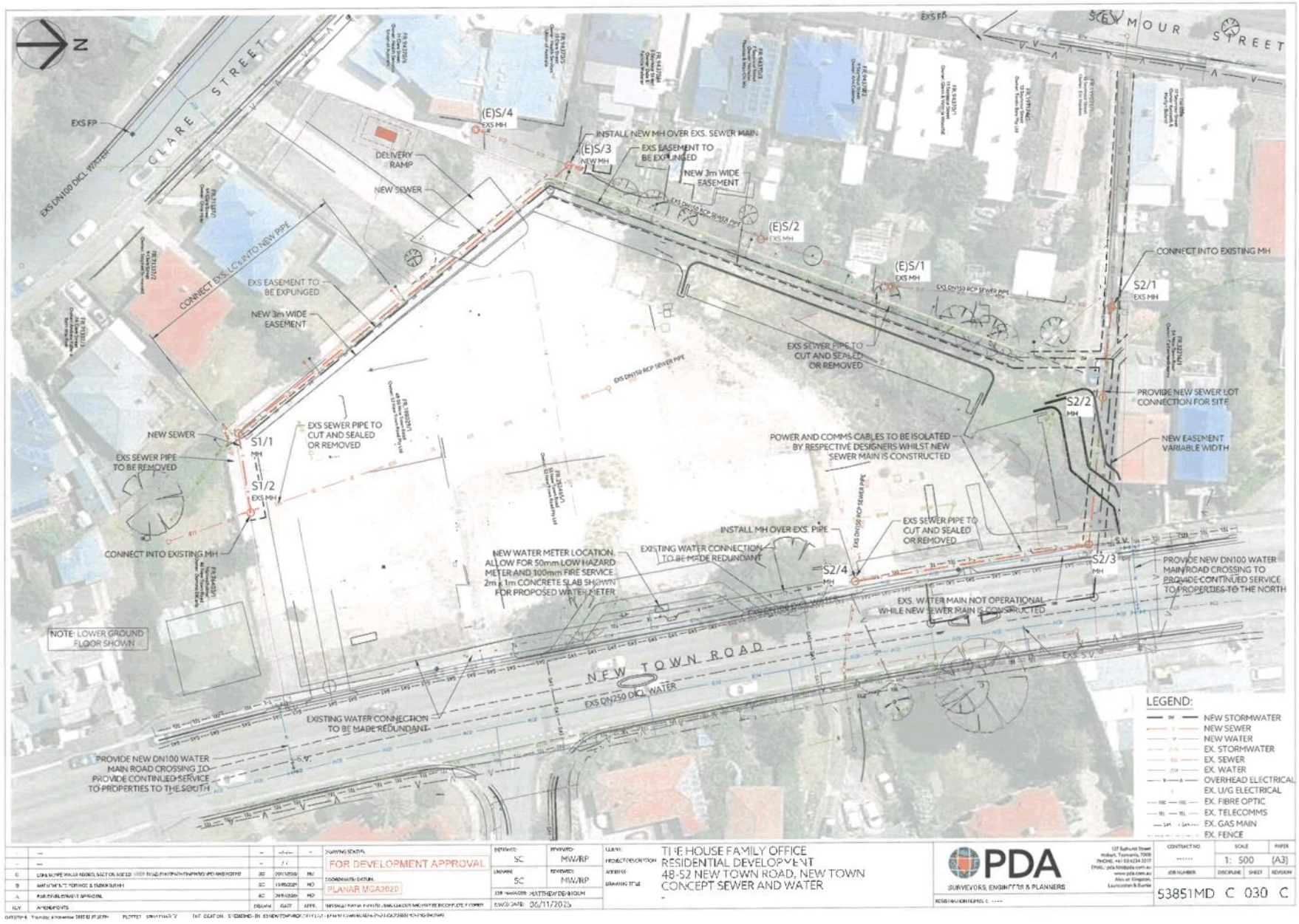


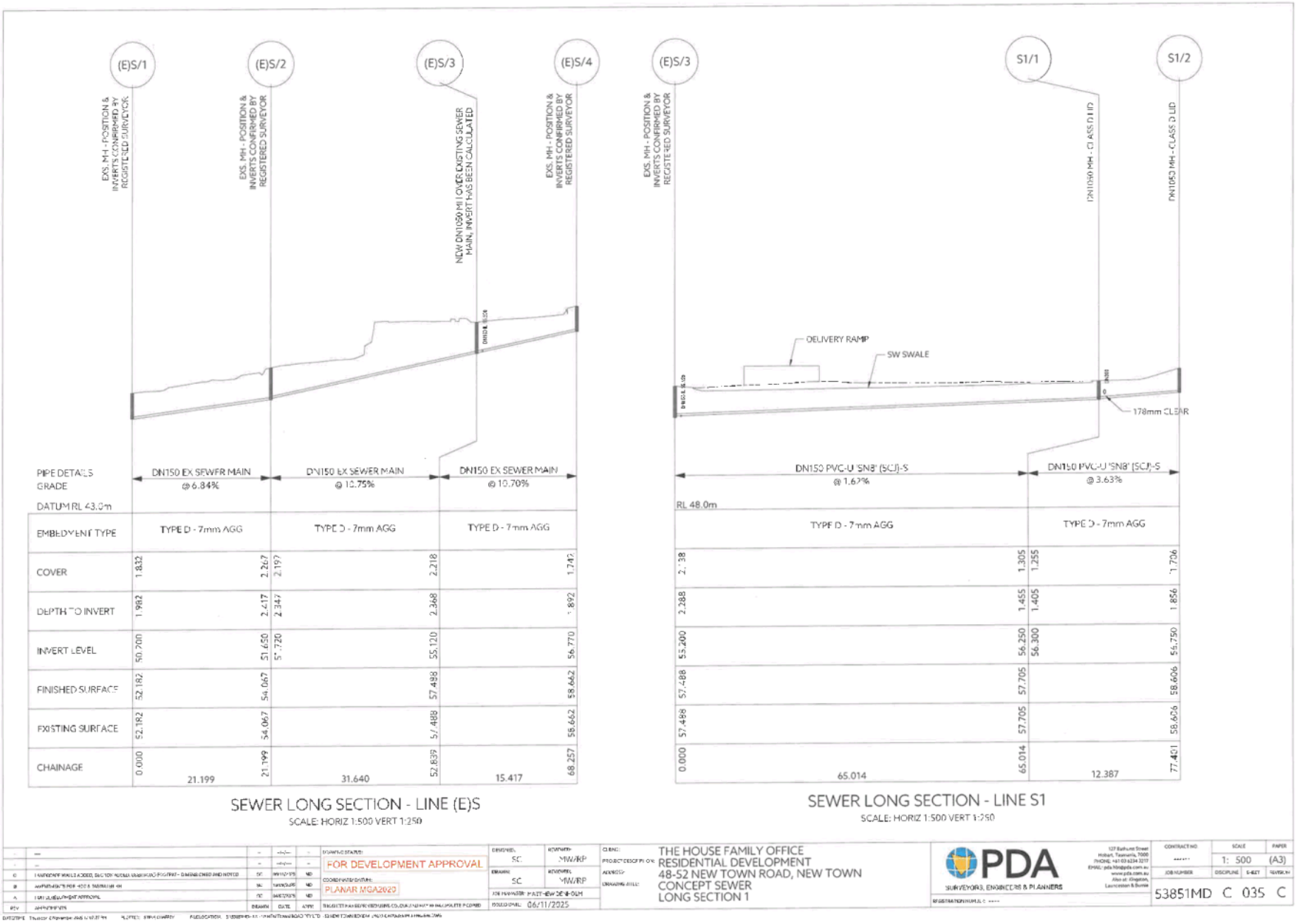
SW LS - LINE SW1

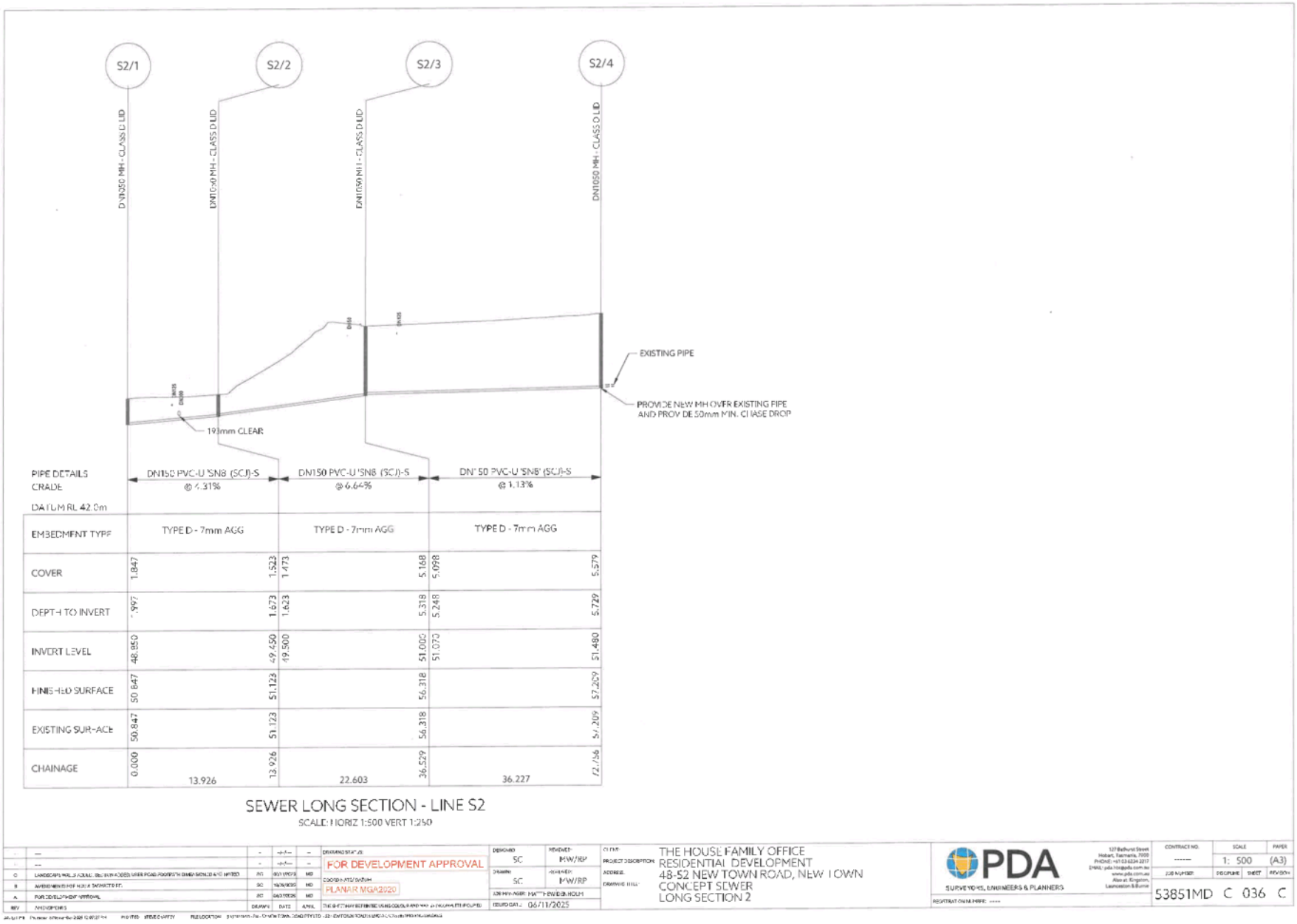
SCALE: HORIZ 1:500 VERT 1:250

| | | |


SW1/2
SW2/1
SW2/2
SW2/3
EXS. MH WITH NEW GRATED LID
DN1200 MH CLASS 2 LID
DN1200 MH CLASS 2 LID
EXS. SW SEP
NEW TOWN RD
NEW TOWN RD
320mm CLEAR
PIPE DETAILS
GRADE
DATUM RL 42.00m
DN600 RCP CLASS 4 RRJ
RRJ @6.75%
DN600 RCP CLASS 4 RRJ
RRJ @0.99%
DN375 RCP CLASS 4 RRJ
RRJ @2.43%
COVER 0.872 3.915 3.865 4.179 1.654 1.251
DEPTH TO INVERT 1.472 4.515 4.465 4.779 2.029 1.526
INVERT LEVEL 49.430 51.700 51.950 52.200 54.950 55.100
FINISHED SURFACE 50.902 56.415 56.979 56.726
EXISTING SURFACE 50.902 56.415 56.979 56.726
CHAINAGE 0.000 36.602 61.944 68.129
36.602
25.343
6.185
SW LS - LINE SW2
SCALE: HORIZ 1:500 VERT 1:250
SW3/1
SW3/2
HEADWALL
HEADWALL
DELIVERY RAMP
SW PIPE UNDER SWALE
PIPE DETAILS
GRADE
DATUM RL 50.00m
DN300 PP SN8
RRJ @0.56%
COVER -0.280 -0.294
DEPTH TO INVERT 0.070 0.056
INVERT LEVEL 57.030 57.100
FINISHED SURFACE 57.106
EXISTING SURFACE 57.756
CHAINAGE 0.000 12.476
12.476
SW LS - LINE SW3
SCALE: HORIZ 1:500 VERT 1:250
FOR DEVELOPMENT APPROVAL
PLANAR MGA2020
THE HOUSE FAMILY OFFICE
RESIDENTIAL DEVELOPMENT
48-52 NEW TOWN ROAD, NEW TOWN
CONCEPT STORMWATER
LONG SECTION 2
PDA
SURVEYORS, ENGINEERS & PLANNERS
53851MD C 026 C
1: 500 (A3)

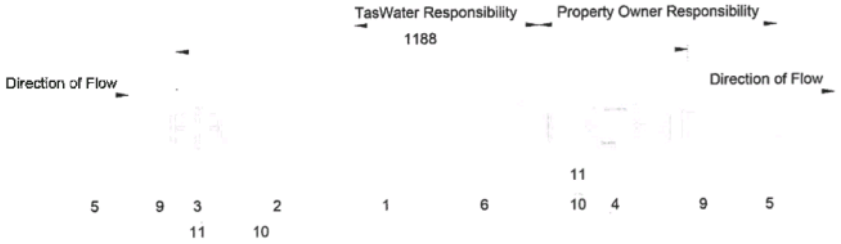

N
CLARE STREET
SEYMOUR STREET
NEW TOWN ROAD
EXS FP
EXS DN100 DICL WATER
EXS DN250 DICL WATER
(E)S/4
EXS MH
(E)S/3
NEW MH
(E)S/2
(E)S/1
S1/1
S1/2
S2/1
S2/2
S2/3
S2/4
DELIVERY RAMP
NEW SEWER
INSTALL NEW MH OVER EXS. SEWER MAIN
EXS EASEMENT TO BE EXPUNGED
NEW 3m WIDE EASEMENT
CONNECT EXS. LC's INTO NEW PIPE
EXS SEWER PIPE TO CUT AND SEALED OR REMOVED
EXS DN150 RCP SEWER PIPE
CONNECT INTO EXISTING MH
PROVIDE NEW SEWER LOT CONNECTION FOR SITE
NEW EASEMENT VARIABLE WIDTH
POWER AND COMMS CABLES TO BE ISOLATED BY RESPECTIVE DESIGNERS WHILST NEW SEWER MAIN IS CONSTRUCTED
EXS SEWER PIPE TO BE REMOVED
INSTALL MH OVER EXS. PIPE
NEW WATER METER LOCATION. ALLOW FOR 50mm LOW HAZARD METER AND 100mm FIRE SERVICE 2m x 1m CONCRETE SLAB SHOWN FOR PROPOSED WATER METER
EXISTING WATER CONNECTION TO BE MADE REDUNDANT
EXS. WATER MAIN NOT OPERATIONAL WHILE NEW SEWER MAIN IS CONSTRUCTED
PROVIDE NEW DN100 WATER MAIN ROAD CROSSING TO PROVIDE CONTINUED SERVICE TO PROPERTIES TO THE NORTH
PROVIDE NEW DN100 WATER MAIN ROAD CROSSING TO PROVIDE CONTINUED SERVICE TO PROPERTIES TO THE SOUTH
NOTE: LOWER GROUND FLOOR SHOWN
LEGEND:
NEW STORMWATER
NEW SEWER
NEW WATER
EX. STORMWATER
EX. SEWER
EX. WATER
OVERHEAD ELECTRICAL
EX. U/G ELECTRICAL
EX. FIBRE OPTIC
EX. TELECOMMS
EX. GAS MAIN
EX. FENCE
FOR DEVELOPMENT APPROVAL
PLANAR MGA2020
TI 9E HOUSE FAMILY OFFICE
RESIDENTIAL DEVELOPVENT
48-52 NEW TOWN ROAD, NEW TOWN
CONCEPT SEWER AND WATER
PDA
SURVEYORS, ENGINEERS & PLANNERS
53851MD C 030 C


(E)S/1
(E)S/2
(E)S/3
(E)S/4
EXS. MH - POSITION & INVERTS CONFIRMED BY REGISTERED SURVEYOR
EXS. MH - POSITION & INVERTS CONFIRMED BY REGISTERED SURVEYOR
NEW DN1050 MH OVER EXISTING SEWER MAIN, INVERT HAS BEEN CALCULATED
EXS. MH - POSITION & INVERTS CONFIRMED BY REGISTERED SURVEYOR
PIPE DETAILS
GRADE
DATUM RL 43.0m
DN150 EX SEWER MAIN @ 6.84%
DN150 EX SEWER MAIN @ 12.75%
DN150 EX SEWER MAIN @ 10.70%
EMBEDMENT TYPE
TYPE D - 7mm AGG
TYPE D - 7mm AGG
TYPE D - 7mm AGG
COVER
DEPTH TO INVERT
INVERT LEVEL
FINISHED SURFACE
EXISTING SURFACE
CHAINAGE
1.832
1.982
50.700
52.182
52.182
0.000
2.267
2.417
51.450
54.067
54.067
21.199
2.197
2.347
51.720
54.067
54.067
21.199
31.640
2.218
2.368
55.120
57.488
57.488
52.839
1.747
1.892
56.770
58.662
58.662
68.257
SEWER LONG SECTION - LINE (E)S
SCALE: HORIZ 1:500 VERT 1:250
(E)S/3
S1/1
S1/2
EXS. MH - POSITION & INVERTS CONFIRMED BY REGISTERED SURVEYOR
DN1050 MH - CLASS D LID
DN1050 MH - CLASS D LID
DELIVERY RAMP
SW SWALE
178mm CLEAR
DN150 PVC-U 'SN8' (SCJ)-S @ 1.63%
DN150 PVC-U 'SN8' (SCJ)-S @ 3.63%
RL 48.0m
TYPE D - 7mm AGG
TYPE D - 7mm AGG
2.138
2.288
55.200
57.488
57.488
0.000
1.305
1.455
56.250
57.705
57.705
65.014
1.255
1.405
56.300
58.606
58.606
77.401
1.706
1.856
56.750
58.606
58.606
65.014
12.387
SEWER LONG SECTION - LINE S1
SCALE: HORIZ 1:500 VERT 1:250
FOR DEVELOPMENT APPROVAL
PLANAR MGA2020
06/11/2025
THE HOUSE FAMILY OFFICE
RESIDENTIAL DEVELOPMENT
48-52 NEW TOWN ROAD, NEW TOWN
CONCEPT SEWER
LONG SECTION 1
PDA
SURVEYORS, ENGINEERS & PLANNERS
1: 500
(A3)
53851MD C 035 C


S2/1
S2/2
S2/3
S2/4
DN1050 MH - CLASS D LID
DN1050 MH - CLASS D LID
DN1050 MH - CLASS D LID
DN1050 MH - CLASS D LID
EXISTING PIPE
PROVIDE NEW MH OVER EXISTING PIPE AND PROVIDE 50mm MIN. CLEARANCE DROP
193mm CLEAR
PIPE DETAILS
GRADE
DATUM RL 42.0m
DN150 PVC-U 'SN8' (SCJ)-S @ 4.31%
DN150 PVC-U 'SN8' (SCJ)-S @ 6.64%
DN 50 PVC-U 'SN8' (SCJ)-S @ 1.13%
EMBEDMENT TYPE
TYPE D - 7mm AGG
TYPE D - 7mm AGG
TYPE D - 7mm AGG
COVER
1.847
1.523
1.473
5.168
5.098
5.379
DEPTH TO INVERT
1.997
1.673
1.623
5.318
5.248
5.729
INVERT LEVEL
48.850
49.450
49.500
51.000
51.070
51.480
FINISHED SURFACE
50.847
51.123
56.318
57.209
EXISTING SURFACE
50.847
51.123
56.318
57.209
CHAINAGE
0.000
13.926
22.603
36.529
36.227
13.926
22.603
36.227
SEWER LONG SECTION - LINE S2
SCALE: H HORIZ 1:500 VERT 1:250
FOR DEVELOPMENT APPROVAL
PLANAR MGA2020
DESIGNED SC
REVIEWED MW/RP
DRAWN SC
REVIEWED MW/RP
ISSUED DATE 06/11/2025
CLIENT
PROJECT DESCRIPTION THE HOUSE FAMILY OFFICE
RESIDENTIAL DEVELOPMENT
ADDRESS 48-52 NEW TOWN ROAD, NEW TOWN
DRAWING TITLE CONCEPT SEWER
LONG SECTION 2
PDA
SURVEYORS, ENGINEERS & PLANNERS
CONTRACT NO. -----
SCALE 1: 500 (A3)
JOB NUMBER 53851MD
DISCIPLINE C
SHEET 036
REVISION C



ELEVATION
1 : 10



PLAN
1 : 10

0 0.2 0.4 0.6 0.8 1.0 metres
SCALE - 1 : 10

BOUNDARY CONNECTION PARTS LIST

No.	DESCRIPTION	COMMENTS
1	DN.50 'Sensus' Meistream Plus Water Meter	Supplied by TasWater
2	DN.50 'Sensus' WP-F Dirt Box	Supplied by TasWater
3	DN.50 Gate Valve	Supplied by TasWater
4	Low Hazard DN.50 'ValvCheQ' DCO3U Double Check Valve Non-Testable - or equivalent.	Owned, operated and maintained by Property Owner
5	DN.50 "Type A" Copper Water Pipe	
6	DN.50 x 200mm Hydrant Riser with 25mm Tapping for Pressure Testing, 20mm Valve and Plug	Supplied by TasWater
7	100mm (minimum) Reinforced Concrete Slab	SL72 placed central
8	Pipe Wrapped where Concrete will contact Pipe	(Refer Note 3)
9	B-Press Fittings or Equivalent	
10	DN.50 BSP to Table E Flange Adaptor	
11	DN.50 Nipple	
12	Pipe Support Bracket	Supplied and installed by Property Owner (Refer Sheet 18)

VALVE & EQUIPMENT SCHEDULE

1. Only use products with watermark certification and approved for use by TasWater and listed within TasWater's approved products catalogue.
2. Installation must comply with manufacturer's written instructions.
3. All valves must be resilient seated, clockwise closing to AS 1628 with 316 stainless steel bolts and washers.
4. Unless approved otherwise the water meter/s, tails and meter boxes are to be supplied by TasWater.

GENERAL NOTES

1. All dimensions in millimeters (mm), unless noted otherwise.
2. DN refers to the nominal internal diameter of the installation/components.
3. If alternative backflow device is installed confirm overall length.
4. A 3mm clearance has been added where a gasket is required.
5. All metallic pipe work to be 'Denso' wrapped, or equivalent where it comes in contact with concrete - to protect it from corrosion.
6. Install and locate the meter assembly so that the meter can be easily read.
7. Install the meter assembly in cage in accordance with TWS-W-0003.
8. The Property Owner is responsible for the ongoing maintenance of the security cage.

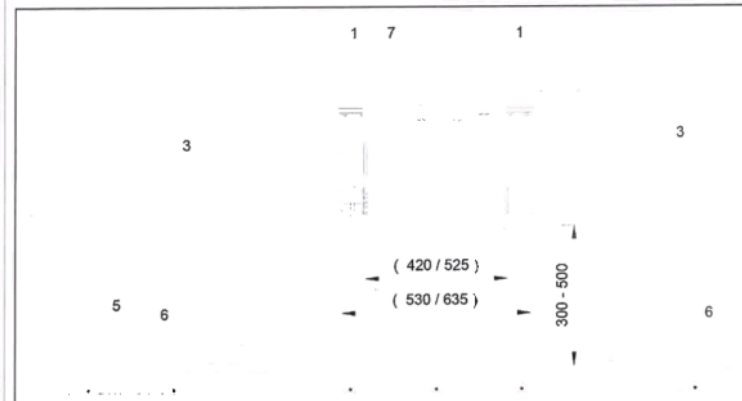
–	–	–	–	DRAWING STATUS:	FOR DEVELOPMENT APPROVAL
–	–	–	–	COORDINATE/DATUM:	PLANAR MGA2020
2	LANDLAW PHILLIP ADDED, MELTON ADDED, LABRADOR FOOTPATH LANDSCAPED AND WORKS	SC	09/11/2023	MC	
1	AMENDMENTS TO TASWATER	SC	05/09/2023	MC	
A	FOR DEVELOPMENT APPROVAL	SC	04/09/2023	MC	
REV	APPROVALS	DRAWN	DATE	APVD	THIS SHEET TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT SHEETS

DESIGNED: SC REVIEWED: MW/KP
DRAWN: SC REVIEWED: MW/RS
JOB NUMBER: MATTHEW DEAKIN
SCALE: 1:100 (A3)
DATE: 06/11/2023

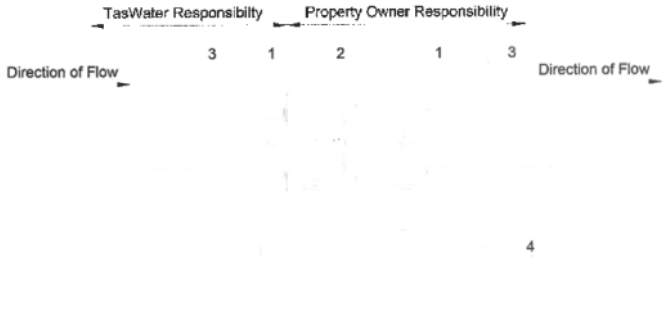
CLIENT: THE HOUSE FAMILY OFFICE
PROJECT DESCRIPTION: RESIDENTIAL DEVELOPMENT
ADDRESS: 48 52 NEW TOWN ROAD, NEW TOWN
DRAWING TITLE: WATER METER DETAILS -1

PDA SURVEYORS, ENGINEERS & PLANNERS

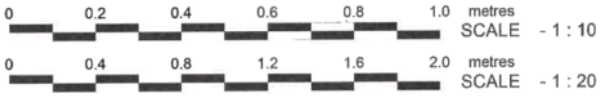
CONTRACT NO: ------
JOB NUMBER: 53851MD
DISCIPLINE: C
SHEET: 040
REVISION: C



ELEVATION
1 : 10



PLAN
1 : 10



BOUNDARY CONNECTION PARTS LIST

No.	DESCRIPTION	COMMENTS
1	DN.100 Lug type Butterfly Valve with Worm Gear Actuator	1 x Supplied by TasWater
2	Low Hazard 'ValvCheQ' DN.100 SDCT03 Single Check Valve - or equivalent	Owned, operated and maintained by Property Owner
3	DN.100 PN16 Metallic Water Pipe	Copper not to be used
4	Metered Bypass	Supplied by TasWater
5	100mm (minimum) Reinforced Concrete Slab	SL72 placed central
6	Pipe Wrapped where Concrete will contact Pipe	(Refer Note 3)
7	'Sensus' Meter size for Low Flow Bypass	DN.25 Bypass for DN.100 - DN.150 DN.32 Bypass for DN.200 DN.40 Bypass for >DN.200



PLAN - DOMESTIC ASSEMBLY
1 : 20

VALVE & EQUIPMENT SCHEDULE

1. Only use products with watermark certification and approved for use by TasWater and listed within TasWater's approved products catalogue.
2. Installation must comply with manufacturer's written instructions.
3. All valves must be resilient seated, clockwise closing to AS 1628 with 316 stainless steel bolts and washers.
4. Unless approved otherwise the water meter/s, tails and meter boxes are to be supplied by TasWater.

GENERAL NOTES

1. All dimensions in millimeters (mm), unless noted otherwise.
2. Dimensions shown in brackets apply to (Low/Medium) hazard based on ValvCheQ backflow device being installed. If alternative backflow device is installed confirm dimensions.
3. DN refers to the nominal internal diameter of the installation/components.
4. Install and locate the meter assembly so that the meter can be easily read.
5. All metallic pipe work to be 'Denso' wrapped, or equivalent where it comes in contact with concrete - to protect it from corrosion.
6. Medium hazard fire assembly suitable for high Hazard sites, provided the domestic supply is separate and fitted with RPZD.
7. Where a vented back flow prevention device is required such as a Reduced Pressure Zone Device (RPZD), it shall:
   - Comply with AS 3500 and AS 2845; and shall
   - Have free ventilation to the atmosphere for the relief valve at all times;
   - Not be in an area that may be subject to ponding;
   - Have the relief drain outlet not less than 300mm above the surrounding surface.
8. Install the meter assembly in cage in accordance with TWS-W-0003.
9. The Property Owner is responsible for the ongoing maintenance of the security cage.

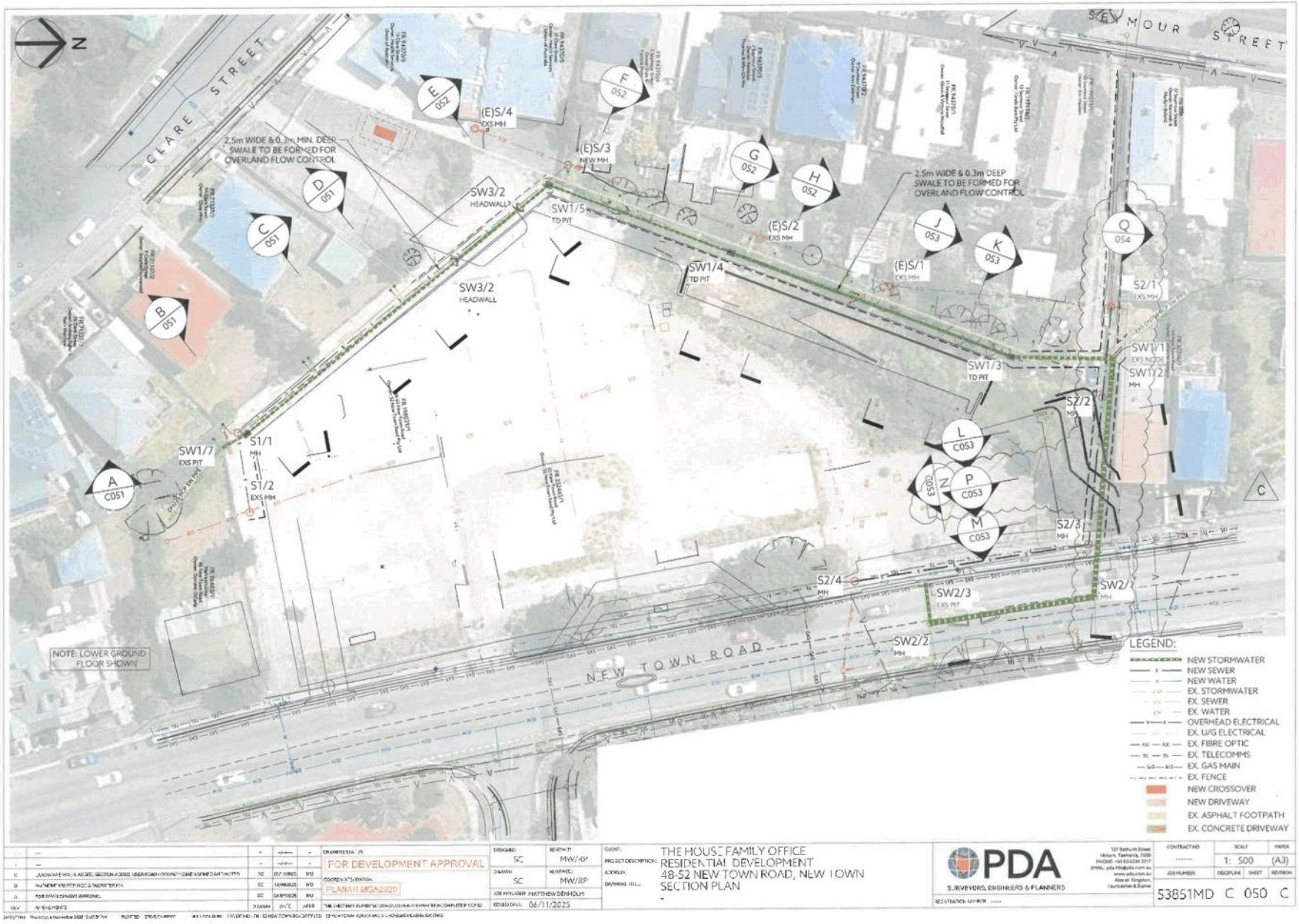
REV	AMENDMENTS	DRAWN	DATE	APPR
-	—	-	-	-
-	—	-	-	-
2	LANDSCAPE WALLS ADDED, SECTION ADDED, NEW RISE, TOP PATH CHANGED ON LAND NO LO	SC	06/11/2025	MD
1	AMENDMENTS TO BACK & MANHOLE	RD	15/08/2025	MD
A	FOR DEVELOPMENT APPROVAL	SC	04/07/2025	MD

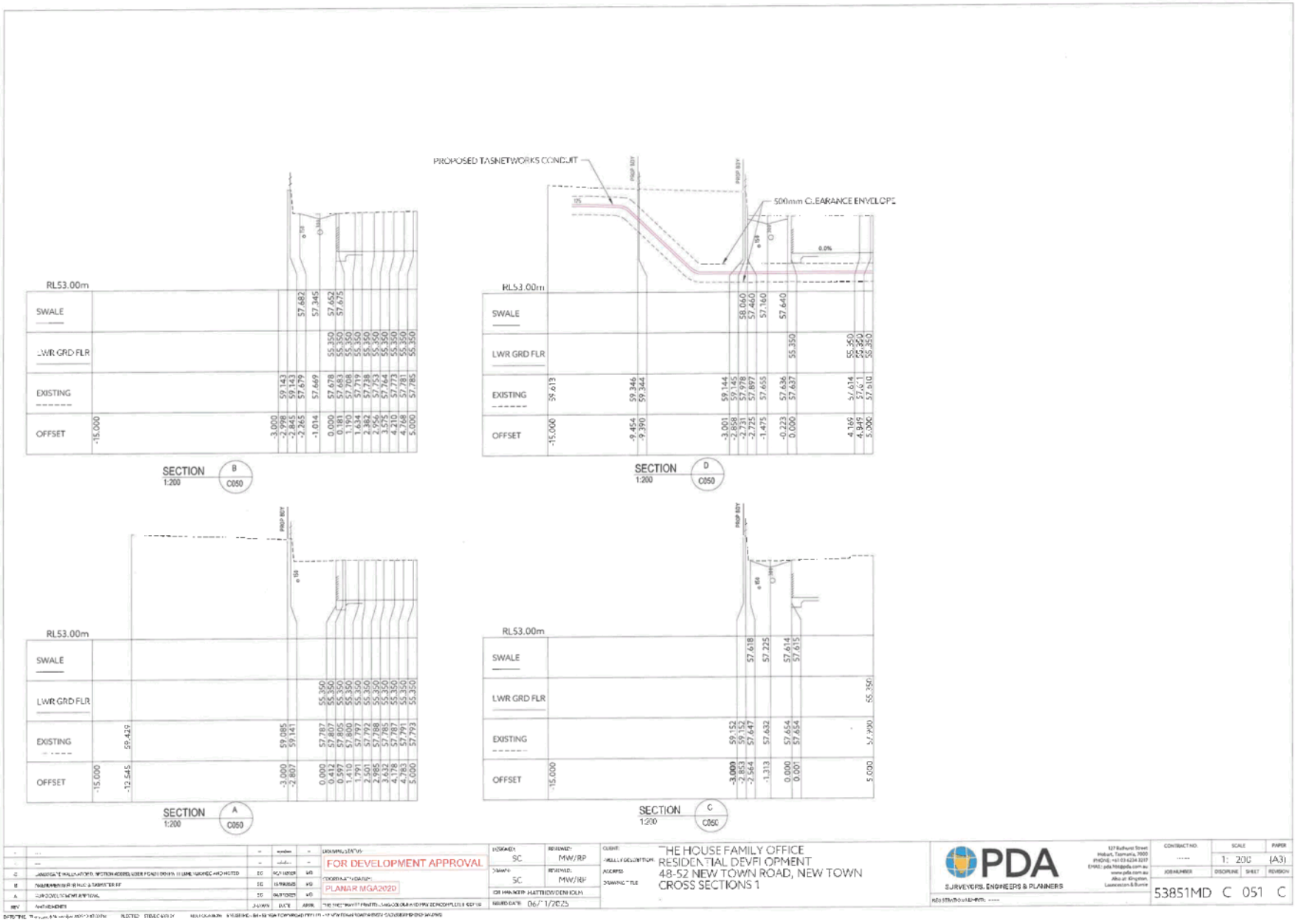
DRAWING STATUS: FOR DEVELOPMENT APPROVAL
CONSULTANTS DATUM: PLANAR MGA2020
DESIGNED: SC — APPROVED: MW/RP
DRAWN: SC — APPROVED: MW/RP
JOB MANAGER: MATTHEW DENHOLM
ISSUED DATE: 06/11/2025

CLIENT: THE HOUSE FAMILY OFFICE
PROJECT DESCRIPTION: RESIDENTIAL DEVELOPMENT
ADDRESS: 48-52 NEW TOWN ROAD, NEW TOWN
DRAWING TITLE: WATER METER DETAILS -2

PDA SURVEYORS, ENGINEERS & PLANNERS
127 Bathurst Street, Hobart, Tasmania, 7000
PHONE: +61 03 6234 3217
EMAIL: pda.hba@pda.com.au
www.pda.com.au
Also at: Kingston, Launceston & Burnie

CONTRACT NO: - - -
SCALE: 1: 100 (A3)
JOB NUMBER: 53851MD
DISCIPLINE: C
SHEET: 041
REVISION: C


N
CLARE STREET
SEYMOUR STREET
NEW TOWN ROAD
2.5m WIDE & 0.3m MIN. DEEP SWALE TO BE FORMED FOR OVERLAND FLOW CONTROL
2.5m WIDE & 0.3m DEEP SWALE TO BE FORMED FOR OVERLAND FLOW CONTROL
(E)S/4 EXS MH
(E)S/3 NEW MH
(E)S/2 EXS MH
(E)S/1 EXS MH
SW3/2 HEADWALL
SW1/5 TD PIT
SW1/4 TD PIT
SW1/3 TD PIT
SW1/7 EXS PIT
SW2/3 EXS PIT
S1/1 MH
S1/2 EXS MH
S2/1 EXS MH
S2/2 MH
S2/3 MH
S2/4 MH
SW1/1 EXS MH
SW1/2 MH
SW2/1 MH
SW2/2 MH
A C051
B 051
C 051
D 051
E 052
F 052
G 052
H 052
J 053
K 053
L C053
M C053
N C053
P C053
Q 054
NOTE: LOWER GROUND FLOOR SHOWN
LEGEND:
NEW STORMWATER
NEW SEWER
NEW WATER
EX. STORMWATER
EX. SEWER
EX. WATER
OVERHEAD ELECTRICAL
EX. U/G ELECTRICAL
EX. FIBRE OPTIC
EX. TELECOMMS
EX. GAS MAIN
EX. FENCE
NEW CROSSOVER
NEW DRIVEWAY
EX. ASPHALT FOOTPATH
EX. CONCRETE DRIVEWAY
FOR DEVELOPMENT APPROVAL
PLANAR MGA2020
DESIGNED: SC
DRAWN: SC
REVIEWED: MW/RP
APPROVED: MW/RP
JOB MANAGER: MATTHEW DENHOLM
ISSUED DATE: 06/11/2025
CLIENT: THE HOUSE FAMILY OFFICE
PROJECT DESCRIPTION: RESIDENTIAL DEVELOPMENT
ADDRESS: 48-52 NEW TOWN ROAD, NEW TOWN
DRAWING TITLE: SECTION PLAN
PDA
SURVEYORS, ENGINEERS & PLANNERS
CONTRACT NO: 53851MD
SCALE: 1: 500 (A3)
JOB NUMBER
DISCIPLINE
SHEET
REVISION
C 050 C


PROPOSED TASNETWORKS CONDUIT
500mm CLEARANCE ENVELOPE
RL53.00m
SWALE
LWR GRD FLR
EXISTING
OFFSET
SECTION B 1:200 C050
SECTION D 1:200 C050
SECTION A 1:200 C050
SECTION C 1:200 C050
FOR DEVELOPMENT APPROVAL
PLANAR MGA2020
SC
MW/RP
MW/JBF
06/ 1/2025
THE HOUSE FAMILY OFFICE
RESIDENTIAL DEVELOPMENT
48-52 NEW TOWN ROAD, NEW TOWN
CROSS SECTIONS 1
PDA
SURVEYORS, ENGINEERS & PLANNERS
1: 200
(A3)
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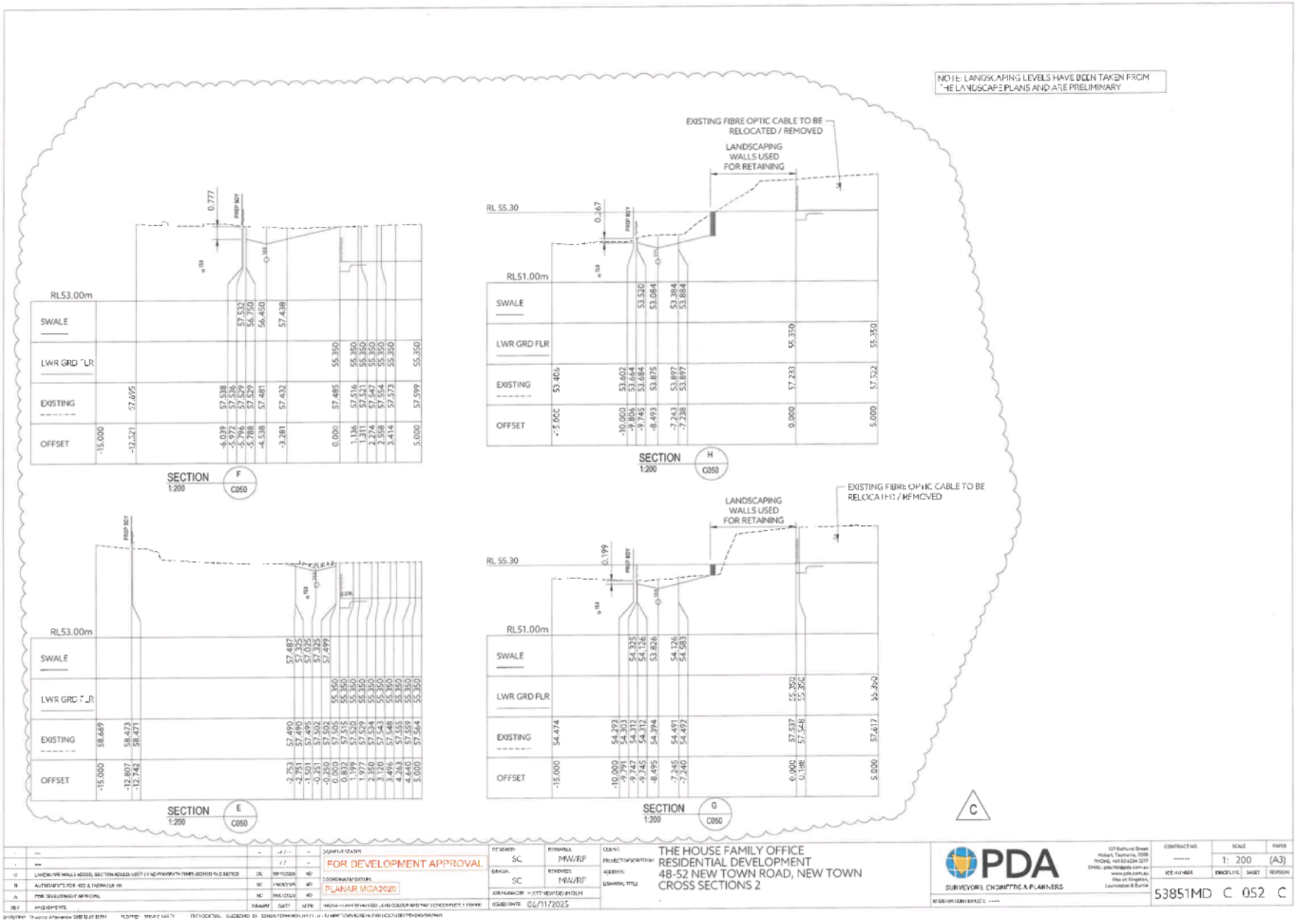
NOTE: LANDSCAPING LEVELS HAVE BEEN TAKEN FROM THE LANDSCAPE PLANS AND ARE PRELIMINARY
EXISTING FIBRE OPTIC CABLE TO BE RELOCATED / REMOVED
LANDSCAPING WALLS USED FOR RETAINING
RL53.00m
RL51.00m
RL 55.30
SWALE
LWR GRD FLR
EXISTING
OFFSET
SECTION F 1:200 C050
SECTION H 1:200 C050
SECTION E 1:200 C050
SECTION G 1:200 C050
C
FOR DEVELOPMENT APPROVAL
PLANAR MGA2020
THE HOUSE FAMILY OFFICE
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48-52 NEW TOWN ROAD, NEW TOWN
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PDA
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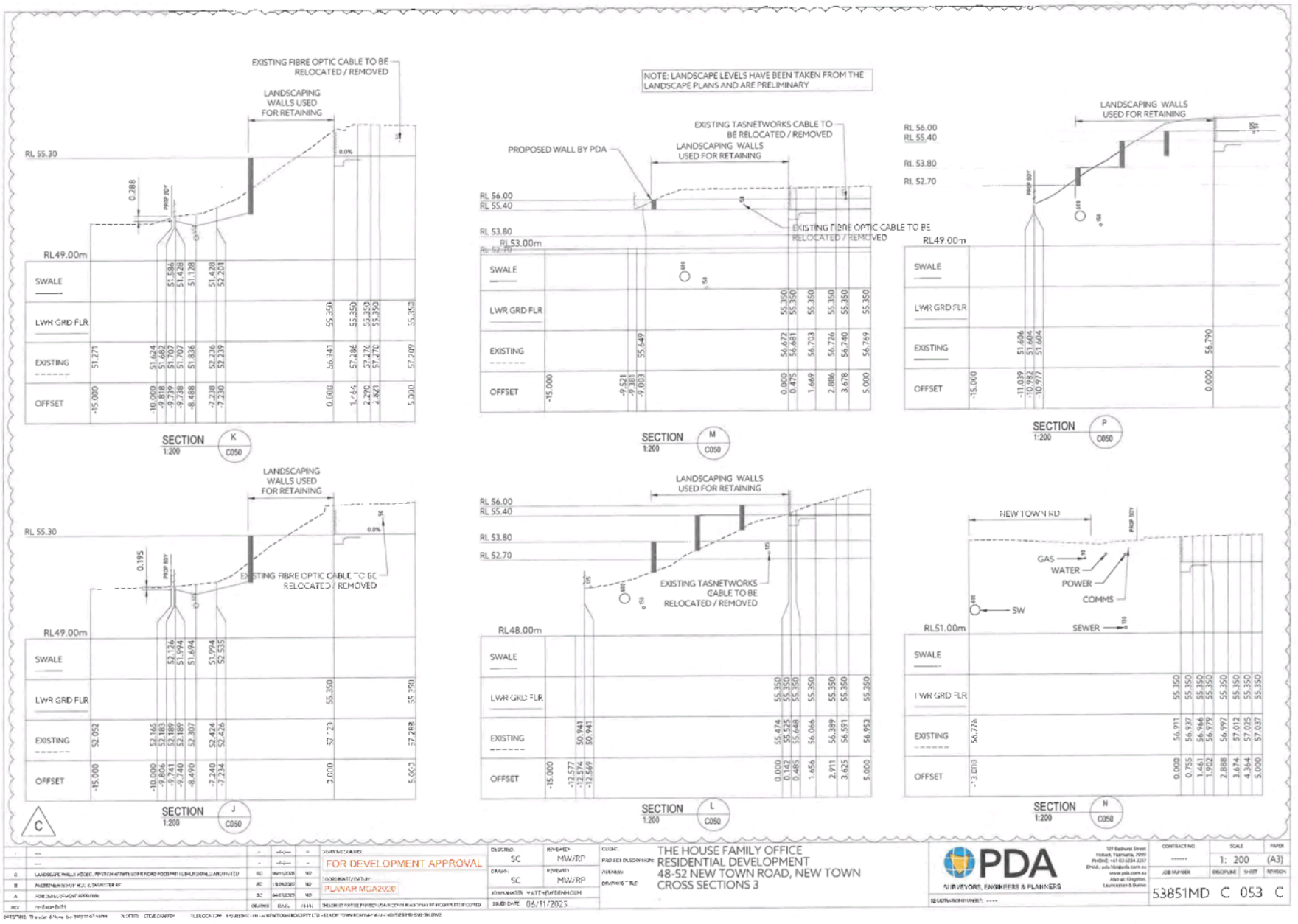
53851MD C 052 C


EXISTING FIBRE OPTIC CABLE TO BE RELOCATED / REMOVED
LANDSCAPING WALLS USED FOR RETAINING
RL 55.30
RL49.00m
SWALE
LWR GRD FLR
EXISTING
OFFSET
SECTION K 1:200 C050
NOTE: LANDSCAPE LEVELS HAVE BEEN TAKEN FROM THE LANDSCAPE PLANS AND ARE PRELIMINARY
PROPOSED WALL BY PDA
EXISTING TASNETWORKS CABLE TO BE RELOCATED / REMOVED
RL 56.00
RL 55.40
RL 53.80
RL 53.00m
SECTION M 1:200 C050
RL 56.00
RL 55.40
RL 53.80
RL 52.70
RL49.00m
SECTION P 1:200 C050
EXISTING FIBRE OPTIC CABLE TO BE RELOCATED / REMOVED
SECTION J 1:200 C050
EXISTING TASNETWORKS CABLE TO BE RELOCATED / REMOVED
RL48.00m
SECTION L 1:200 C050
NEW TOWN RD
GAS
WATER
POWER
COMMS
SW
SEWER
RL51.00m
SECTION N 1:200 C050
C
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MW/RP
06/11/2025
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SURVEYORS, ENGINEERS & PLANNERS
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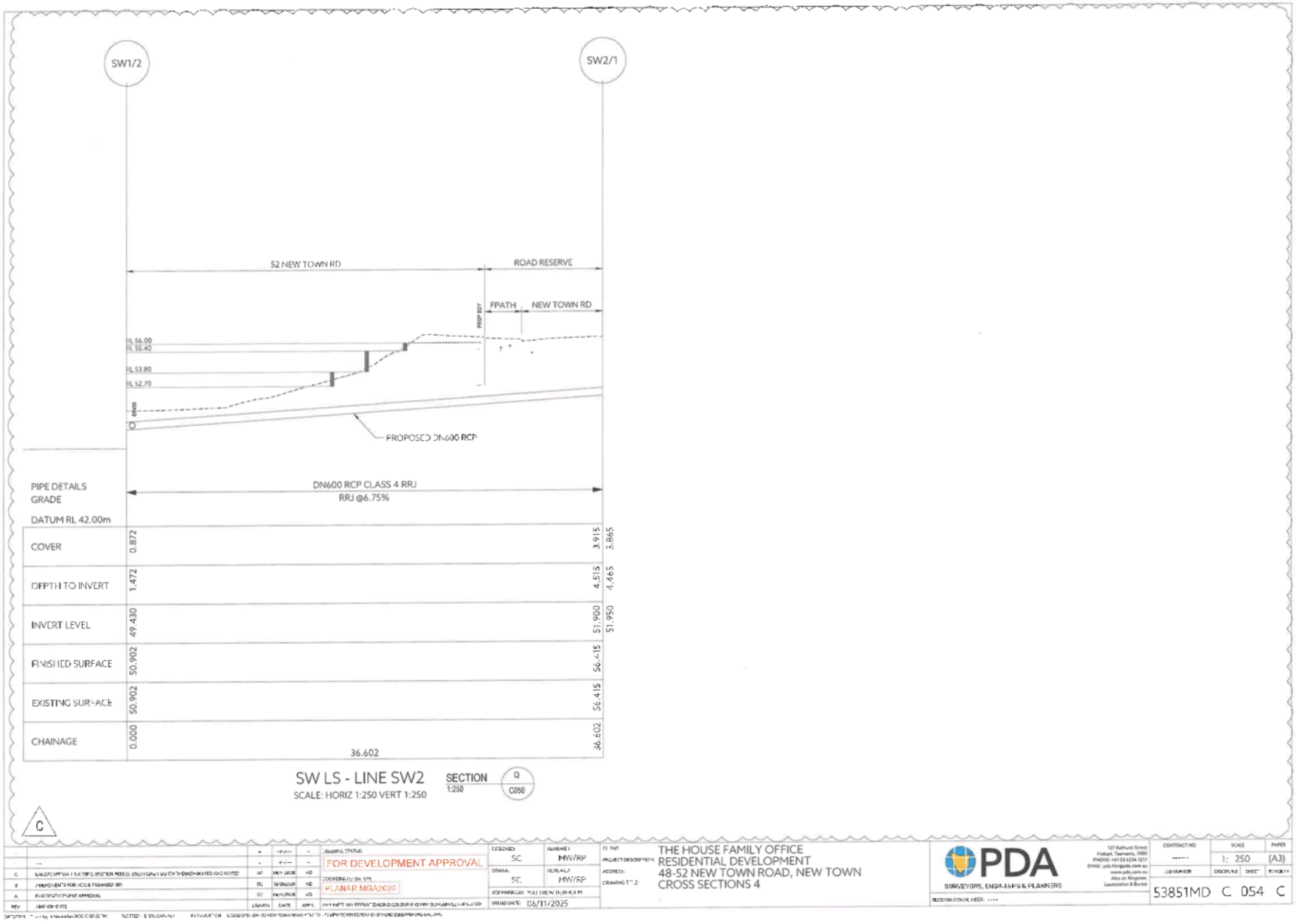
SW1/2
SW2/1
52 NEW TOWN RD
ROAD RESERVE
FPATH
NEW TOWN RD
PROP BDY
FL 56.00
FL 55.40
FL 53.80
FL 52.70
PROPOSED DN600 RCP
PIPE DETAILS
GRADE
DATUM RL 42.00m
DN600 RCP CLASS 4 RRJ
RRJ @6.75%
COVER 0.872 3.915 3.865
DEPTH TO INVERT 1.472 4.515 4.465
INVERT LEVEL 49.430 51.900 51.950
FINISHED SURFACE 50.902 56.415
EXISTING SURFACE 50.902 56.415
CHAINAGE 0.000 36.602 36.602
36.602
SW LS - LINE SW2
SCALE: HORIZ 1:250 VERT 1:250
SECTION 1:250
C050
C
FOR DEVELOPMENT APPROVAL
PLANAR MGA2020
DESIGNED: SC
DRAWN: SC
CHECKED: MW/RP
APPROVED: MW/RP
DATED: 06/11/2025
THE HOUSE FAMILY OFFICE
RESIDENTIAL DEVELOPMENT
48-52 NEW TOWN ROAD, NEW TOWN
CROSS SECTIONS 4
PDA
SURVEYORS, ENGINEERS & PLANNERS
SCALE 1: 250 (A3)
53851MD C 054 C



PLN-HOB-2024-0716: 48-52 New Town Road, New Town

Stormwater Management and Flood Hazard Report – Rev 0

53851MD | 2025/07/04 | Rev 0

PDA SURVEYORS, ENGINEERS & PLANNERS

Table of Contents

1 Project Overview 6
1.1 Site overview 6
1.2 Purpose of this report 6
2 Model Inputs 9
2.1 Extent of model and boundary conditions 9
2.2 Rainfall 10
2.3 Grid resolution 10
2.4 Surface roughness 11
2.5 Impervious surface coverage 11
2.6 Fences 12
2.7 Topographical data 12
2.8 Model run time 12
2.9 Cadastral information and building polygons 12
2.10 GIS information of existing pipes 12
3 Initial Model Runs 12
3.1 Grid size determination 12
3.2 Determination of design storm event 12
3.3 Comparison with Council's flood mapping 13
4 Model results – existing scenario 14
4.1 External flows entering site 14
4.2 Flow hydrographs 16
4.3 Comparison with results from Drains model 20
5 Proposed stormwater system 20
5.1 Stormwater diversion 20
5.2 New stormwater system 20
5.3 Model of proposed development 23
5.3.1 Revised pipe network 23
5.3.2 Revised topography 23
6 Model results – proposed development scenario 25
7 Flood hazard 30
8 Stormwater quality 34
9 E15.7.4 – Riverine Inundation Code 35
9.1 Acceptable solution A1 35

10 Summary 35
11 Qualifications 36
Annexures 36
ANNEXURE A – Flood Depth Mapping 37

List of Figures

Figure 1 – Location of Property 6
Figure 2 – Extent of model and boundary conditions 10
Figure 3 – Council flood mapping for the site 13
Figure 4 – Run003 results for 1% AEP, SSP3-7.0, tp01 14
Figure 5 – Run009 results for 1% AEP, SSP3-7.0, tp01 (Existing) 15
Figure 6 – Flows predicted to enter from Clare Street 16
Figure 7 – Positions of extracted flow hydrographs 17
Figure 8 – Hydrograph at position 1 (existing) 17
Figure 9 – Hydrograph at position 2 (existing) 18
Figure 10 – Hydrograph at position 3 (existing) 18
Figure 11 – Hydrograph at position 4 (existing) 19
Figure 12 – Hydrograph at position 5 (existing) 19
Figure 13 – Hydrograph of DN750 outfall pipe from site (existing) 20
Figure 14 – Proposed diversions 21
Figure 15 – Topography of development site used in model 24
Figure 16 – Run009 results for 1% AEP, SSP3-7.0 long term , tp01 (Proposed) 25
Figure 17 – Hydrograph at position 1 (proposed scenario) 27
Figure 18 – Hydrograph at position 2 (proposed scenario) 27
Figure 19 – Hydrograph at position 3 (proposed scenario) 28
Figure 20 – Hydrograph at position 4 (proposed scenario) 28
Figure 21 – Hydrograph at position 5 (proposed scenario) 29
Figure 22 – Hydrograph of DN750 outfall pipe from site (proposed scenario) 29
Figure 23 – Flood hazard curves extracted from ARR Manual 30
Figure 24 – Flood hazard mapping – proposed scenario – 1% AEP, 30 min, tp01, SSP3-7.0, 2100 31
Figure 25 – Flow velocity vectors – existing scenario – 1% AEP, 30 min, tp01, SSP3-7.0, 2100 32
Figure 26 – Flow velocity vectors – proposed scenario – 1% AEP, 30 min, tp01, SSP3-7.0, 210033

List of Tables

Table 1 Manning's n values applied to model 11
Table 2 Proportions of impervious coverage 11
Table 3 Design Storm 13
Table 4 Comments on flood mapping for proposed development (refer figure above) 26

PDA Contributors

Author	**R Parsons**	**2025/07/04**
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Review 2	Matt Denholm	2025/07/04

Revision History

Revision	Description	Date
0	First Issue – for DA approval	2025/07/04

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PDA SURVEYORS, ENGINEERS & PLANNERS

Abbreviations

AEP	Annual Exceedance Probability
AMC	Antecedent Moisture Condition
ARI	Annual Recurrence Interval
ARR	Australian Rainfall and Runoff
BOM	Bureau of Meteorology
CC	Climate Change
COH	City of Hobart
IFD	Intensity – Duration - Frequency
IL-CL	Initial Loss – Continuing Loss
NRE	Department of Natural Resources and Environment Tasmania
OSD	On-site Stormwater Detention
PSD	Permissible Site Discharge
RCP	Representative Concentration Pathway
SW	Stormwater
WSUD	Water Sensitive Urban Design

1 Project Overview

This report has been prepared by PDA Surveyors, Engineers & Planners on behalf of *The House Family Office*, for the development of an upmarket residential strata development on 48-52 New Town Rd, New Town. Reference is made to our Concept Stormwater Management & Flood Hazard Report, dated 19 December 2024, which was submitted to support an application for landowner consent. It is superseded by the current report, which is submitted to support the development application PLN-HOB-2024-0716, responding to Council RFI dated 02 April 2025.

1.1 Site overview

The combined property measures approximately 0.62 Ha and is located between Clare Street, Seymour Street and New Town Road, in New Town, Hobart. See Figure 1 below. The site was previously a television station. It is zoned mainly as Urban Mixed Use, with the access off Seymour Street zoned as Inner Residential.

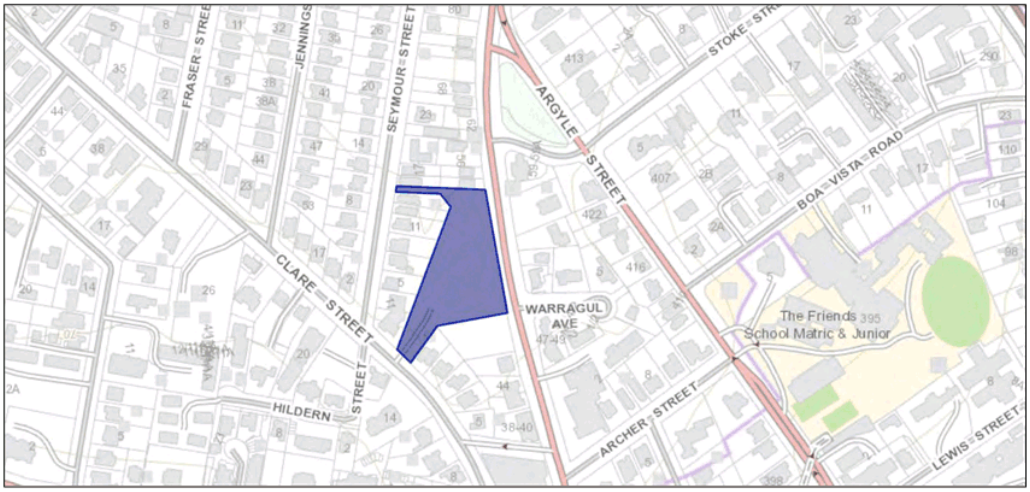


Figure 1 – Location of Property

1.2 Purpose of this report

This report responds to the RFI from Hobart City Council dated 02 April 2025. The items addressed in this report are only those pertaining to stormwater and flood hazard management. A summary response follows in this section, with more detailed discussions in the subsequent sections.

RFI Item 10:

Sw6 - Stormwater Code

A stormwater drainage design prepared by a suitable qualified person which demonstrates compliance with the following:
1. accommodate a storm with an ARI of 20 years when the land serviced by the system is fully developed
2. Stormwater runoff will be no greater than pre-existing runoff or any increase can be accommodated within existing or upgraded public stormwater infrastructure.

- *Please provide a revised DRAINS model for the proposed infrastructure demonstrating the diverted mains will have 5% AEP capacity for a future fully-developed catchment.*
- *Please state the proposed % impervious for the site, as reflected in the landscaping plans.*

Advice: Fully-developed should be taken in consideration of the Planning Zone, over the life of the stormwater assets.

As per previous agreement with Council, the existing site can be regarded as having 72% impervious coverage. However, the impervious proportion of the proposed development will be about 60%, possibly less. We therefore argue that the development will decrease the runoff from the site and therefore no hydraulic calculations regarding the 5% AEP event need to be presented. In addition to this, the development will propose water tanks for re-use purposes on site, further decreasing the peak flows from the development.

RFI Item 11:

Sw7 - Stormwater Code

A stormwater drainage design prepared by a suitable qualified person which demonstrates compliance with the following:

- *designed to accommodate a storm with an ARI of 100 years.*

Advice: see below Inundation request and advice

The proposed stormwater design has been modelled in 2D using TUFLOW, and designed to accommodate the 1% AEP event plus an allowance for climate change as described below.

RFI Item 12:

IND 1 - Inundation Prone Area Code

An inundation risk management plan and associated calculations prepared by a suitably qualified engineer in accordance with best practice guidelines that details:
1. The risk of inundation to the site, proposed buildings and building floor levels (based on a predicted 1% Annual Exceedance Probability flood event for the year 2100 including consideration of climate change. Clearly state the vertical clearance between the proposed finished floor level of any habitable rooms and the flood level,

The maximum water level in the swale is 58.15, whereas the finished ground floor level is 59.050, that is, 0.9 m clearance.

2. The impact of the proposed development upon the risk of inundation of other land, buildings and infrastructure (including frequency, extent, depth and velocity); and

The proposed development somewhat alleviates the flood risk on neighbouring properties to the north of the site, since the swale will capture much of the overland flow and direct it into the piped system. The result is a slight decrease in overland flows leaving the site and a slight increase in the flows conveyed to the pipe system.

3. Any inundation control measures or design features proposed to be employed to reduce the risk, and the resultant level of risk

No measures are required.

4. clearly show pre and post overland flow paths through and around the property, justifying their location.

The pre- and post-development velocity vectors are shown in Section 7.

- *Council notes the proposed 3mx1m swale along the western boundaries may have potential clashes with existing and proposed walls, drops, and landscaping. The indicative long-section of the stormwater pipe suggests grades outside the range looked at for the swale. Please clarify. The report is unclear re % of flows entering from the direction of 46 New Town vs those entering at the Clare St entrance. Should flows be entering from Clare St, briefly demonstrate how these will be directed to the swale with no impact on third-party land.*

The modelled swale is 3 m wide and 0.3 m deep. There was in inconsistency between the dimensions in the previously submitted drawings and calculations. This is corrected in the current drawing issue. However, the detailed design of this swale will be done in the next stage, with consideration to be given to the kerb and channel systems in the roads surrounding the site, which will have an important implication for the design of the swale.

Minimal flows are predicted to enter the site via the Clare Street entrance. Some flow is predicted to enter from New Town Road just south of No. 46, but this is likely to be a limitation of the LIDAR as the detailed survey does not extend beyond this.

- *Council notes an overland flow path is shown entering the site from New Town Rd in Council modelling, but the DRAINS model has this bypassing the site and entering the neighbour's land. Please justify the altered overland flow route, and clarify how this path will be diverted safely around the building site to maintain 300mm freeboard and no impact on third party land, particularly noting the proposed tiered retaining walls and associated cut/fill.*

As will be explained later, this overland path does not exist. Rather, the water will flow down New Town Road.

- *Please clarify the overland flow depth in the road reserve and whether it will enter the driveway.*

As explained later in the report, the kerb and channel system as well as the walkway crossfall, will prevent water from running into the driveway.

- *It appears likely floor levels of the building (particularly the lower ground carpark) will not be 300mm above the adjacent flood levels. Please address the provisions of E15.7.4 A1.*

E15.7.4 A1 is addressed later in the report in this regard.

- *Please provide all inputs and assumptions used in the DRAINS model, including but not limited to inlets, ponding, and overland flow shapes and depths. Council notes the DRAINS results provided but requires the associated map to identify the pipes and overflow paths. Please submit the DRAINS model via email.*

The Drains model referred to in the previous report is superseded by the 2D analysis presented in this report.

Council notes the suggestion to postpone 2D analysis to detailed design stage. Council recommends this is carried out at Planning stage, to clarify actual flow paths, depths and hazard

A 2D flood analysis has been carried to address this item, specifically considering a 1% AEP event and accounting for the SSP3-7.0 climate change scenario.

RFI Item 13:

IND 3 - Inundation Prone Area Code

If landfill or solid walls are proposed within the modelled flood area, provide an assessment by a suitably qualified person, accompanied by any necessary engineering detail, outlining:
1. How no adverse affect on flood flow over other property through displacement of overland flows;

An impervious fence or wall is proposed on the outside of the swale to contain flow within the property and direct more of the flow into the pipe system. The flood extent on neighbouring property is not predicted to increase.

2. How any proposed infrastructure and techniques will ensure the net discharge of stormwater and the rate of stormwater discharge does not exceed pre-development levels; and

In the 1% AEP climate change event, there is a decrease of about 50 ℓ/s of overland flow, but about 90 ℓ/s increase in piped flow.

In the 5% AEP event the flow peak is likely to decrease, since there will be water tanks and the proportion of impervious surface will be less, with numerous gardens throughout the site.

3. How stormwater quality from the development site would compare with pre-development levels

Gross pollutants are proposed to be removed by means of proprietary mesh baskets placed inside the pits. Suspended solids and dissolved pollutants are likely to decrease, because of water tanks and gardens. To demonstrate this, calculations can be shown at detailed design. In any event, the best practise reduction targets can easily be achieved for nitrogen and phosphorous, given the reduced impervious proportion.

RFI Item 14:

IND 4 - Inundation Prone Area Code

If buildings or works are proposed within the modelled flood area, provide evidence from a suitably qualified person that proposed buildings or works will be designed and constructed to resist hydrostatic and hydrodynamic forces as a result of inundation.

It is not expected that forces from flood water will be a significant concern. At detailed design stage, flow velocities and depths will be provided to the structural engineer if this is relevant.

2 Model Inputs

A 2D flood model was created in TUFLOW, with input data and parameters as summarised below.

2.1 Extent of model and boundary conditions

The extent of the flood model is shown below. Because the site is some distance from Maypole Creek, it was suggested to Council that we would select the downstream end of the model at a point sufficiently far from the site so that an error in the boundary conditions would not have an impact on the hydraulics of the stormwater on the site. The following boundary conditions were applied:

- 2D boundary condition - At a location in Pedder Street – energy slope of 2%, corresponding to the slope of the road.
- 1D boundary condition – At a pit in Pedder Street on the DN900 stormwater main – HGL taken conservatively to be 0.3 m above the pit surface level.

Rainfall was applied to the model using the rainfall-on-grid method. This is described further later.

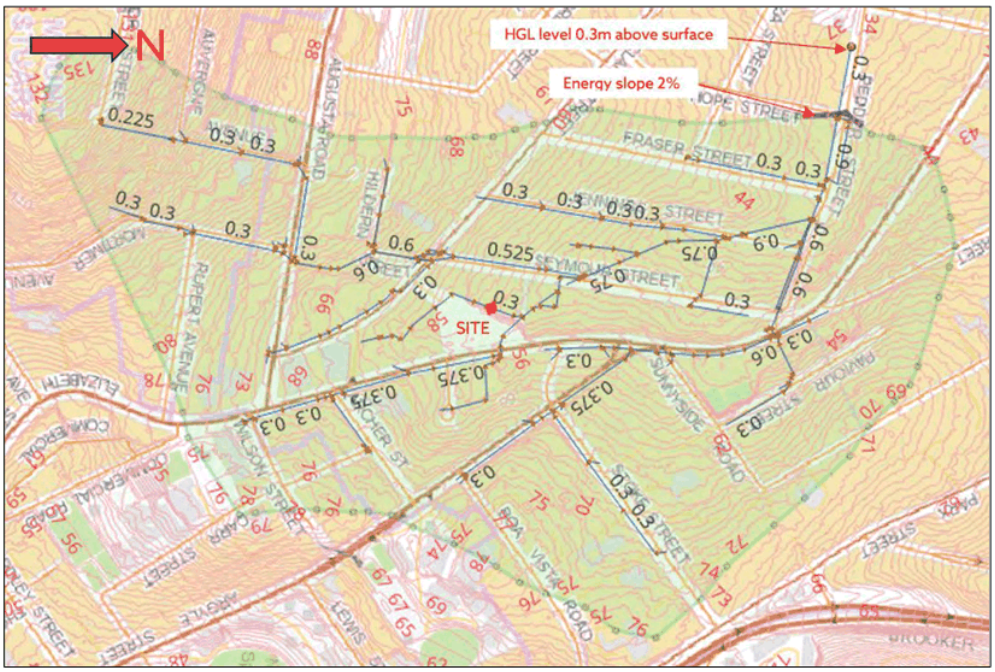


Figure 2 – Extent of model and boundary conditions

2.2 Rainfall

In addition to the applied boundary conditions, rainfall was applied directly onto the gridded model of the topography. Rainfall data was obtained from the ARR and the BOM using a plug-in tool provided by TUFLOW. IFD data was obtained for a 1% AEP, for both conditions of no climate change and for the SSP3-7.0 Long Term climate change scenario. Data for durations from 10 min to 90 min were obtained. Rainfall losses due to infiltration on pervious surfaces were obtained, based on the IL-CL method. Ten temporal patterns were modelled for each duration to simulate the effect of varying intensities during the course of a given storm event. Pre-burst rainfall was accounted for by subtracting the ARR-recommended pre-burst rainfall depths from the initial loss applied to the rainfall.

2.3 Grid resolution

To determine the appropriate grid size to use, six simulations, with grid sizes of 0.5 m, 1 m, 2 m, 3 m, 4 m and 5 m were run, using temporal pattern tp01 and a duration of 30 min in each case. It was found that the results of the 1 m grid spacing provided close agreement with those of the 0.5 m grid. Because the run time for the 0.5 m grid was unpractically long, the 1 m grid was chosen for further simulation. Sub-grid sampling was applied, with 5 samplings for each grid direction. The benefit of sub-grid sampling is to more accurately account for storage within a grid cell where topography is highly variable.

2.4 Surface roughness

The following Manning's n surface roughness values were applied

Table 1 Manning's n values applied to model

Surface type	n (s/m$^{1/3}$)	Comment
Grass / landscaping	0.03	Swale drain and other landscaping on the development site
Existing properties	0.1	Ground surfaces around building on existing properties, allowing for fences and other obstacles
Buildings	0.3	Allowance for flow resistance within buildings
Road reserves	0.02	Including roadway, kerbs, walkways and grassed verges
Existing project site	0.02	Allows for combination of concrete surfaces, vegetation and other coverages on existing property

2.5 Impervious surface coverage

The following proportions of impervious surface were applied to the model

Table 2 Proportions of impervious coverage

Surface type	% impervious	Comment
Existing development site	72%	As communicated by HCC
Proposed development site	60%	Based on areas extracted from architect's drawings, 56% impervious area is estimated. 60% used as conservative approach. This proportion is applied to all surfaces uniformly. At detail design stage, the shapefiles used to delineate material types can be drawn with greater detail based on final architectural design.
Private lots outside of the site	50%	This accounts for both buildings and other impervious surfaces on the lots
Buildings on properties surrounding the site	100%	On the lots surrounding the site, building polygons were digitised. This is conservative in that buildings surrounding the site were already including in the 50% figure in the row above.
Road reserves	80%	The entirety of the road reserve, including the roadway, kerb & channel, walkways, driveways and grassed verges

2.6 Fences

It has been assumed that fences between properties do not present an obstacle to flow, as per Council's approach to modelling of boundary fences.

2.7 Topographical data

Several layers of topographical data were applied to the model:

- 1 m LIDAR data from Geoscience Australia in the form of GeoTIFF files covering all of the catchment area considered
- Detailed survey data of the existing site and bounding portions of New Town Road, Clare Street and Seymour Street
- Shapefiles of proposed building platforms, created manually in QGIS
- Shapefiles with triangulations of new topography within the property boundary with estimated levels of the areas between the buildings, the swale, driveways and remaining areas on the site, created manually in QGIS. The levels were obtained from reading of the architectural and landscaping drawings and are subject to revision at detail design stage.

2.8 Model run time

The model run time for each model run was 2 hours, giving enough time for flood hydrographs to pass through the model.

2.9 Cadastral information and building polygons

Cadastral boundaries and building polygons were obtained from the LIST.

2.10 GIS information of existing pipes

GIS data of Council's stormwater assets was downloaded from their website. The GIS data had data on pipe and pit locations and diameters. There was no information on pipe inverts, so the relevant portion of the stormwater system was modelled in CAD

3 Initial Model Runs

3.1 Grid size determination

As mentioned above, the model was initially run with a 30 min storm duration, with temporal pattern tp01, with grid sizes varying from 0.5 m to 5 m. A spacing of 1 m was found to be the optimum, with acceptable accuracy and tolerable simulation times.

3.2 Determination of design storm event

A simulation was run using temporal pattern tp01 for durations from 10 min to 90 min, for the 1% AEP and climate change. Based on the resulting hydrographs at the northern end of the site, the 15 m, 20 min, 25 min, 30 min and 45 min durations were identified as candidates for the

critical duration. A simulation was then done for the above five durations for all ten temporal patterns. Based on the results, a duration of 30 min was identified as critical. An analysis was then done with an ASC-to-ASC routine to determine the median storm temporal pattern, shown to be temporal pattern tp10. The design storm was therefore determined to be the following:

Table 3 Design Storm

Storm parameter	Value
AEP	1%
CC scenario	SSP3-7.0 Long Term
Duration	30 min
Temporal pattern	tp10

3.3 Comparison with Council's flood mapping

The output of the initial model runs was compared with the flood mapping from Council. Because Council's flood mapping was likely based on LIDAR, our initial model was also run with LIDAR for the purpose of comparison. Below are shown Council's mapping and PDA's initial mapping.



Figure 3 – Council flood mapping for the site

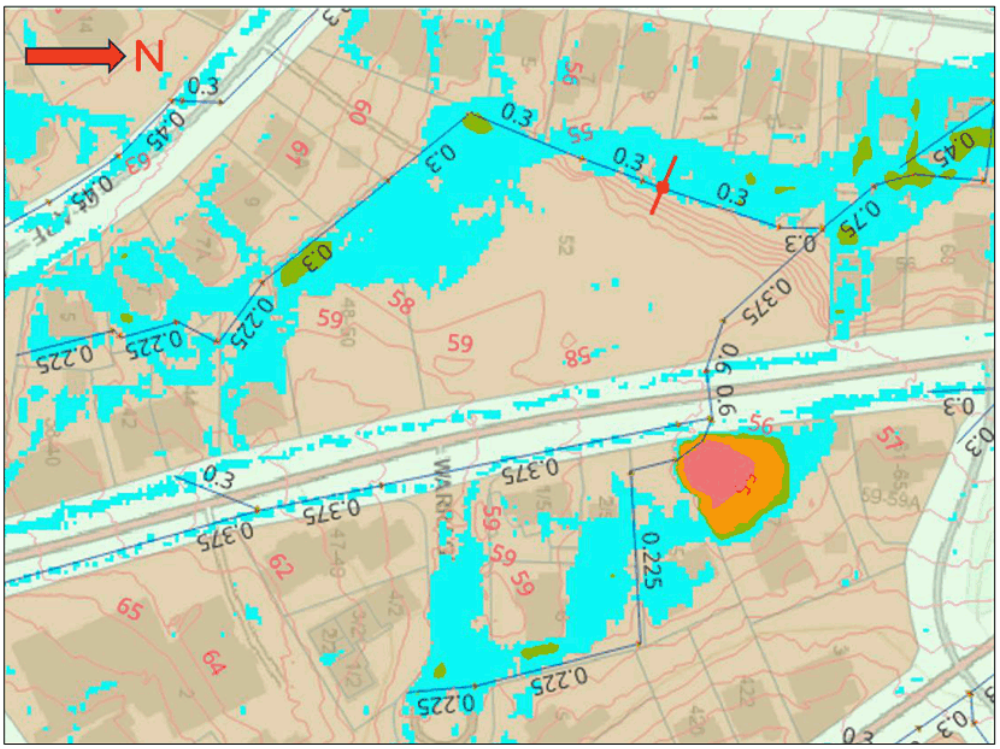


Figure 4 – Run003 results for 1% AEP, SSP3-7.0, tp01

The flood mapping in Figure 4 is in substantial agreement with the Council mapping, except that the extent of flooding on the development site is more. This may be due to the cutoff display depth used for Council mapping potentially being different to the 50 mm used in the PDA mapping.

4 Model results – existing scenario

4.1 External flows entering site

Once the initial runs were complete, the DTM surface produced from the detailed site survey was used to modify the LIDAR surface on an around the development site. The generated flood mapping for the existing scenario is shown below. It can be seen that the predicted overland flow path entering from New Town Road at the north of the site is removed. This is because the kerb and channel have been more accurately picked up than in the LIDAR. This is an important result which has relevance to RFI Item 12. See Figure 5 below.

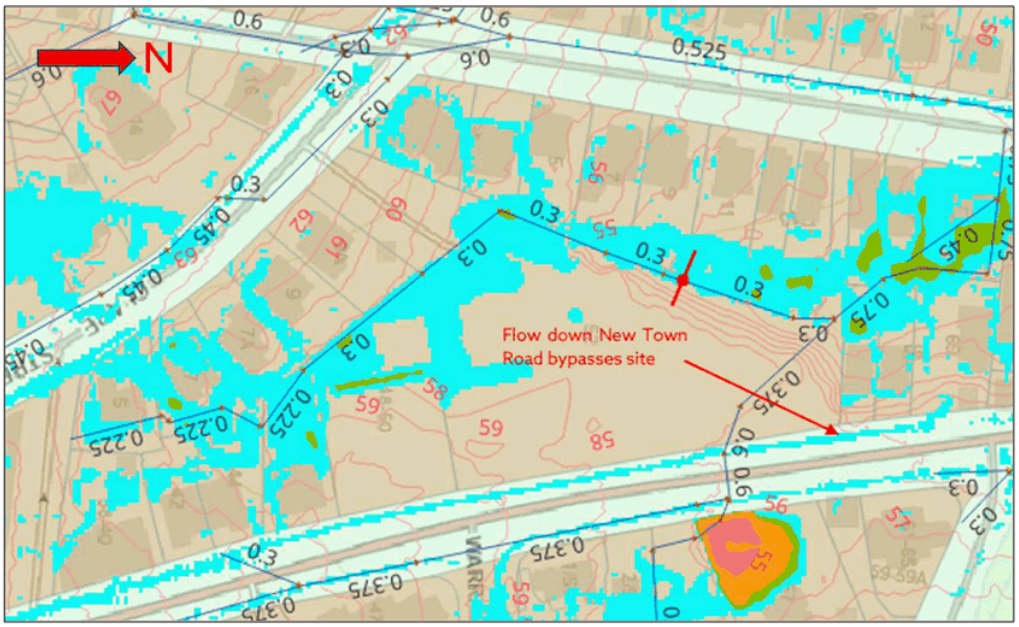


Figure 5 – Run009 results for 1% AEP, SSP3-7.0, tp01 (Existing)

Considering the above, it is believed that a more accurate survey of portions of Clare Street and further southwards in New Town Rd will make it possible to show that much of the flow modelled to be entering the development site from the south will in fact run down the road ways of these streets. We intend to investigate this at detailed design stage as it will have significant implications for the stormwater system of the development site.

See the figure below, which shows velocity vectors of flows from Clare Street, as well as from New Town Road south of the extent of the site and of the detailed survey.

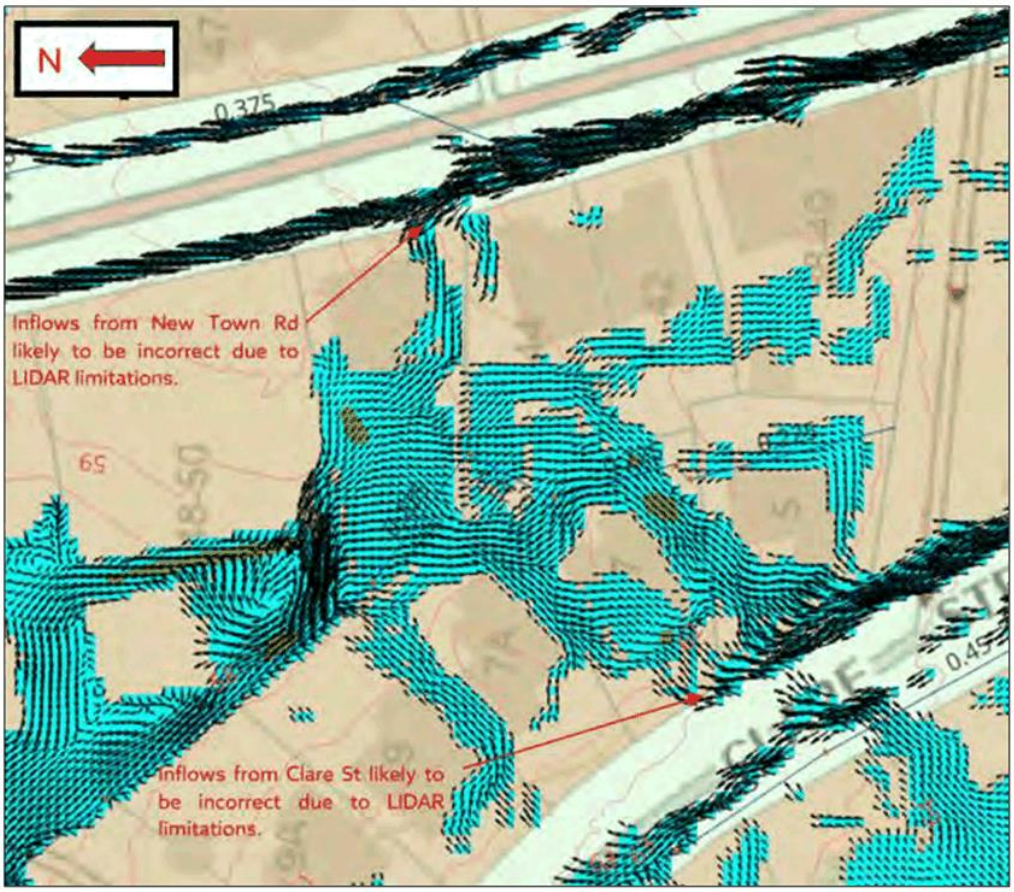


Figure 6 – Flows predicted to enter from Clare Street

4.2 Flow hydrographs

Flow hydrographs were extracted from the results at the positions of the blue arrows shown below. The direction of the arrow goes from left to right when one looks in the direction of flow.

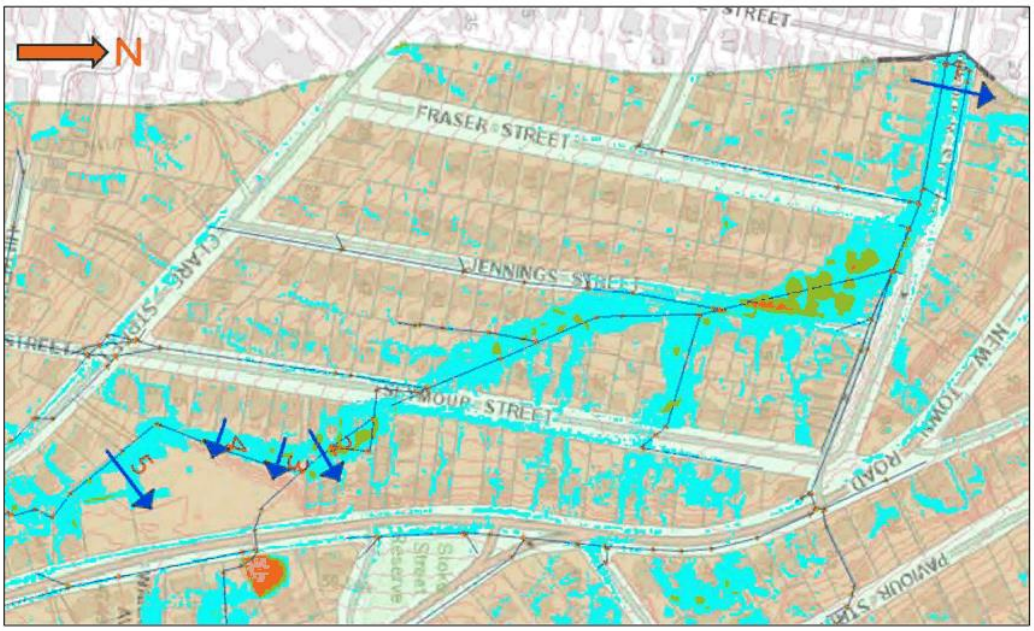


Figure 7 – Positions of extracted flow hydrographs

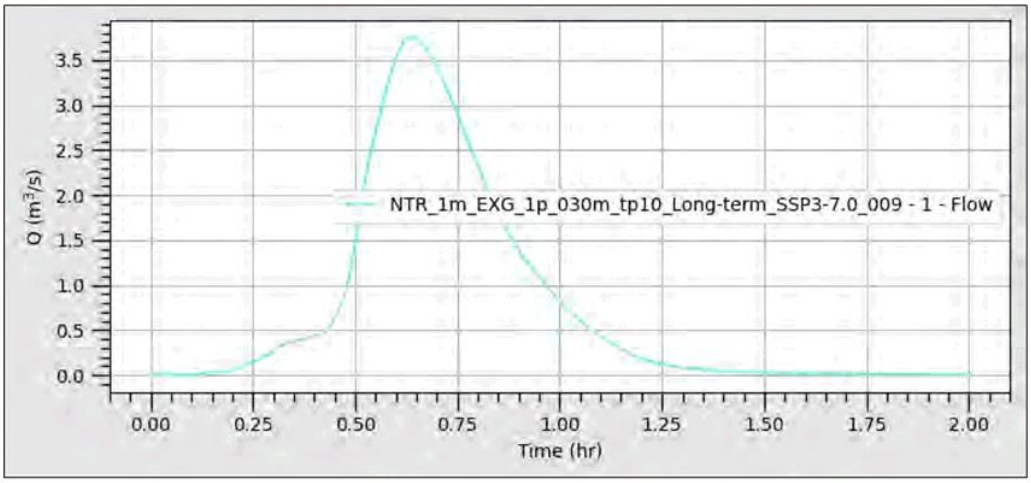


Figure 8 – Hydrograph at position 1 (existing)

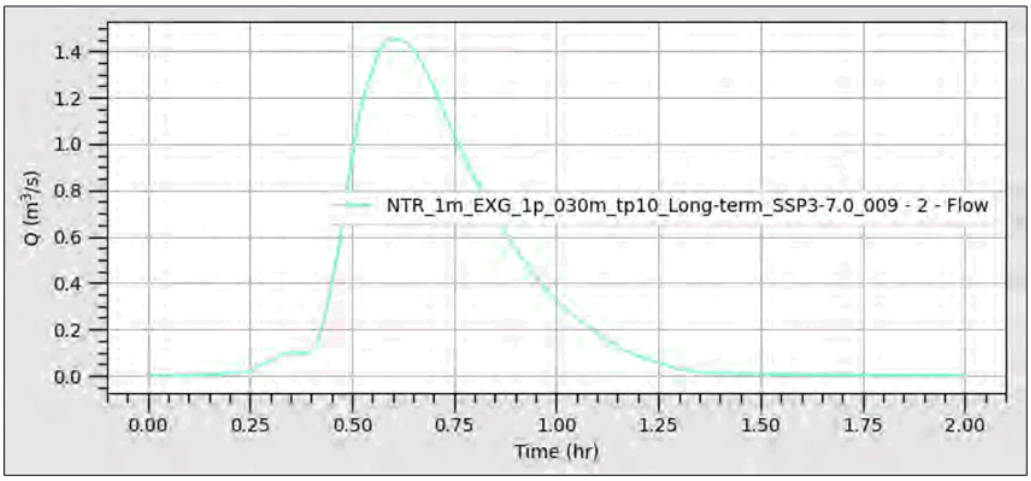


Figure 9 – Hydrograph at position 2 (existing)

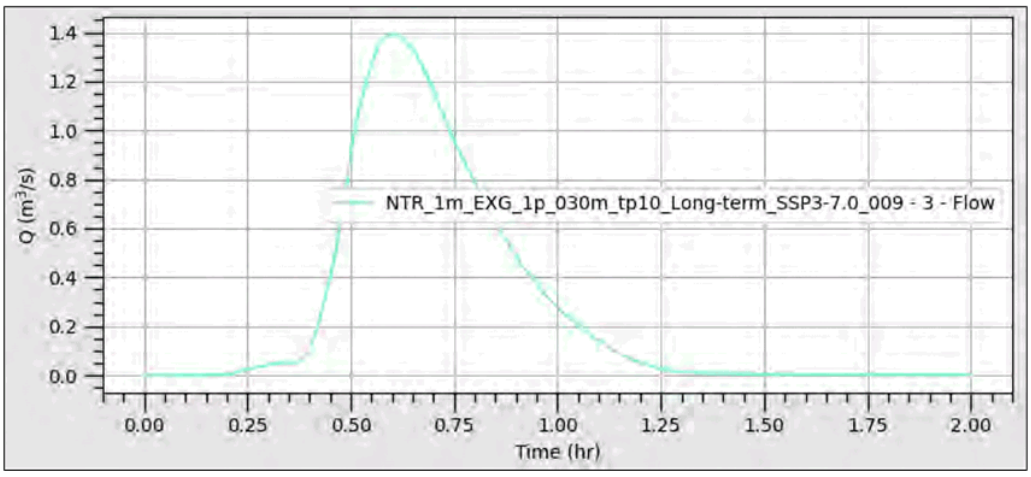


Figure 10 – Hydrograph at position 3 (existing)

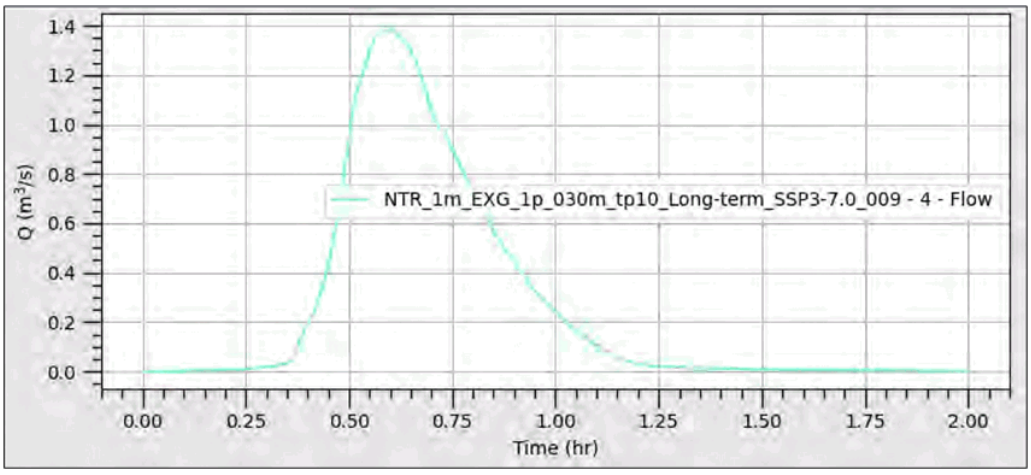


Figure 11 – Hydrograph at position 4 (existing)

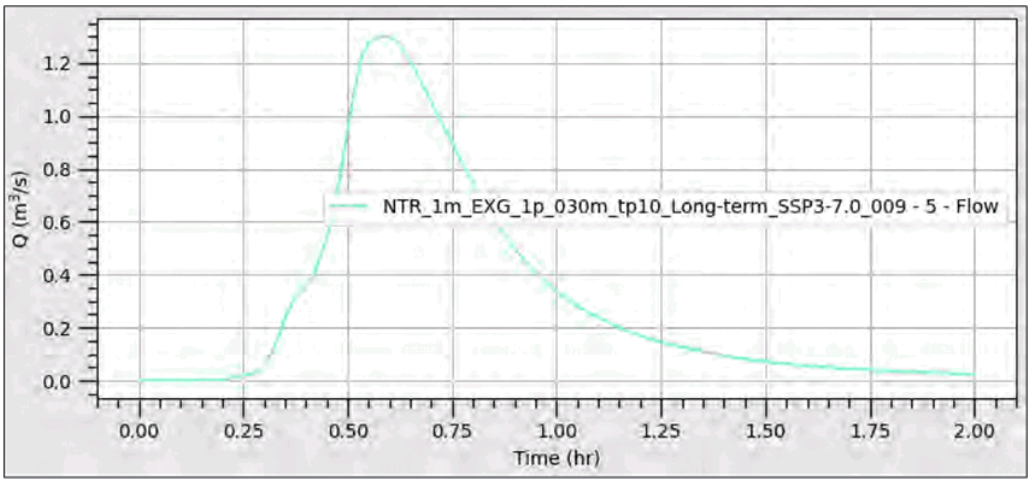


Figure 12 – Hydrograph at position 5 (existing)

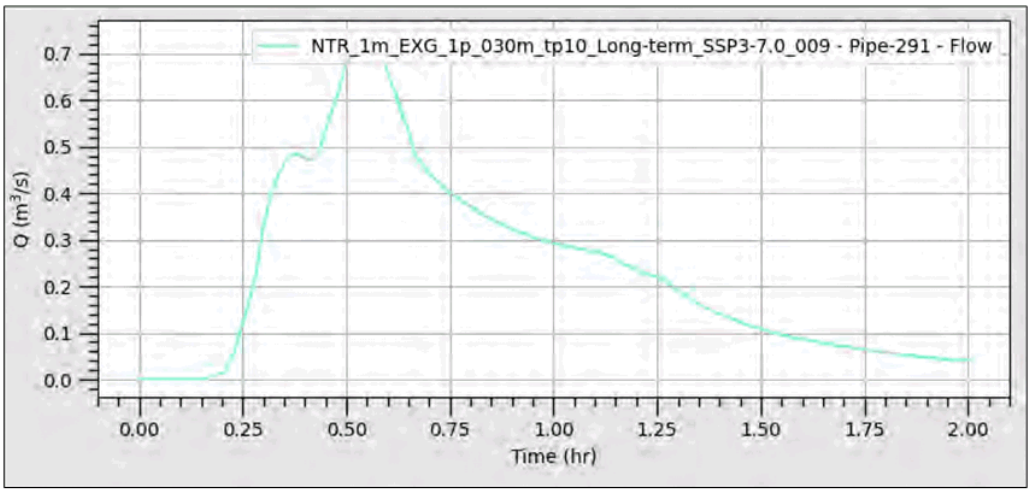


Figure 13 – Hydrograph of DN750 outfall pipe from site (existing)

4.3 Comparison with results from Drains model

As part of the analysis done for the previous stormwater report submitted to support the landowner consent application, a hydraulic model had been prepared in Drains. The model had considered the SSP5-8.5 2090 scenario. In order to provide validation to the above-mentioned TUFLOW modelling, the Drains model was amended to account for the SSP3-7.0 2100 scenario. The model predicted a 1% AEP peak surface runoff leaving the site to the north of 1.27 m^3/s and a flow of 0.63 m^3/s for the DN750 outfall pipe from the site. This compares well with the surface flow from TUFLOW of 1.43 m^3/s (see Figure 9) and the DN750 pipe flow from TUFLOW of a 0.74 m^3.

5 Proposed stormwater system

5.1 Stormwater diversion

The proposed stormwater pipe diversion is shown below. Also shown is a new open drain / swale which will run along the western boundary of the site.

5.2 New stormwater system

The details of the internal reticulation within the site are to be determined during the detailed design stage. The concept will be to drain the stormwater to water tanks for re-use on site. The implication of this is that stormwater peak flows will likely be reduced below the modelling presented in this report.

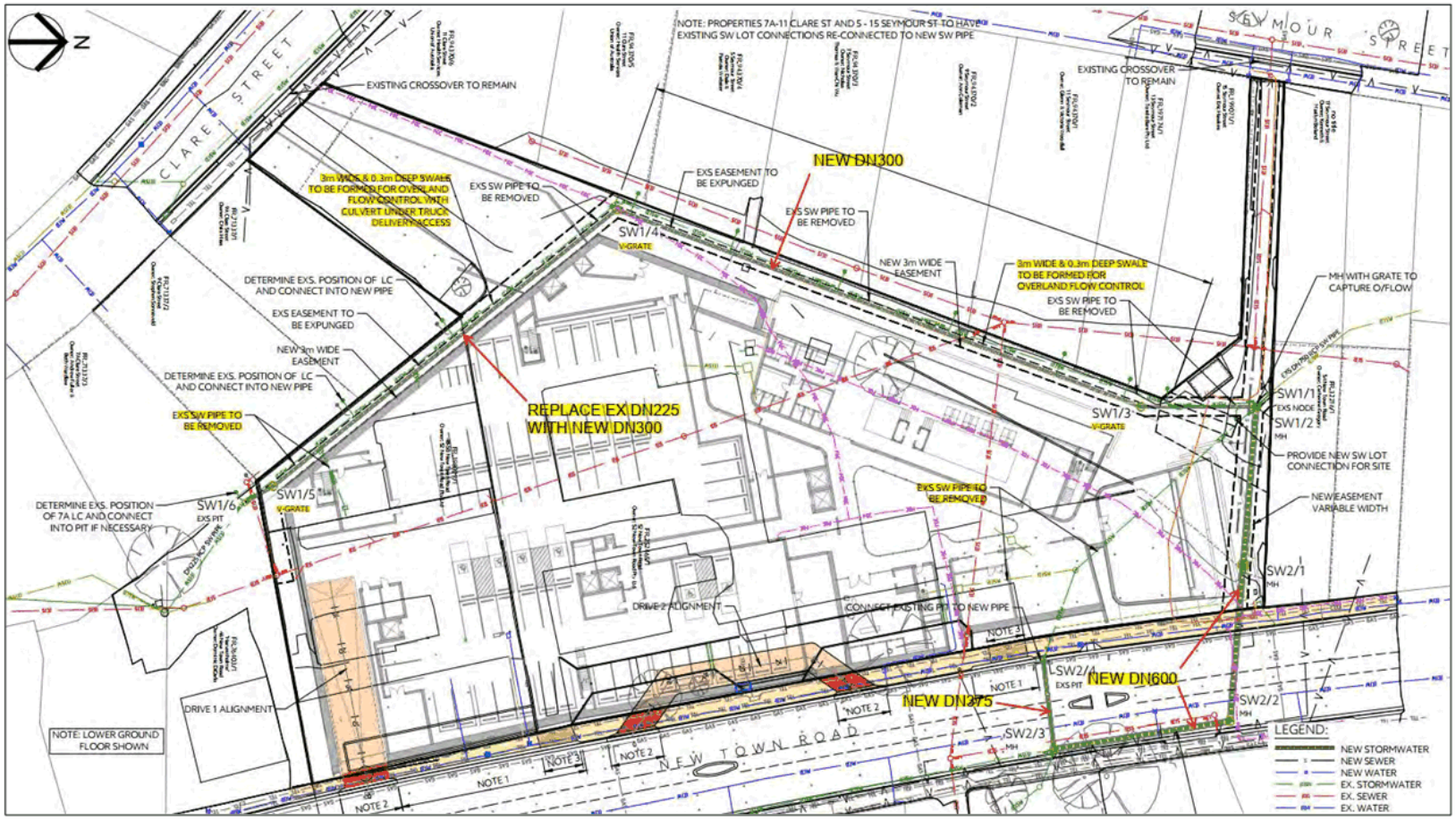


Figure 14 – Proposed diversions

5.3 Model of proposed development

5.3.1 Revised pipe network

For the model of the proposed development, the pipe network used for the existing scenario was amended in QGIS to account for the proposed diversion. The future internal reticulation was not included in the amended network, as this still needs to be finalised under the detailed design stage. It is however conservative to neglect the future internal system in this analysis.

5.3.2 Revised topography

The modelling of the revised topography was challenging. It is not easy to account fully for the effect of the various floor levels which sometimes overhang lower levels and which have different configurations of roof gardens on the various levels. The topography of the proposed development was therefore modelled as summarised and illustrated below.

- Model the building primarily as a slab at ground floor level RL 59.050.
- Then a TIN (triangulated irregular network) model was created in QGIS.
- The levels of the TIN tie in to the levels at the boundaries.
- A 300 mm deep swale was modelled in the TIN along the SW and NW boundaries.
- An impervious fence was modelled along the outside of the swale to present flows from spilling over into the properties of the Seymour Street neighbours.

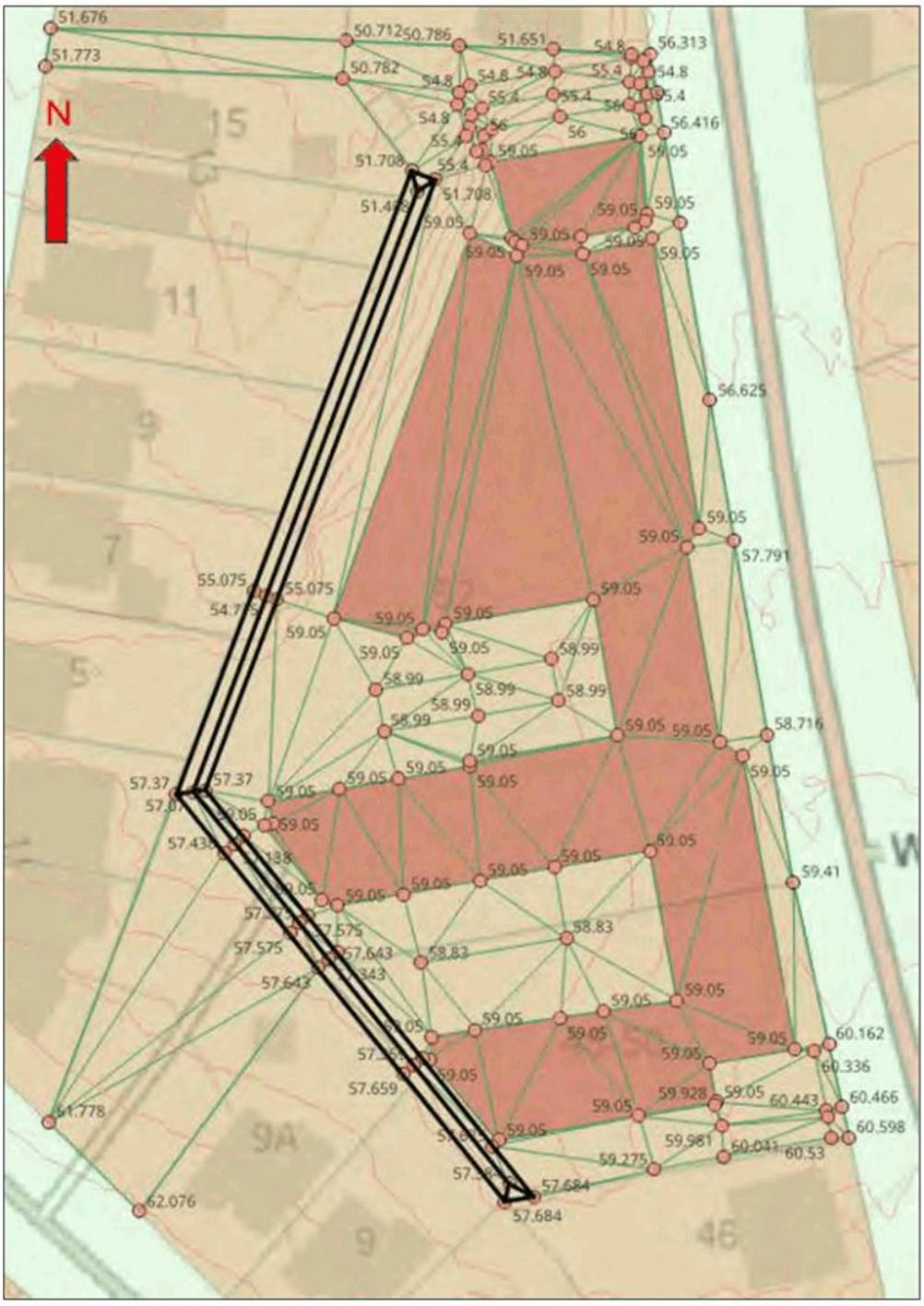


Figure 15 – Topography of development site used in model

6 Model results – proposed development scenario

The flood mapping for the proposed development, for the design storm, is shown below. With explanations overleaf.

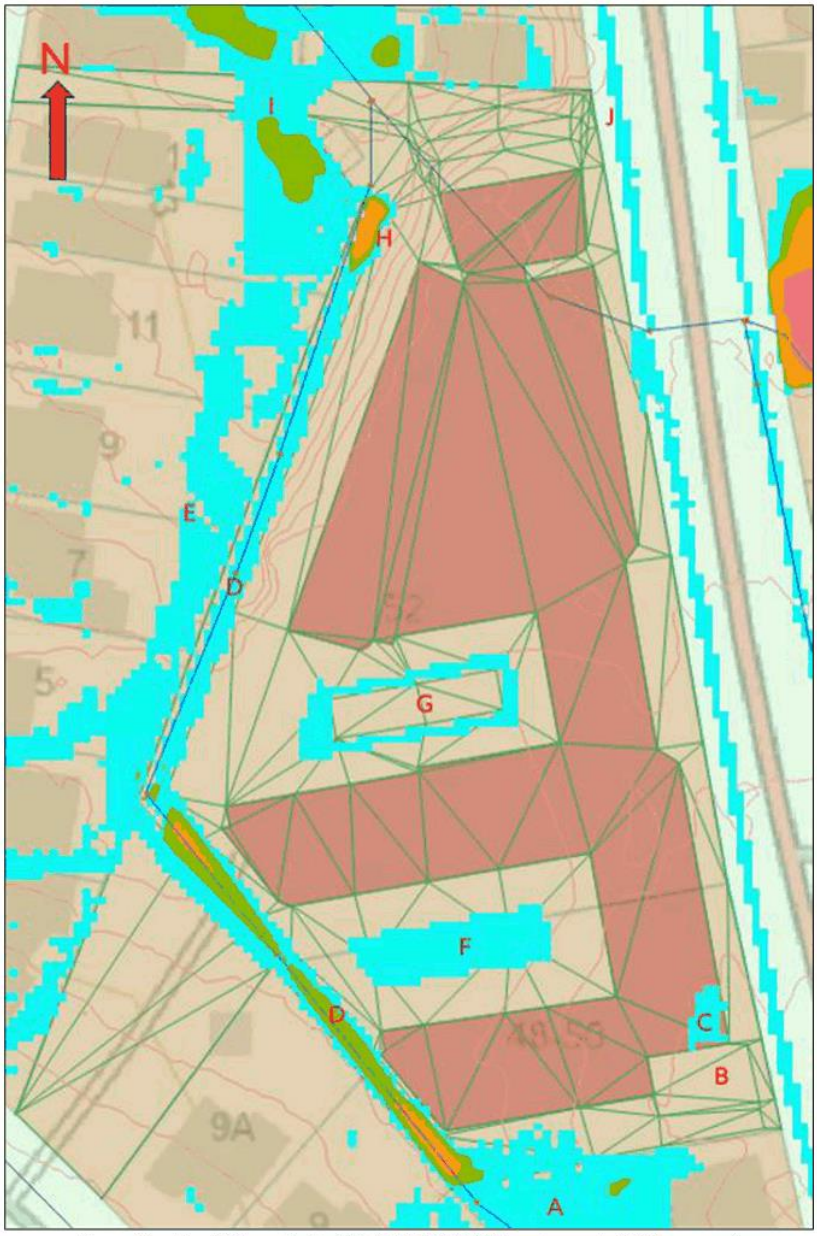


Figure 16 – Run009 results for 1% AEP, SSP3-7.0 long term , tp01 (Proposed)

Table 4 Comments on flood mapping for proposed development (refer figure above)

Location	Comment
A	These flows from the south are subject to detail design. We believe these flows will reduce when the kerbs and channels of surrounding roads are taken into consideration based on an extended survey.
B	The kerb and channel and levels of the existing walkway will prevent flows from New Twon Road from entering the driveway.
C	This predicted ponding can be addressed during detailed design when levels and stormwater drainage are designed in detail.
D	1 m wide 300 mm deep swale drain with an impermeable fence running along the outside to prevent flows running to the neighbours. These flows will likely reduce once surrounding roads are more accurately considered – see note A.
E	These flows are generated on the neighbouring lots and are not of concern to the subject development.
F	This is the "Village Green". Levels will slope away from the floor level of the surrounding building towards this area, where stormwater drainage will be provided. The detailed drainage is beyond the scope of this report and will be designed at detailed design stage.
G	Similar to the case of note F above, this area is the greenhouse. Levels in the TIN slope towards the greenhouse. Stormwater drainage will be designed at detailed design stage and is beyond the scope of this report.
H	A large grated pit will be provided at this point to capture as much of the surface flow as possible. The downstream surface flows will be reduced. See hydrographs following this table.
I	As mentioned in note H above, these surface flows will decrease below those resulting from the existing condition. See hydrographs following.
J	With the detailed survey in New Town Road taking the kerb and channel and the walkway crossfall into account, no flows are predicted to enter the site from the road at this location.

See below the hydrographs for the proposed development, taken at the same locations as in Section 4 above.

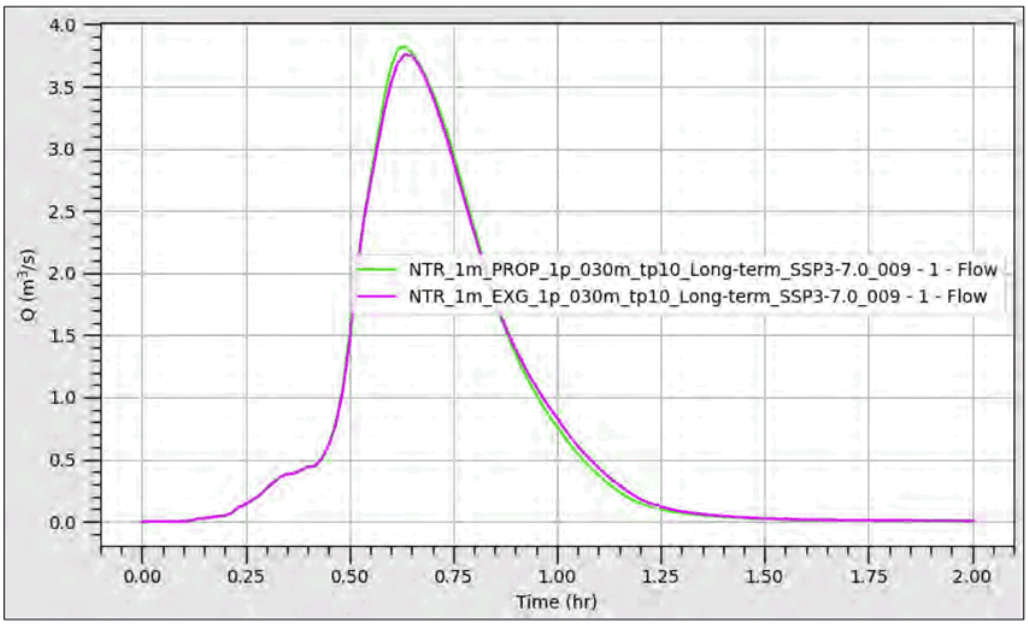


Figure 17 – Hydrograph at position 1 (proposed scenario)

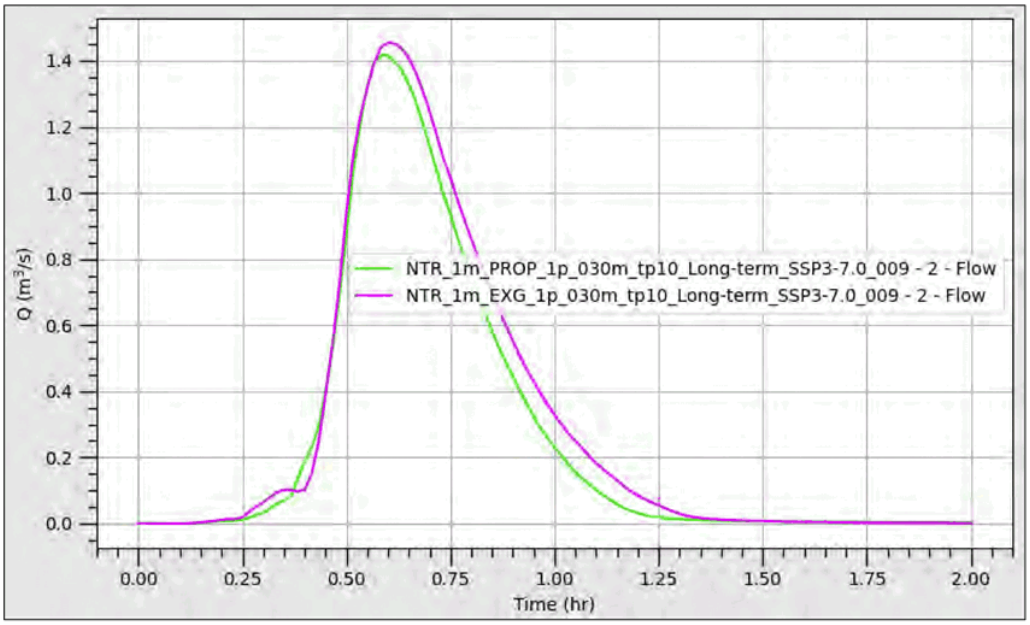


Figure 18 – Hydrograph at position 2 (proposed scenario)

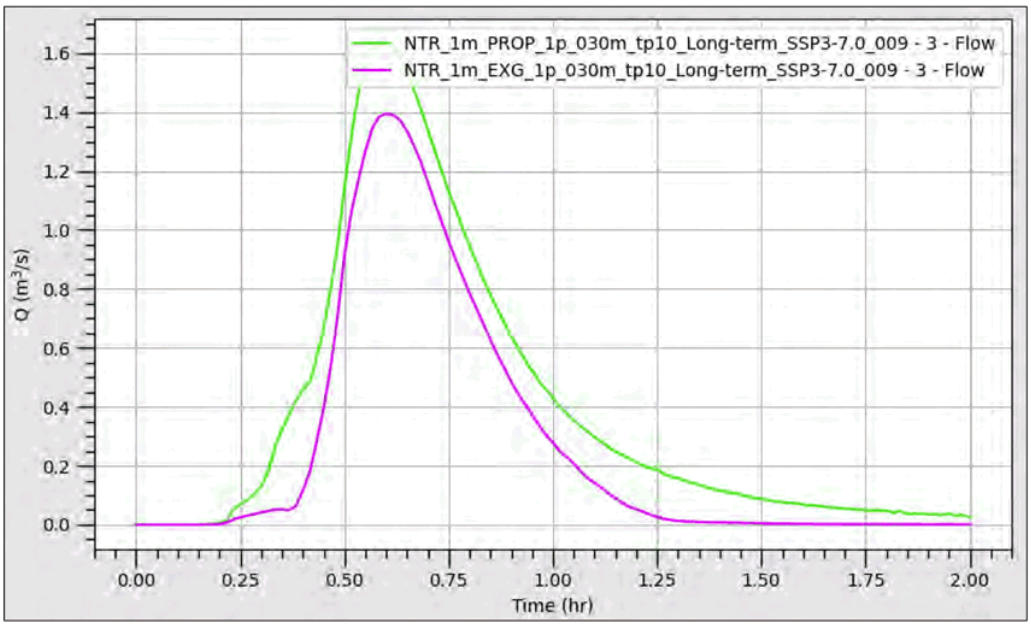


Figure 19 – Hydrograph at position 3 (proposed scenario)

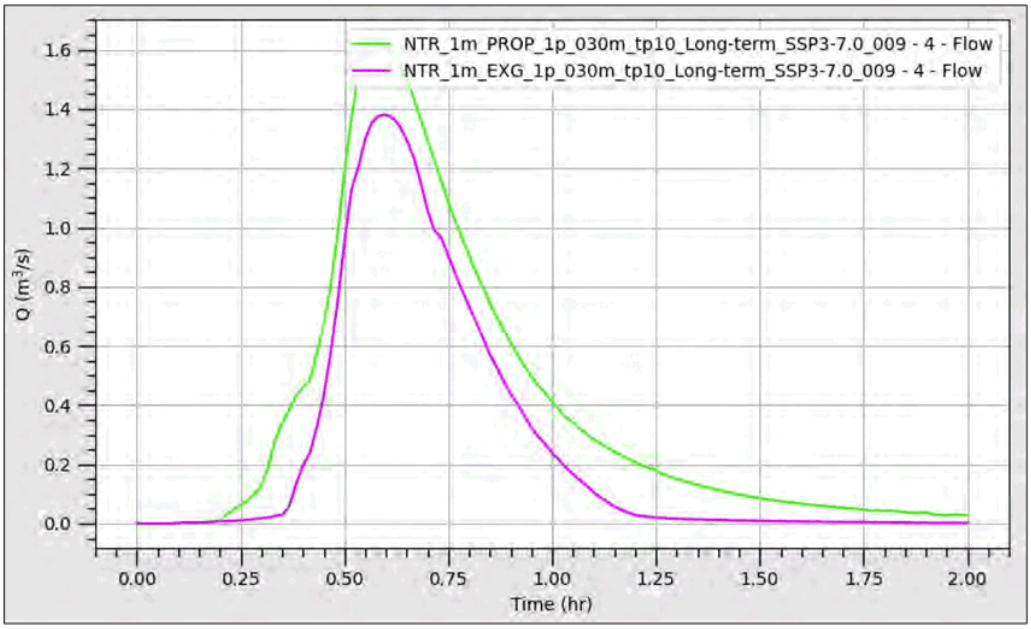


Figure 20 – Hydrograph at position 4 (proposed scenario)

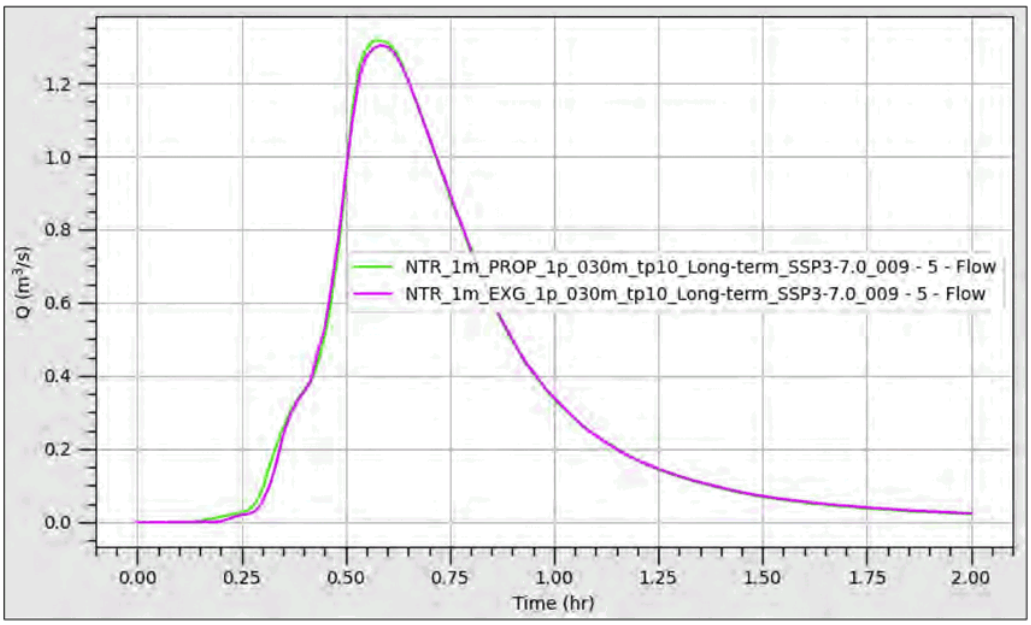


Figure 21 – Hydrograph at position 5 (proposed scenario)

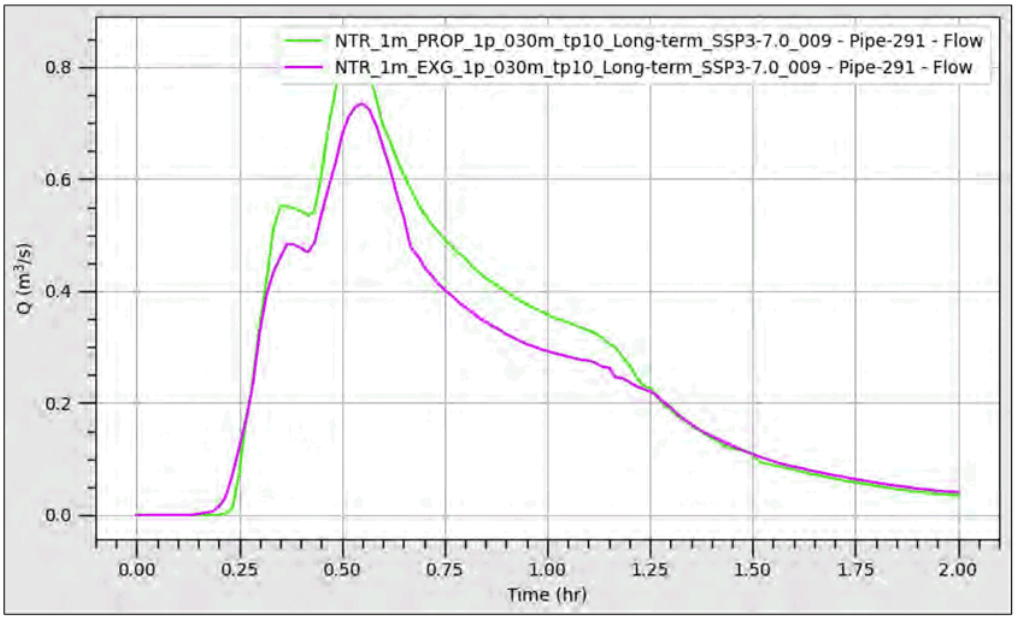


Figure 22 – Hydrograph of DN750 outfall pipe from site (proposed scenario)

A few things are to be noted about these results:

- The 1% AEP flow at the downstream end of the model is practically the same within the limits of accuracy of the model
- The flow is directed more rapidly to the overland flow easement
- The surface flow downstream of the site (see Figure 18) is decreased from about 1.45 m^3/s to 1.41 m^3/s
- More flow is channelled into the DN750 outfall pipe (see Figure 22) – increasing from about 0.76 m^3/s to 0.85 m^3/s.
- Note that the effect of water tanks has not been taken into account

7 Flood hazard

Flood hazard has been considered on the basis of the flood hazard curves from the ARR Manual. These curves are also found in the manual from the Australian Institute of Disaster Resilience and are reproduced below.

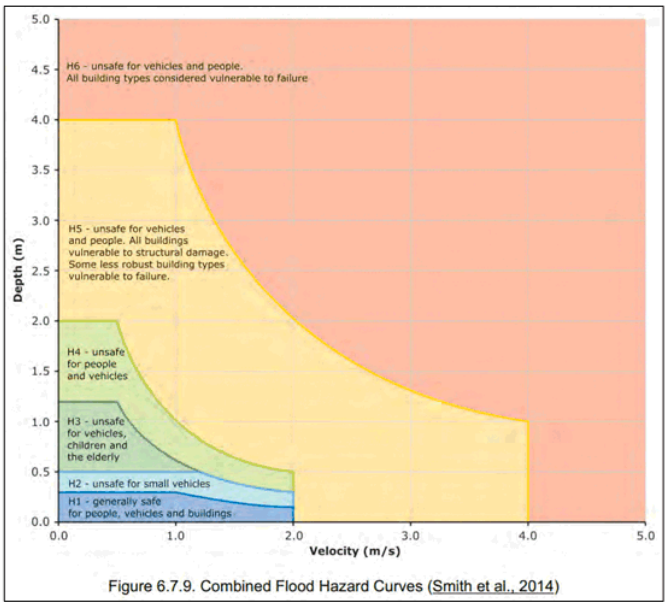


Figure 23 – Flood hazard curves extracted from ARR Manual

The flood hazard mapping, in terms of the above curves, is shown below. It can be seen that the entirety of the site is mapping within an H1 hazard category, with the exception of the overland flow easements, which is to be designed for these flows.

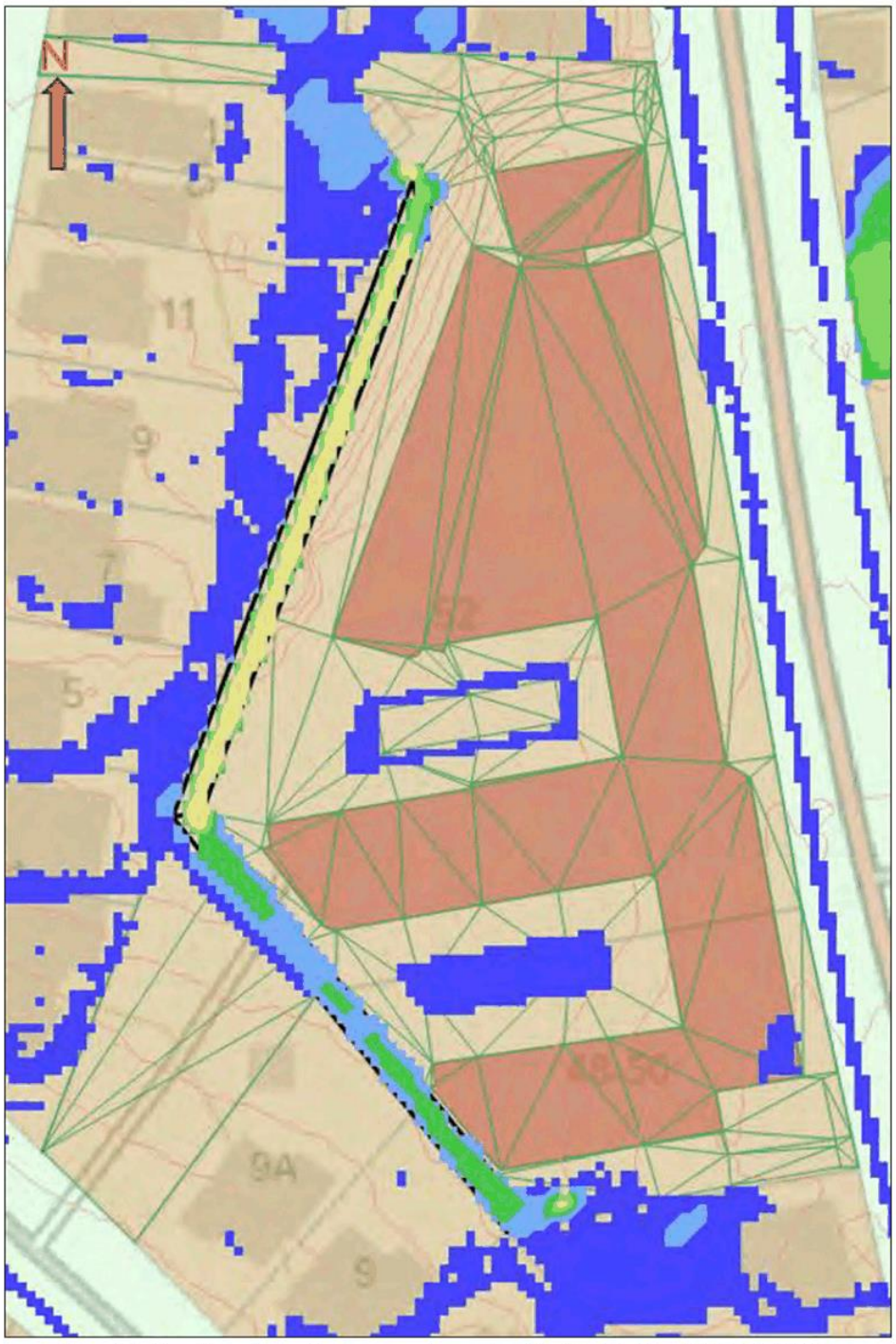


Figure 24 – Flood hazard mapping – proposed scenario – 1% AEP, 30 min, tp01, SSP3-7.0, 2100

Below are shown the pre- and post-development overland flow velocity vectors through the site.

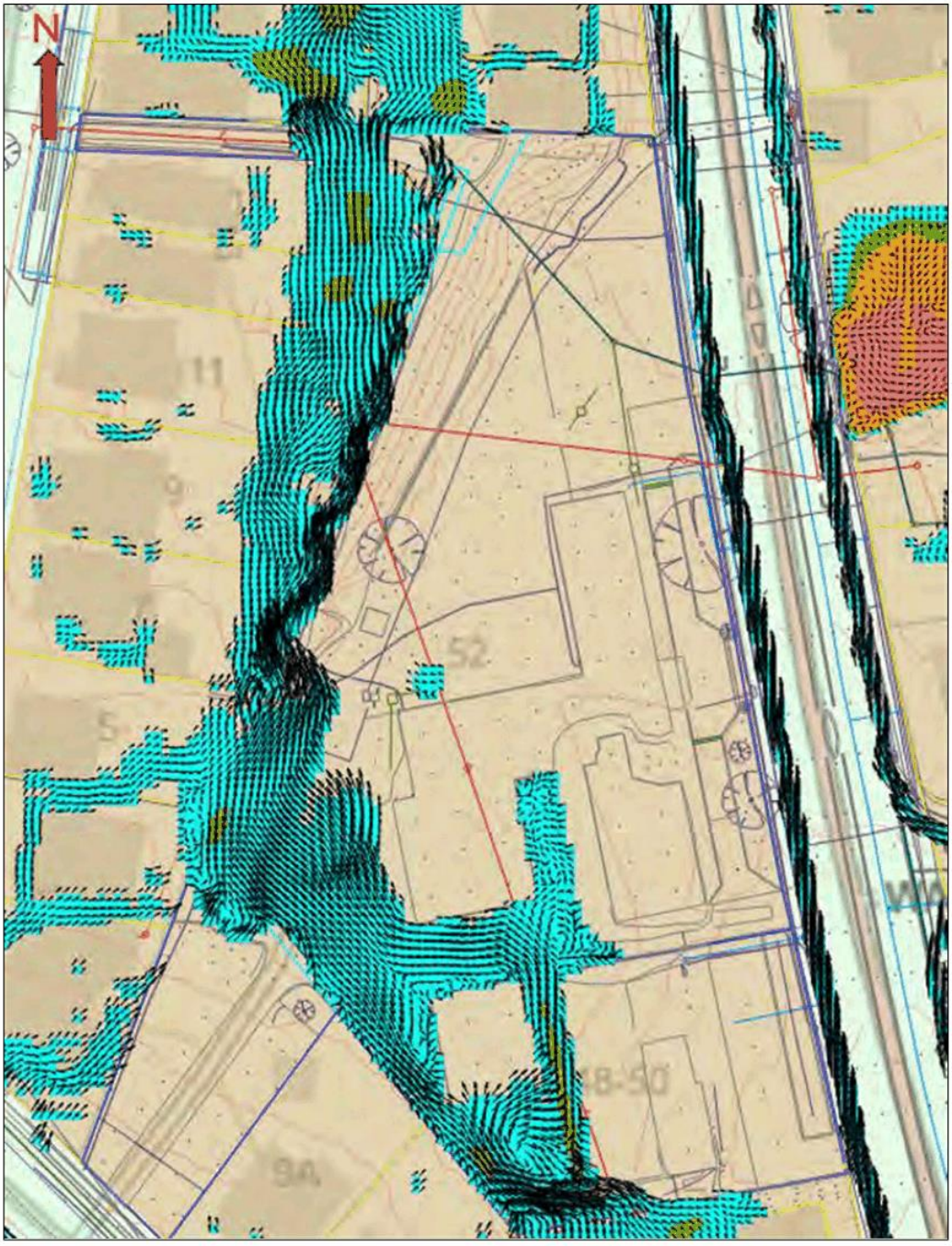


Figure 25 – Flow velocity vectors – existing scenario – 1% AEP, 30 min, tp01, SSP3-7.0, 2100



Figure 26 – Flow velocity vectors – proposed scenario – 1% AEP, 30 min, tp01, SSP3-7.0, 2100

8 Stormwater quality

From discussions with Council, we understand that payment to Council in lieu of tertiary treatment will be accepted, however primary treatment will be required to intercept gross pollutants. Because the proportion of impervious surface will decrease and there will be numerous gardens and use will be made of water tanks, it is possible that TSS, TN and TP concentrations may decrease and therefore that the best practise pollutant reductions should be very easily achieved. Calculations can be provided at detailed design stage to take account of the various gardens and water tanks.

9 E15.7.4 – Riverine Inundation Code

9.1 Acceptable solution A1

A new habitable building must have a floor level no lower than the 1% AEP (100 yr ARI) storm event plus 300 mm.

There are no habitations proposed on the lower ground floor. The lowest habitable floor is the ground floor, which is a level of 59.050, which is 0.9 m higher than the highest predicted flood level.

10 Summary

- It is likely that the 5% AEP flows will be less than the pre-development flows due to a decrease in impervious surface and the proposed use of roof water tanks. This is beyond the scope of the report and will be addressed at detail design when there is greater clarity on the details of the tanks and of the stormwater reticulation.
- The proposed development is predicted to decrease overland flows from the development;
- A 3 m wide swale is proposed to manage overland flows from the upstream catchment ;
- Quality targets will be achieved by means of a combination of primary treatment in the form of mesh bags. It is expected that due to the decrease in impervious coverage and the provision of roof gardens and tanks, that the best practice pollution reduction targets will be easily achieved,

11 Qualifications

This document is intended solely for the purpose of documenting the calculations followed for the design of the stormwater drainage system and should not be used for any other purpose without proper consultation. It should be used by qualified professionals in conjunction with their professional judgement.

The calculations presented in this document are based on the data available at the time of the writing. The design calculations were performed in accordance with the relevant design standards and guidelines applicable at the time of the writing. Future updates to these standards may require revisions to the design.

This document includes, but is not limited to, several assumptions regarding the site's condition, hydrological parameters, and, where applicable, projections for future climate scenarios. These assumptions are detailed within the report and any deviation from these assumptions may affect the outcome of the design. The design is based on site-specific conditions understood from available information. This includes information and data provided by third parties. While this information is believed to be accurate, no warrant is given as to its completeness and or reliability.

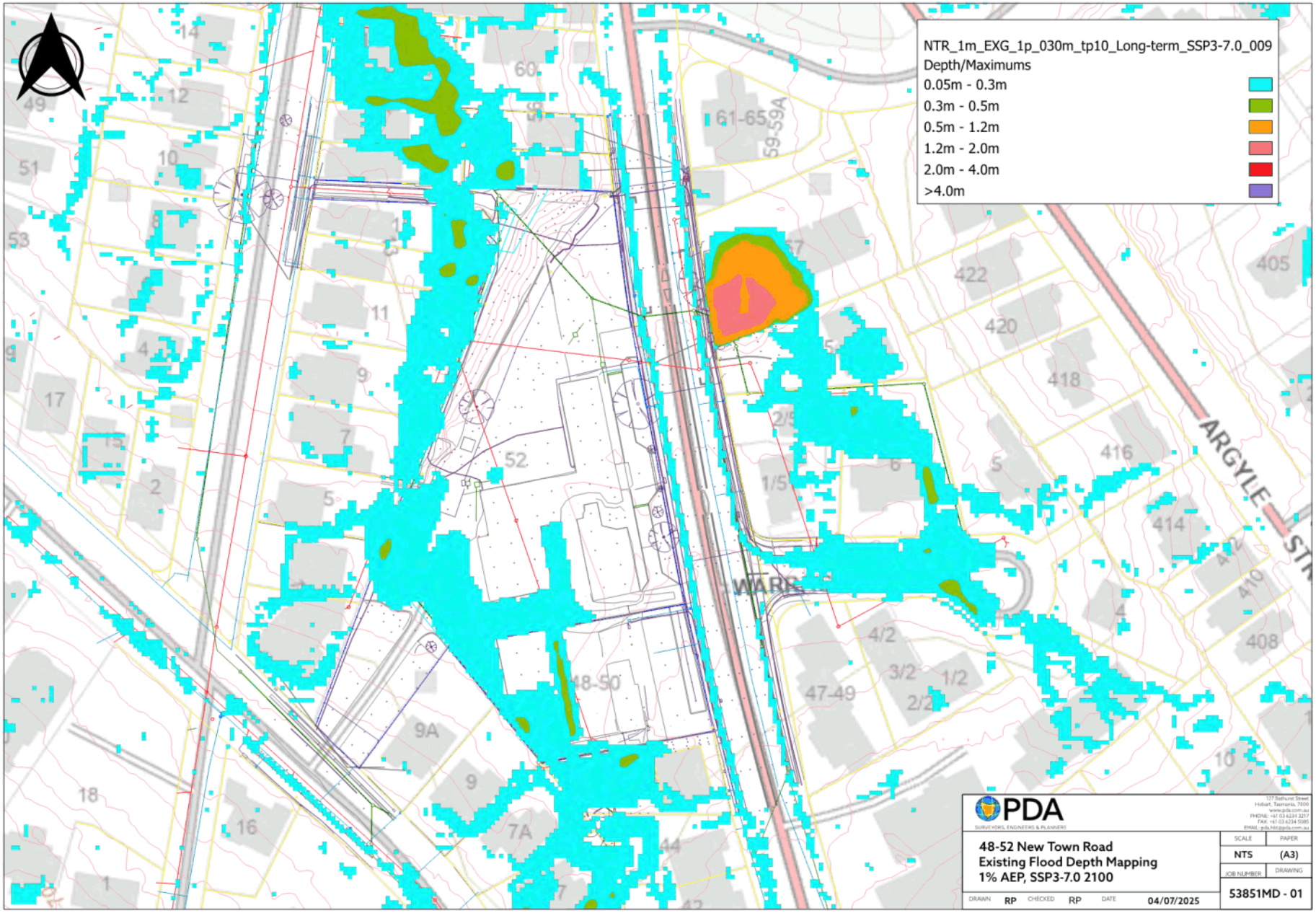
While every effort has been made to ensure the accuracy of the calculations and design, PDA and the authors assume no liability for any direct, indirect, or consequential damages resulting from the use of this document. The performance of the stormwater drainage system is subject to external factors such as extreme weather events, future land-use changes, and maintenance practices. These factors can significantly impact the effectiveness of the system.

Annexures

ANNEXURE A – Flood Mapping

PDA
SURVEYORS, ENGINEERS & PLANNERS

ANNEXURE A – Flood Mapping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0.5m - 1.2m
1.2m - 2.0m
2.0m - 4.0m
>4.0m
ARGYLE
WARR
PDA
48-52 New Town Road
Existing Flood Depth Mapping
1% AEP, SSP3-7.0 2100
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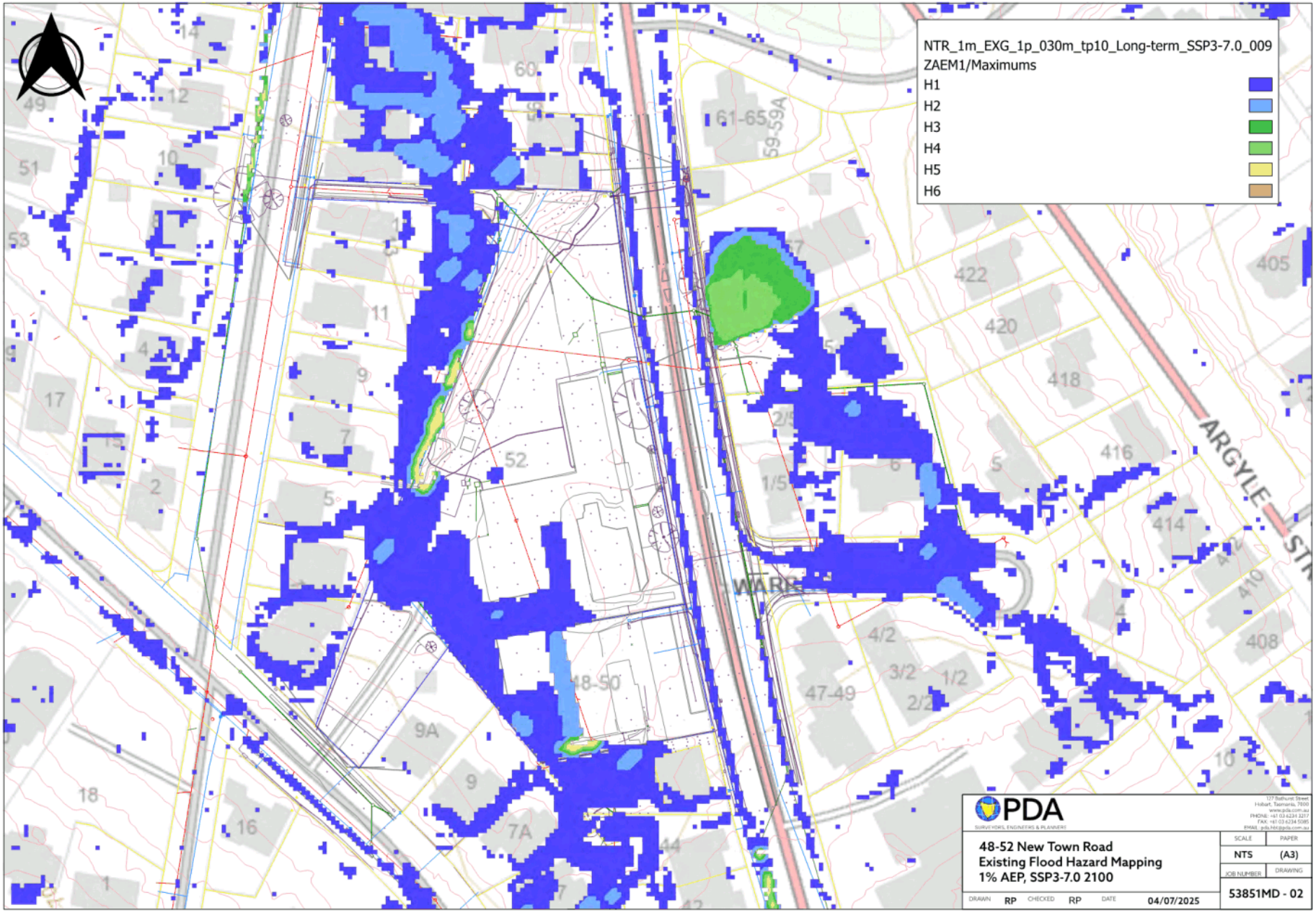
DATE 04/07/2025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H5
H6
ARGYLE ST
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48-52 New Town Road
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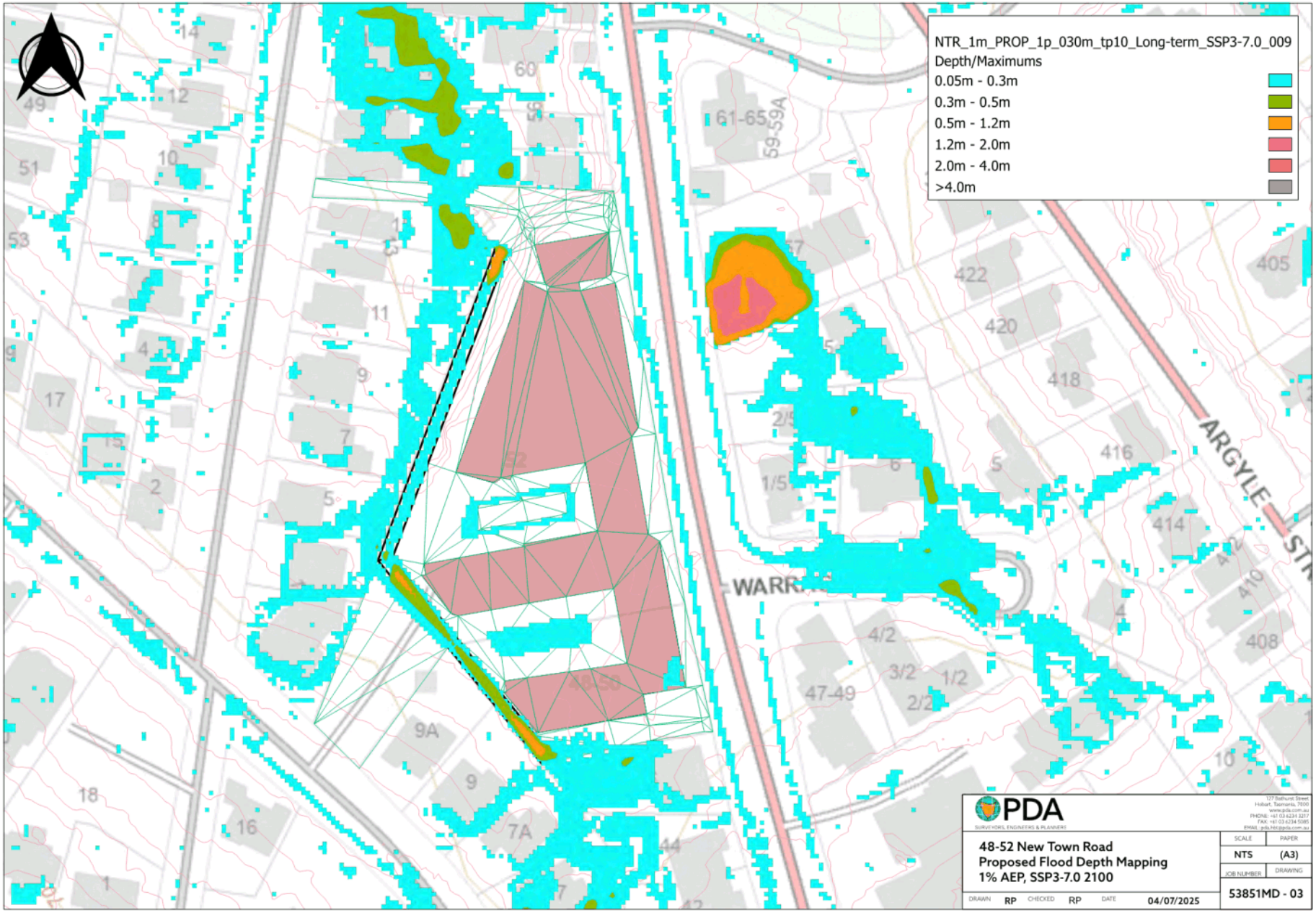
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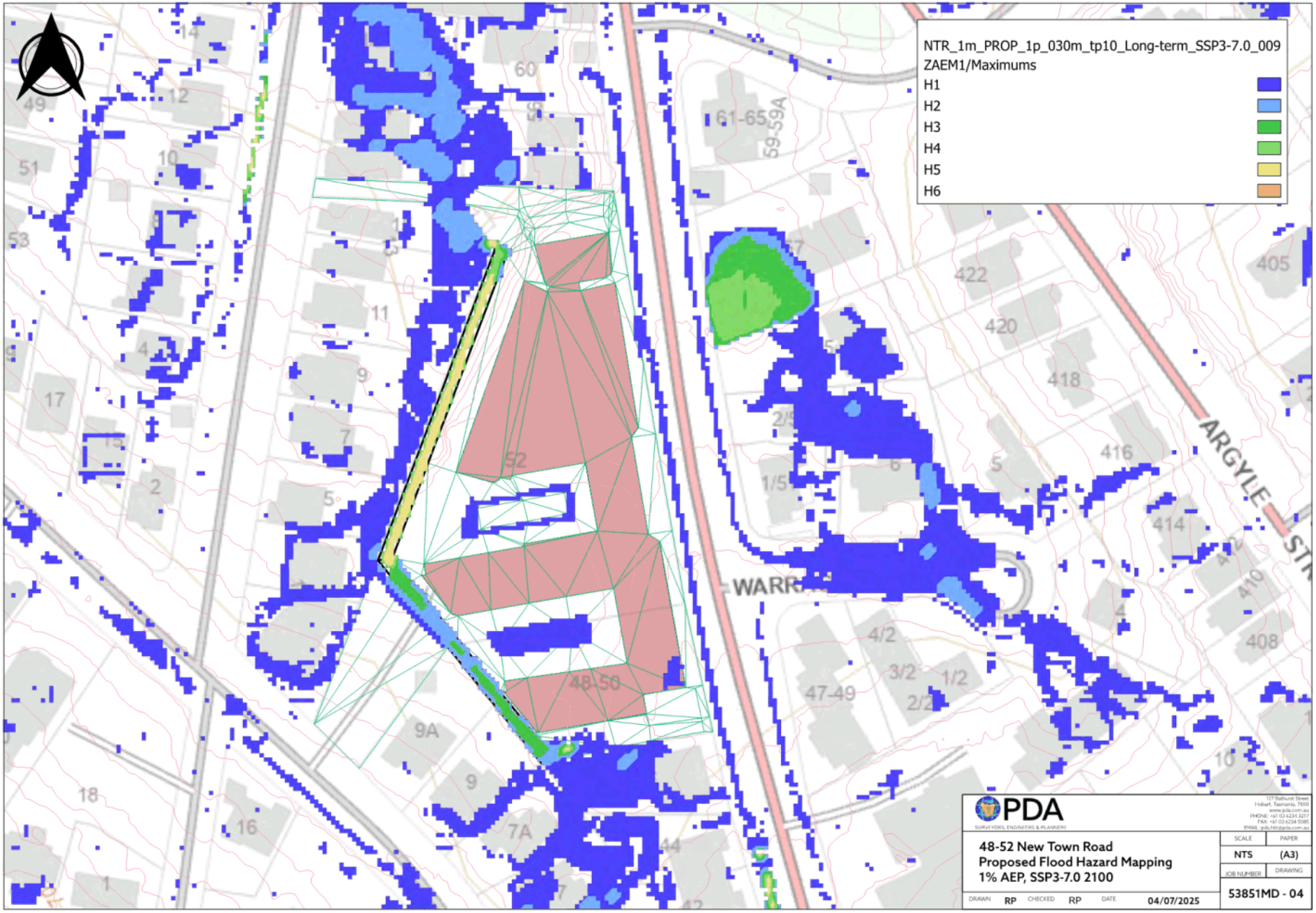
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ZAEM1/Maximums
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H4
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04/07/2025

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Our Ref: 53851CT
53851MD - RFI Response 2025.09.19.docx

19 September 2025

The Technical Officer Environment | Waterways
City of Hobart
16 Elizabeth Street
Hobart TAS 7001
Email: sarah.zehmeister@hobartcity.com.au
Submitted via PlanBuild

Attention: Sarah Zehmeister

PLANNA-HOB-2025-3176 – RESPONSE TO STORMWATER -RELATED ITEMS OF RFI

Reference is made to Council RFI dated 13 August 2025. This letter presents additional information to address the stormwater-related items in the RFI.

I - RFI ITEMS

INFsw 1 – Protection of Council Infrastructure - Stormwater

Advice for plans submitted 7/8/25: No cross-sections have been provided. Council notes the new note on Site Demolition Plan Rev C - please clarify the future location of the substation and associated underground cables.

Cross-sections have been indicated on the revised drawings which are submitted together with this letter. The approximate position of the new substation is also shown.

IND 1 – Inundation Prone Area Code

Advice for documents submitted 7/8/25: Thank you for the Flood study. The following additional information is required. The lower ground carpark is a floor in a habitable building (albeit nonhabitable itself). As such, E15.7.4 A1 is not met, and risk to the building, user, third-party land and remediation must be briefly addressed to demonstrate compliance with E15.7.4 P1.

See Section II below, which addresses the drainage of the lower ground carpark.

The flood depth and hazard mapping appear to suggest an alteration in flooding at the rear of 15 Seymour St. Due to the large depth bands mapped, it is difficult for Council to assess its significance.

See Section IV below, which addresses the impacts on the rear of 15 Seymour St.

Please provide further detail and discussion demonstrating no adverse impact on third-party property. Please provide a 'differences' map indicating change of flood characteristics (eg depth, hazard, "was wet now dry", "was dry now wet").

See Section V below, which addresses impacts on third-party property. Afflux mapping is presented in the annexures.

Clarify the reason for any increased flows - has the removal of the substation from the model affected the flow path at the end of the swale?

See Section VI regarding the removal of the substation and Section VII regarding flow rates.

Please clarify the maximum modelled depths against the proposed building approximately behind 9 Clare St, against the impervious fence behind 13 Seymour St, and at the outbuilding in the rear yard of 15 Seymour St.

See section VIII for a discussion on the modelled depths at the above locations.

II - ASSESSMENT OF RISK TO THE LOWER GROUND CARPARK AGAINST E15.7.4 P1

The proposed finished floor level of the lower ground floor is at RL 55,350. This is 5 m higher that the invert level of the grated pit SW1/3 in the swale. Refer to the accompanying engineering drawings. It will therefore be possible to drain the ground floor by gravity to the stormwater system, in the event that stormwater enters the lower ground floor. The details of the drainage system are to be determined at detailed design stage (EDA stage).

E15.7.4 P1
A new habitable building must have a floor level that satisfies all of the following:

(a) Risk to users of the site, adjoining or nearby land is acceptable;

The drainage from the lower ground floor will be so designed that risk to users will be acceptable. As noted, an adequate gravity system will be designed to allow stormwater to drain to the stormwater infrastructure outside the building. The risk to adjoining or nearby land is negligeable.

(b) Risk to adjoining or nearby property or public infrastructure is acceptable;

The risk to adjoining or nearby property or public infrastructure is negligeable.

(c) Risk to buildings or other works arising from riverine flooding is adequately mitigated through siting, structural or design methods;

Risk of flooding of the lower ground floor will be mitigated by a gravity system which will drain water to the stormwater infrastructure outside the building.

(d) Need for future remediation works is minimised;

A well-designed gravity system will minimise ponding depths within the lower ground floor, so that any remediation works are minimised.

(e) Provision of any developer contribution required pursuant to policy adopted by Council for riverine protection works

Not applicable.

III – AMENDMENTS TO THE MODEL

As part of responding to the RFI, some amendments were made to the pre- and post-development models:

- Additional survey data was collected on Clare Street and incorporated into the model to better represent stormwater flow paths, aiming to demonstrate that flows would primarily follow Clare Street rather than through private property into the development site. The revised survey data was added to the model.

IV – IMPACTS ON THE REAR OF 15 SEYMOUR ST

To address the impacts on the rear of 15 Seymour Street, the following amendments were made to the design and model:

- The impervious fence was removed;

- The swale was modelled with additional interpolated levels to ensure that ponding did not occur in the model. It was found that the coarseness of the grid (1 m) had resulted in local depressions in the swale. This has now been corrected. Due to the presence of the existing retaining wall along the boundary, the width of the swale had to be decreased to 2.5 m.
- The pipe size from SW1/4 to SW1/3 was increased from DN300 to DN375;
- The pipe size from SW1/3 to SW1/2 was increased from DN300 to DN450;
- The design levels along the western boundary of the site were interpolated at smaller intervals to prevent height differences between the project site and neighbouring properties, to avoid ponding;
- The design levels around the existing substation were likewise interpolated more densely to align more closely with levels on neighbouring properties.

The effect of these measures is that it has been possible to improve predicted existing flooding conditions on neighbouring properties and specifically the rear of 15 Seymour St, as can be seen in the afflux mapping. Note that at detailed design the finished levels and updated mapping will be provided.

V – IMPACTS ON THIRD-PARTY PROPERTY

Depth and hazard afflux mapping are presented in the annexures. It can be seen that the flooding conditions on neighbouring properties will be improved.

VI – REMOVAL OF SUBSTATION

The existing substation was not modelled, but we do not expect that it would have any significant influence on the flow rates. The new position of the substation will be preferable from a flooding point of view.

VII – FLOW RATES

As mentioned in the flood report, the predicted design peak surface flow at location "2" (see Figures 7 & 18 of the report) decrease from 1.45 m^3/s to 1.41 m^3/s and the flow in the DN750 increases from 0.76 m^3/s to 0.85 m^3/s). However, due to the modelling amendments described in the sections above, the revised flow rates at location "2" are as follows.

Table 1. Peak flow rates at Location "2"
(17 Seymour Street) – 1% AEP SSP3-7.0 Long Term

Flow element	Pre-dev	Post-dev
Pipe (DN 750)	0.73 m^3/s	1.01 m^3/s
Overland	1.48 m^3/s	1.27 m^3/s
Total	**2.21 m^3/s**	**2.28 m^3/s**

In additional to the above, it is stressed that the detailed design of the stormwater on the site is still to follow.

VIII – FLOW DEPTHS AT SPECIFIED LOCATIONS

Modelled depth behind 9 Clare Street

The modelled water depth is about 0.51 m. Greater accuracy can be achieved at detailed design when the final surface levels are determined and when a finer modelling mesh will be used.

Modelled depth behind 13 Seymour Street

Due to amendments to design surface levels it was possible to remove the impervious fence. Please refer to the revised depth mapping in the annexures.

Modelled depth in rear yard of 15 Seymour Street

The maximum modelled post-development depth at the outbuilding in the rear of 15 Seymour St is around 0.29 m. This is an improvement on the modelled pre-development depth of 0.34 m.

We trust that this letter, in combination with the revised drawings, adequately addresses Council's concerns. Please do not hesitate to contact the undersigned if you have any further queries.

PDA Surveyors, Engineers & Planners

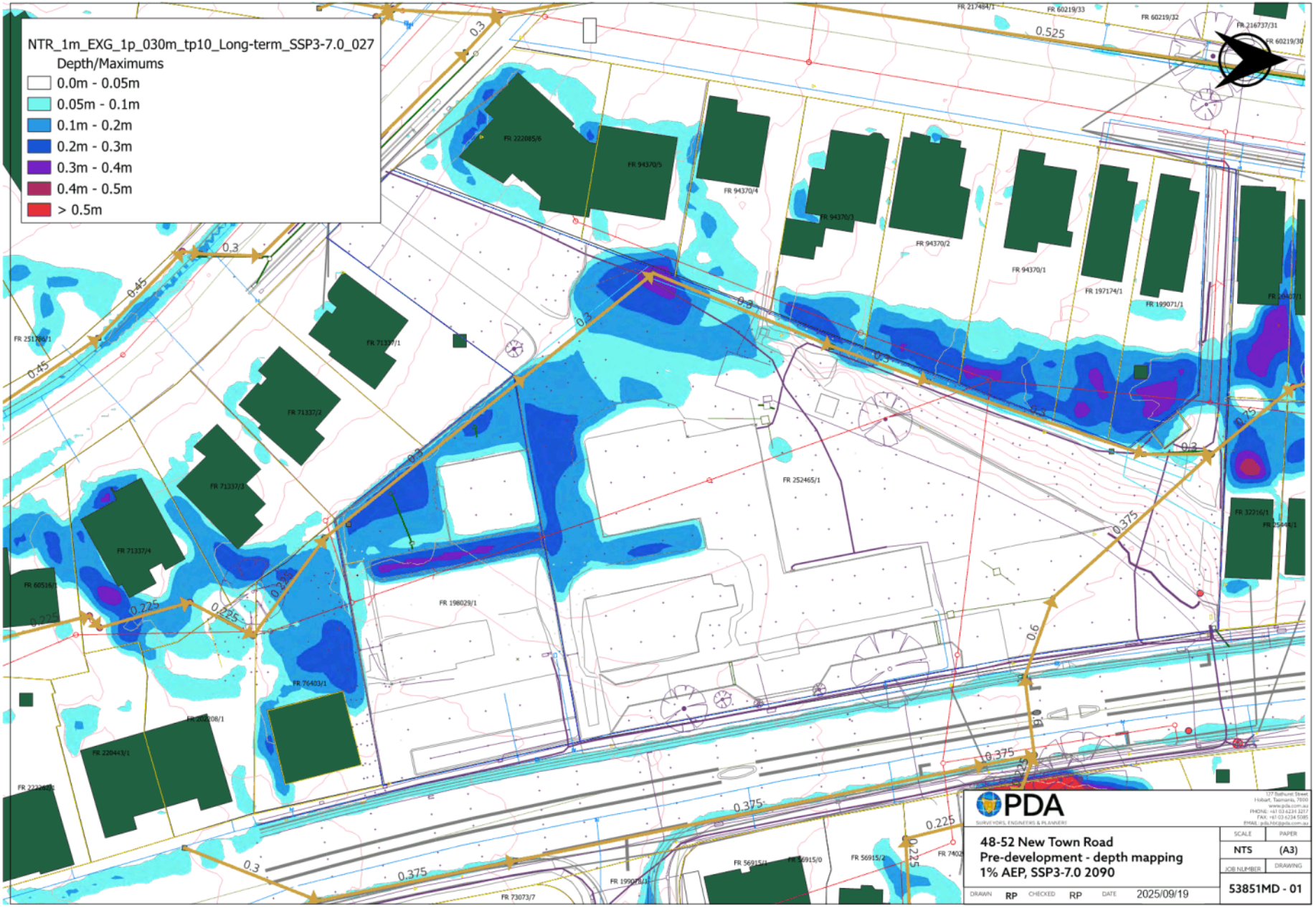
Per:

Roderick Parsons
CIVIL ENGINEER

ANNEXURES

A – Revised flood depth mapping
B – Revised flood hazard mapping
C – Revised depth afflux mapping
D – Revised hazard afflux mapping

A – Revised flood depth mapping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48-52 New Town Road
Pre-development - depth mapping
1% AEP, SSP3-7.0 2090
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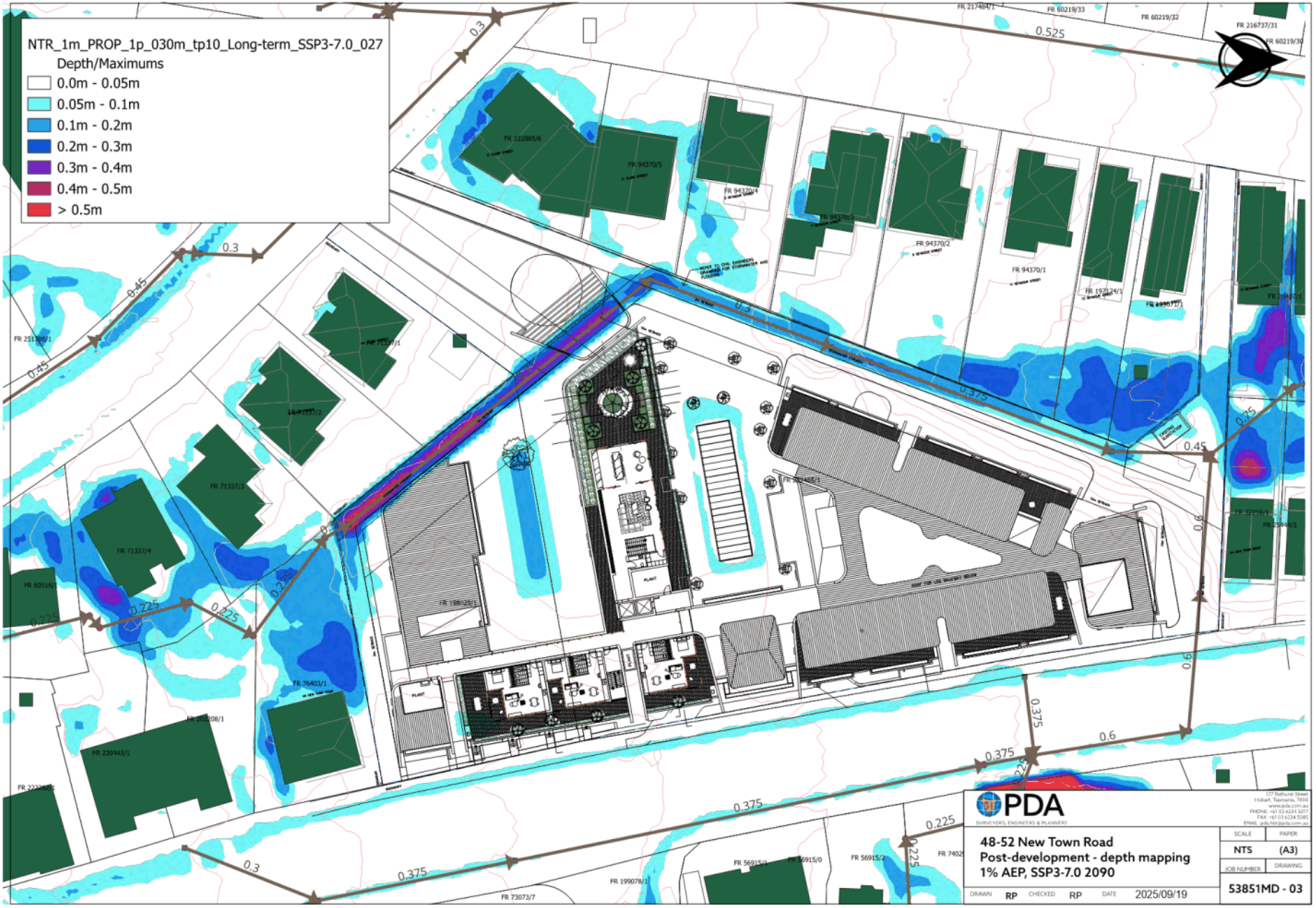
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> 0.5m
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48-52 New Town Road
Post-development - depth mapping
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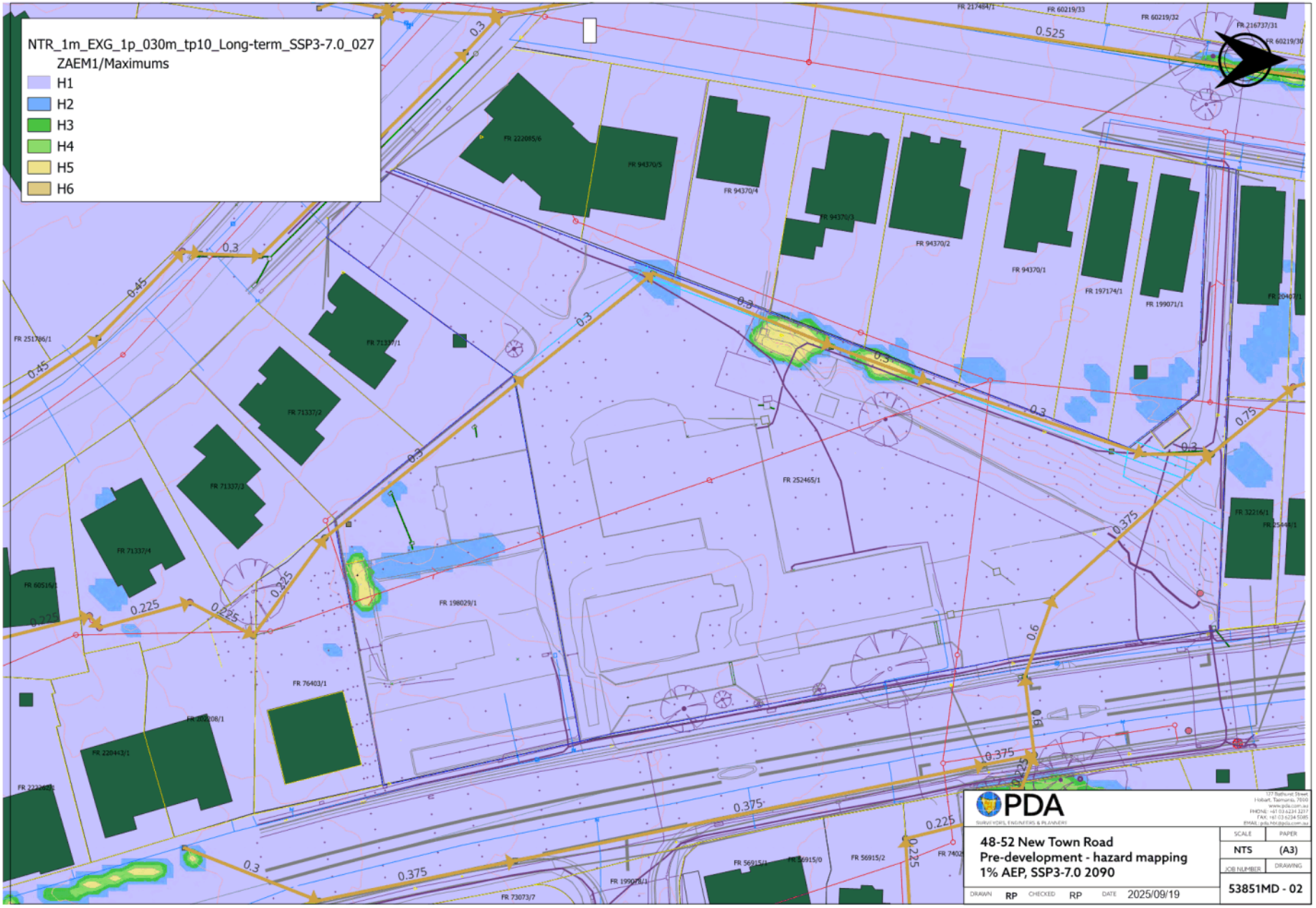
DATE 2025/09/19

B – Revised flood hazard mapping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H2
H3
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H6
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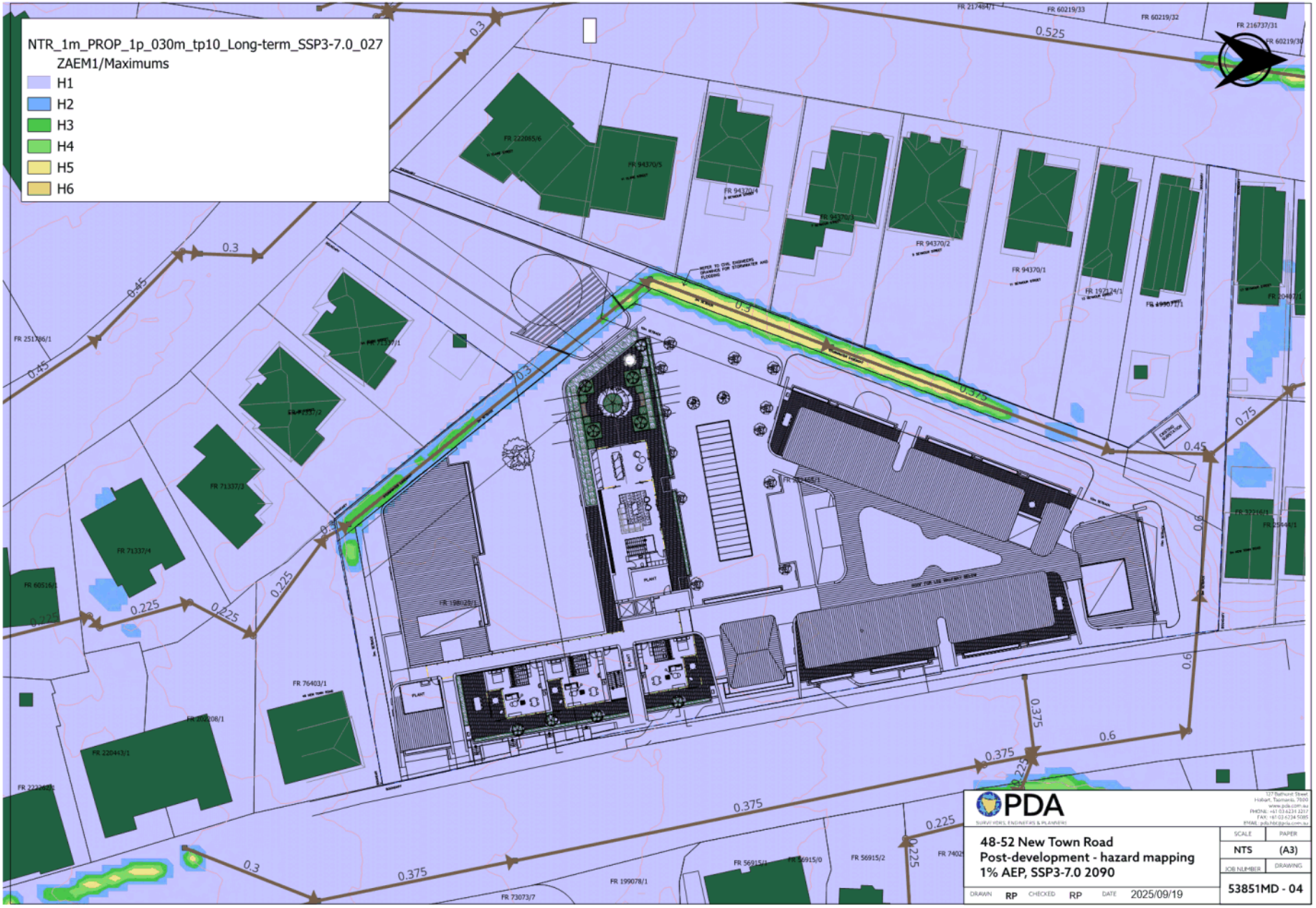
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Post-development - hazard mapping
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DRAWING
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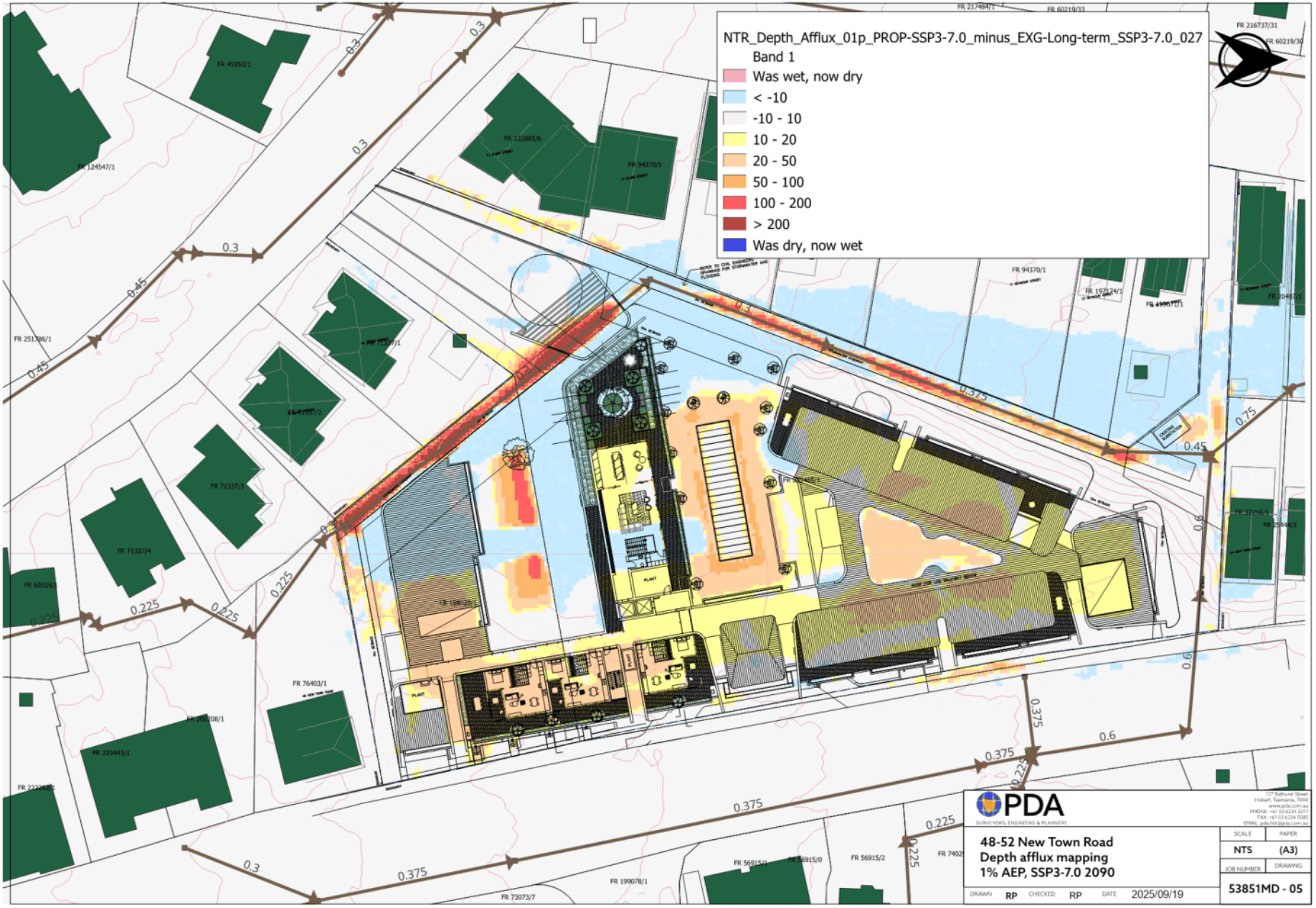
DATE 2025/09/19

C – Revised depth afflux mapping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Was wet, now dry
< -10
-10 - 10
10 - 20
20 - 50
50 - 100
100 - 200
> 200
Was dry, now wet
PDA
48-52 New Town Road
Depth afflux mapping
1% AEP, SSP3-7.0 2090
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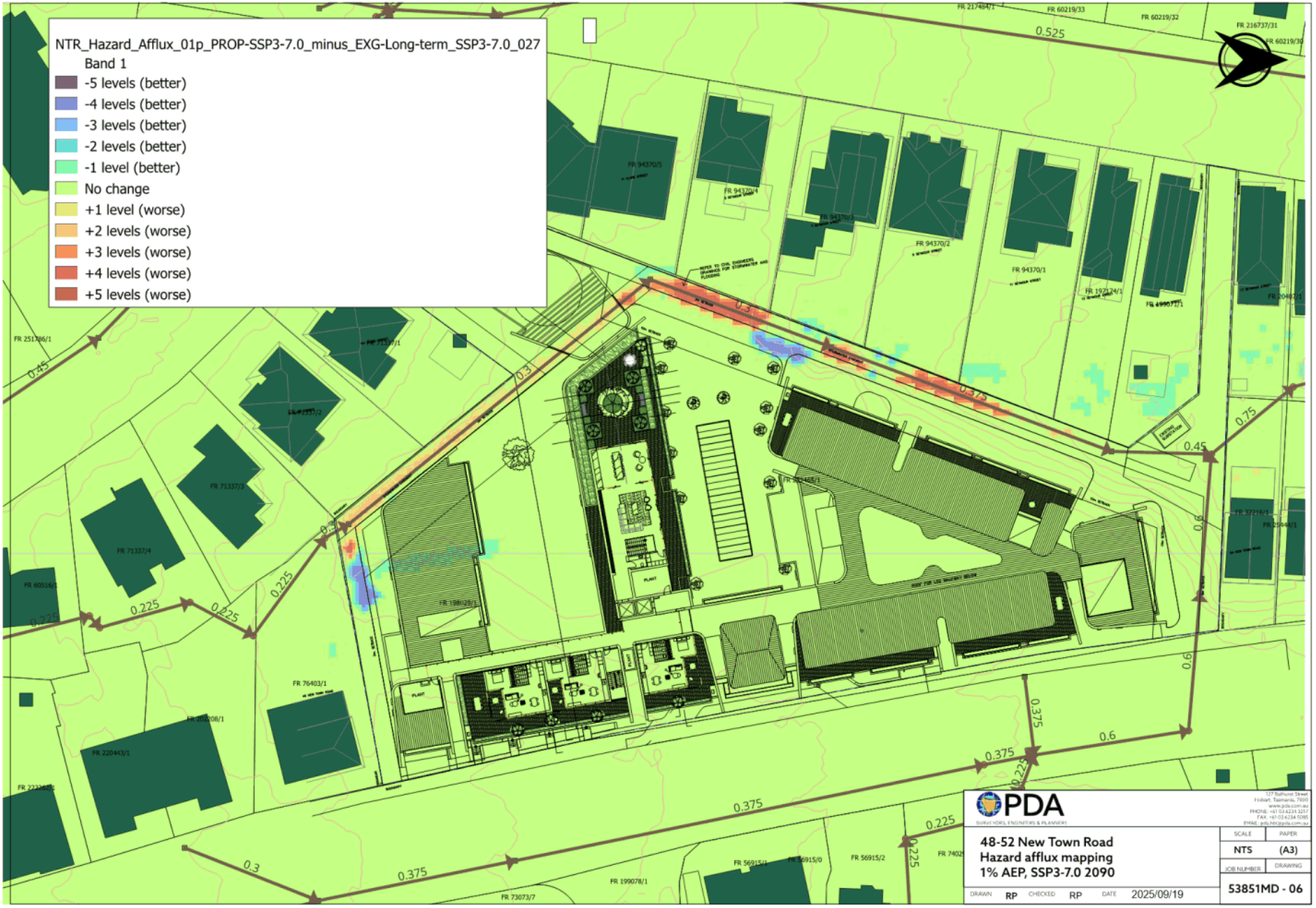
D – Revised hazard afflux mapping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Band 1
-5 levels (better)
-4 levels (better)
-3 levels (better)
-2 levels (better)
-1 level (better)
No change
+1 level (worse)
+2 levels (worse)
+3 levels (worse)
+4 levels (worse)
+5 levels (worse)
PDA
48-52 New Town Road
Hazard afflux mapping
1% AEP, SSP3-7.0 2090
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				DATE OF ISSUE & NO. OF COPIES
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		TASWATER NO :	TASWASPAN-HOB-2025-0050	
DISTRIBUTION :		COMPANY :	CONTACT :	
CLIENT		THE HOUSE FAMILY OFFICE		x
CLIENT				
COUNCIL		Hobart City Council	S.Zehmeister,PlanBuild	
TASWATER		Taswater	Al Cole	
ARCHITECT				
STRUCTURAL ENGINEER				
CIVIL ENGINEER				
ELECTRICAL ENGINEER				
QUANTITY SURVEYOR				
BUILDING CONTRACTOR				
OTHER				

SIZE	PDA DRAWING NUMBER	DESCRIPTION (Precontract - A to Y (Alphabetic); Start Contract - 0 (Issued for construction); Contract - 1 to 100 (Numeric); Post Contract - Z (Drawing of record); Electronic copy - e)	REVISION
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A3	53851MD 002	GENRAL NOTES	A
A3	53851MD 010	EXISTING SERVICES	A
A3	53851MD 020	CONCEPT STORMWATER & ACCESS'S	A
A3	53851MD 021	OVERLAND FLOW PATHS & DETAILS	A
A3	53851MD 022	CONCEPT DRIVE 1 LONG SECTION	A
A3	53851MD 023	CONCEPT DRIVE 2 LONG SECTION	A
A3	53851MD 025	STORMWATER LONG SECTION 1	A
A3	53851MD 026	STORMWATER LONG SECTION 2	A
A3	53851MD 030	CONCEPT SEWER AND WATER	A
A3	53851MD 035	CONCEPT SEWER LONG SECTION 1	A
A3	53851MD 036	CONCEPT SEWER LONG SECTION 2	A
A3	53851MD 040	WATER METER DETAILS 1	A
A3	53851MD 041	WATER METER DETAILS 2	A

RECEIVED BY .....

COMPANY .....

DATE .....

PDA
SURVEYORS, ENGINEERS & PLANNERS

127 Bathurst Street
Hobart, Tasmania 7000
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pda.hbt@pda.com.au
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Our Ref: 53851MD
53851MD - TasWater RAI ETs.docx

16/05/2025

The House Family Office – New Town Residences
48-52 New Town Road
New Town, TAS, 7008

Response to TasWater RAI
TAWASPAN-HOB-2025-0050

1. *To allow TasWater to determine potential hydraulic service capacity limitations, please provide the following:*

    a. *Total sewage flow at the point of connection*

The sewage design flow was calculated using WSA 02-2014-3.1 Gravity Sewerage Code of Australia and TasWater's Supplement to the code. The following design assumptions are made, as detailed by the TasWater Supplement:

When utilising Appendix C the following default values shall be utilised unless approved otherwise by TW:

k	1.50	mm	
d/D	0.7		
EP/ET	3.00		
Industrial/Commercial	75	EP/Ha	
ADWF	150	L/d/EP	new residences (post 2014)
	180	L/d/EP	existing residences (prior to 2014)
Median lot Area	700	m^2	
Net/Gross lot area	70%		
Sewer below water table	70%	$Portion_{Wet}$	
Soil aspect	0.8	S_{aspect}	See Note 1 below
Network defects aspect	0.6	N_{aspect}	
Leakage severity, C	1.4	$S_{aspect} + N_{aspect}$	See Note 1 below
ARI	5	years	
$Portion_{Impervious}$	0.2		Default value of 0.2 unless known

$$\boldsymbol{Design\ Flow = PDWF + GWI + RDI}$$

For 47 sewer ETs:

PDWF:

$$ADWF = ET * 450\ L/ET/day * 0.000012 = 47 * 450 * 0.000012 = 0.254\ L/s$$

$$PDWF = d * ADWF$$

$$d = 0.01(\log A)^4 - 0.19(\log A)^3 + 1.4(\log A)^2 - 4.66 \log A + 7.57$$

Where, A is the gross plan area of the developments catchment (ha)

$$A = 0.766\ ha$$
$$d = 8.129$$

$$\boldsymbol{PDWF = 8.129 * 0.254 = 2.063\ L/s}$$

GWI:

$$\boldsymbol{GWI = 0.025 * A * Portion_{wet} = 0.025 * 0.766 * 0.7 = 0.013\ L/s}$$

RDI:

$$RDI = 0.028 * A_{eff} * C * I$$

For commercial development:

$$A_{eff} = A\left(1 - 0.75 Portion_{impervious}\right) = 0.766(1 - 0.75 * 0.50) = 0.479\ m^2$$

Leakage Severity:

$$C = S_{Aspect} + N_{Aspect} = 0.8 + 0.6 = 1.4$$

Rainfall Intensity:

$$I = I_{1,2} * Factor_{size} * Factor_{containment}$$

1 hour duration rainfall intensity for average recurrence interval of 2 years, obtained from the Bureau of Meteorology (BOM):

$$I_{1,2} = 11.9\ mm/h$$

Factor size:

$$Factor_{size} = \left(\frac{40}{A}\right)^{0.12} = 1.607$$

Factor containment for 5-year ARI:

$$Factor_{containment} = 1.3$$

$$I = 11.9 * 1.607 * 1.3 = 24.867\ mm/h$$

$$\boldsymbol{RDI = 0.028 * 0.479 * 1.4 * 24.867 = 0.467\ L/s}$$

Design Flow:

$$\boldsymbol{Design\ Flow = 2.063 + 0.013 + 0.467 = 2.543\ L/s}$$

b. The required Peak day flow rate in L/s and the required residual pressure (kPa) at the point of connection (nominate a connection point)

Table 2.5.3.3 below shows the minimum service pressure required. This is an extraction from the "TasWater Supplement to Water Supply Code of Australia WSA 03 – 2011-3.1 MRWA Edition V2.0".

Pressure at the connection point [1,2]	Residential Flat Grade [3] (≤ 18%)	Residential Steep Grade [3] (> 18%)	Non-Residential
Minimum Pressure at PH	220kPa (22m)	250kPa (25m)	250kPa (25m)

Table 2.5.3.3

The site located at 48-52 New Town Road, New Town is considered as a non-residential development. This requires 250 kPa (25 m) minimum pressure.

The peak day flow rate in L/s can be taken from part c below:

$$Peak\ Day\ Demand\ (PD) = 61{,}650\ \frac{L}{day} = \frac{61650}{24 * 60 * 60} = 0.714\ L/s$$

Required Flow Rate	0.714 L/s
Required Residual Pressure	25 m (250 kPa)

c. Peak day usage in L/day

$$Average\ Day\ Demand\ (AD) = 685\ L/ET/day$$

For 40 water ETs:

$$Average\ Day\ Demand\ (AD) = 685 * 40 = 27{,}400\ L/day$$

$$Peak\ Day\ Demand\ (PD) = 2.25 * AD = 2.25 * 27400 = 61{,}650\ L/day = \ 61.650\ kL/day$$

d. The required fire flow rate in L/s and the required residual pressure (kPa) at the point of connection

Table 3.1.5 below shows the fire flows required from TasWater fire hydrants. This is an extraction from the "TasWater Supplement to Water Supply Code of Australia WSA 03 – 2011-3.1 MRWA Edition V2.0".

Zoning[1]	Unassisted Feed Hydrant Demand[2]	Design Fire Flows[3]	System Residual Pressure	Background Demand[4]
General Residential Inner Residential Urban Mixed Use Village (if Serviced) Low Density Residential Rural Living	10 L/s @ 200kPa minimum residual pressure from one hydrant for a period of 4 hours	10 L/s @ 250 kPa (new) or 300 kPa (old) minimum residual pressure from one hydrant for a period of 4 hours	100 kPa in entire service zone	2/3PH (not less than AD)
Local Business General Business Central Business Commercial Light Industrial General Industrial	20 L/s @ 200kPa minimum residual pressure from two adjacent hydrants @ 10l/s each for a period of 4 hours	20 L/s @ 250 kPa (new) or 300 kPa (old) minimum residual pressure from two adjacent hydrants @ 10 l/s for a period of 4 hours	50 kPa in entire service zone	2/3PH (not less than AD)
Community Purpose Recreation Utilities Major Tourism Port and Marine	As per highest adjacent zoning	As per highest adjacent zoning	As per highest adjacent zoning	

Table 3.1.5

The site located at 48-52 New Town Road, New Town is within "Mixed Urban Use" zoning. This requires 10 L/s @ 250 kPa minimum residual pressure from one hydrant for a period of 4 hours.

The location of proposed private fire hydrants is unknown. Assumptions have been made to calculate the worst-case scenario for pressure losses.

Assumptions:
- DN100 PVC-O PN16 RRJ internal fire pipework
- 150m length of pipe to the fire hydrant
- Hazen-Williams coefficient of 130

Friction Losses - Hazen-Williams Equation:

$$V = 0.85C\left(\frac{D}{4}\right)^{0.63}S^{0.54}$$

$$Q = \frac{V\pi D^2}{4}$$

$$S = \frac{h_f}{L}$$

For Q = 10 L/s, L = 150 m, C = 130, D = 0.1145 m.

$$V = \frac{4 * 0.01}{\pi * 0.1145^2} = 0.971\ m/s$$

$$h_f = (\frac{V * 4^{0.63} * L^{0.54}}{0.85 * C * D^{0.63}})^{1/0.54} = 1.476\ m$$

Minor Losses:

$$h_m = k_f \frac{V^2}{2g}$$

Assuming 1x 90 degrees bend and 3x 45 degrees bend

$$k_f = 0.6 + 3 * 0.3 = 1.5$$

$$h_m = 1.5 * \frac{0.971^2}{2 * 9.81} = 0.072\ m$$

Total Losses:

$$\boldsymbol{h_L = h_f + h_m = 1.476 + 0.072 = 1.548\ m}$$

Based on the assumptions made:

$$Required\ Residual\ Pressure = 25 + 1.548 = 26.548\ m$$

Required Fire Flow Rate	10 L/s
Required Fire Residual Pressure	26.6 m (266 kPa)

e. *Calculations of the number of Equivalent Tenements. A table outlining the existing/previous, to be demolished and proposed uses as floor areas in m2 will assist with this request*

Existing Site:

- No buildings on the proposed site
- Sewer and Water ETs N/A

Site Demolition:

- Refer W-B Woods Bagot plans titled "New Town Residences" Revision A dated 04/02/2025 Sheet DA – 1005.
- Demolition of existing infrastructure is limited to existing concrete slabs and accesses.

Proposed Site:

Table 1 displays the area schedule for the proposed New Town Residences.

Table 1: Proposed New Town Residences area schedule.

	Lower Ground Floor (m2)	Ground Floor (m2)	Level 1 (m2)	Level 2 (m2)	Level 3 (m2)	TOTAL (m2)
Residential		1176	1587	1374	367	4504
Gym/Wellness Centre (including pool)	1112					1112
Café		137				137
Carparking	2647					2647
Balcony		246	351	513	413	1523
Common Area	150	1064	541	484	126	2365
Rooftop				55	27	82

Table 2 displays the Equivalent Tenement (ET) calculations for the proposed New Town Residences, with reference to TasWater Supplement to Water Supply Code of Australia WSA 03 – 2011-3.1 MRWA Edition V2.0 Appendix A: Equivalent Tenement Rates.

Appendix A does not supply a development type for a gym/wellness centre. Additionally, the Swimming Pool development type details a case-by-case rate for water and sewer ETs. Therefore, a rate of 0.01 water and sewer ET rate per Gross Building Floor Area (GBFA) (m^2) was adopted.

Table 2: Proposed New Town Residences ET calculations

Proposed Use	ET Code	Units	Water ET Rate	Sewer ET Rate	Value	Water ETs	Sewer ETs
Unit - 1 bedroom	RM01	Dwelling	0.4	0.5	49	19.6	24.5
Unit - 2 bedroom	RM02	Dwelling	0.6	0.75	8	4.8	6
Unit - 3+ bedroom	RM03	Dwelling	0.8	1	4	3.2	4
Café	MP01	GBFA (sqm)	0.005	0.008	137	0.685	1.096
Gym/Wellness Centre (including pool)	N/A	GBFA (sqm)	0.01	0.01	1112	11.12	11.12
Carparking	N/A	N/A	0	0	2647	0	0
Balcony	N/A	N/A	0	0	1523	0	0
Common Area	N/A	N/A	0	0	2215	0	0
Rooftop	N/A	N/A	0	0	82	0	0
TOTAL						39.405	46.716

Yours faithfully,

PDA Surveyors, Engineers & Planners

David Monks
Graduate Civil Engineer

ireneinc
PLANNING & URBAN DESIGN



7 August 2025

Hobart City Council
GPO Box 503
HOBART, TAS 7000

FURTHER INFORMATION RESPONSE - 48-52 NEW TOWN ROAD

The following has been prepared in response to the request for further information received on the 16/04/2025, regarding the application on the abovementioned site (PLN-2024-0716).

In addition to information provided to council on 30 June 2025, the following documents accompany this response:

- Updated Architectural Package (rev D_250804)
- Updated Civil Engineering Set (rev. A 04/07/2025)
- Storm Water Management and Flood Hazard Report
- Updated Traffic Impact Assessment (July 2025)
- Updated Environmental Site Assessment (V9)
- Updated Contamination Plan (V6)
- Updated planning report (August 2025).

A summary addressing each further information request is provided below and should be read in conjunction with the documents above.

1. TW1 - TasWater - Add Info

Information to satisfy the enclosed additional information request from TasWater (TasWater Reference No. TASWASPANHOB- 2025-0050 dated 2 April 2025). To discuss these points please call TasWater on 13 69 92.

A response to this item was submitted on 30 June 2025 – please refer to the updated civil plans submitted by PDA.

2. PLN Fi 1 - Planning

To enable the Council to assess the application against the Hobart Interim Planning Scheme 2015, please provide the following:

ireneinc
49 Tasma St, North Hobart, TAS 7000
Tel (03) 6234 9281
Fax (03) 6231 4727
Mob 0418 346 283
Email planning@ireneinc.com.au
PLANNING TAS PTY LTD TRADING AS IRENEINC PLANNING & URBAN DESIGN ABN 78 114 905 074

1. *Please confirm the full extent of all proposed works, development or use of land on adjoining properties, including the full extent of the 'exs sewer pipe to be removed' on the concept sewer and water plan.*

A response to this item was submitted on 30 June 2025. However, a revised copy of the civil drawings accompanies this response – incorporating responses to the stormwater and inundation FI items.

2. *The titles for the following properties were not included in the lodged documents. Please confirm whether these lots are to be included as part of the subject site and if so, please submit a copy of the certificate of title and a declaration that the owners have been notified.*

    a. *CT: 94370/5 (this is part of the 11 Clare Street site for which the other title was submitted)*

    b. *PID 5527880 (17 Seymour Street)*

As stated in the response submitted on 30 June 2025, the property at 11 Clare Street forms part of the application. A copy of the additional title which relates to this property (CT 94370/5) has been submitted.

17 Seymour Street was not included in the owner declaration list, as no works are required and does not form part of the application.

3. *The title for 54 New Town Road (32216/1) was included in the lodged documents, but the owners were not listed in the owner declaration section.*

    Please confirm whether this lot is intended to be part of the application and if so please declare that the owners have been notified.

As stated in the response submitted 30 June 2025, this property is not required to form part of the application.

We request that the title document for this property be removed from the document set.

4. *Please provide a scale on the existing site plan, demolition plan, proposed site plan and proposed floor plans in the Architectural Drawings set.*

5. *Please provide a scale bar on all site, floor and elevation plans in the Architectural Drawings set.*

Please refer to the updated Architectural Set provided with this response, which addresses item 4 and item 5.

6. *Photomontages from key points around the proposal showing the proposal in relation to existing development.*

A copy of the requested photomontages was provided in the response submitted 30 June 2025.

7. *A 3D model submitted in 3ds format of the proposed building (not including roads or adjacent buildings) to allow the building be imported into the Council's Key 2 Virtual Insight (K2Vi) software.*

A copy of the 3D model was submitted prior to the UDAP meeting on 8 July 2025.

8. *Please confirm whether there is any intention to use soil nails in the construction of the basement. If so, please provide details on their location, dimensions and all affected properties.*

Please refer to the response submitted on 30 June 2025 which confirms that no soil nails are proposed at this stage.

We understand that any subsequent requirement for soil nails will require separate planning approval.

3. HER Fi1 - Heritage Code - Heritage

To enable the Council to assess the application against the relevant provisions of the Historic Heritage Code of the Hobart Interim Planning Scheme 2015 please:

- *Confirm whether any works are proposed to the right of way to Seymour Street, including but not limited to paving or other new surface finishes. If any works are proposed to this area, please provide plans detailing the extent of the works and any proposed materials and finishes.*
- *Confirm whether new fencing or gates are proposed to the Seymour Street right of way. If works are proposed, please provide plans and elevations detailing the works including proposed fence/gate height, materials, finishes, location and design.*

The applicant is advised that the Seymour Street right of way component of the site is located within the NT7 Fraser Street Heritage Precinct as per Table E13.2 of the Hobart Interim Planning Scheme 2015.

Please refer to the response submitted on 30 June 2025. No works including paving, surface finishes or gates/fences are proposed in this portion of the site and associated right-of-way.

As shown in the amended civil engineering plans, the scope of works is limited to stormwater infrastructure upgrades. These works will be underground and are limited to the north-eastern corner of the right-of-way. Surface levels will be made good, no impact on the heritage significance or character of this portion of the site or broader precinct.

4. E6.6.1 - Parking and Access Code – Number of Car Parking Spaces

To satisfy the Hobart Interim Planning Scheme 2015 clause E6.6.1, please provide the following:

- *To comply with the acceptable solution A1, provide a site plan showing the number of spaces required by Table E6.1.*

- *Alternatively, to comply with the performance criteria P1, address each of the requirements in E6.6.1 P1 by a suitably qualified person*

Advice:

- *A traffic impact assessment has been provided which assesses the proposed number of on-site car parking spaces with regard to 61 Residential Units. The proposal comprises of 38 Visitor Accommodation units, 23 Multiple Dwellings, commercial facilities and consulting rooms and should be addressed accordingly.*
- *Please clearly identify car parking space allocation within the lower ground car park, clearly specifying the number of car parking spaces allocated to each unit, visitor accommodation and use's.*
- *Given the proposal is deficient by over 45 car parking spaces, a parking survey to identify the level of impact of the proposal, and the on-street parking networks ability to accommodate this deficiency, in accordance with the Department of State Growth Traffic Impact Assessment Guidelines August 2020.*

Please refer to the accompanying Traffic Impact Assessment and Planning Report, which provide updated responses to the performance criteria P1 to Clause E6.6.1. Additionally, the revised architectural plans provided with this response highlight the intended allocation of parking for residential and visitor accommodation uses which align with the considerations of the Traffic Impact Assessment.

5. E6.7.10 – Parking and Access Code – Bicycle Parking Spaces

To satisfy the Hobart Interim Planning Scheme 2015 clause E6.6.4, please provide the following:

- *To comply with the acceptable solution A1, provide a site plan showing the number of spaces required by Table E6.2.*
- *Alternatively, to comply with the performance criteria P1, address each of the requirements in E6.6.4 P1 by a suitably qualified person.*

Advice:

Please address the number of bicycle parking spaces required for the other uses of the development in accordance with Table E6.2.

The proposed development provides a total of more than 30 bicycle parking spaces within a dedicated area within the car park and will comply with A1. Please refer to the accompanying Traffic Impact Assessment which provides a further response to this item.

6. 6.6.1 - Road and Rail Assets Code - Number of Car Parking Spaces

To satisfy the Hobart Interim Planning Scheme 2015 clause E6.6.1, please provide the following: To comply with the acceptable solution A1, provide a site plan showing the number of spaces required by Table E6.2. Alternatively, to comply with the performance criteria P1, address each of the requirements in E6.6.4 P1 by a suitably qualified

Advice: Please address the number of bicycle parking spaces required for the other uses of the development in accordance with Table E6.2.

Please refer to the updated architectural plans and Traffic Impact Assessment, outlining requirements and provision of bicycle parking.

7. E6.7.2 – Parking and Access Code – Design of Access

To satisfy the Hobart Interim Planning Scheme 2015 clause E6.7.2, please provide scaled and dimensioned drawings prepared by a suitably qualified expert to address all aspects of the acceptable solution or performance criteria.

Advice:

- *In accordance with section 3.3 of AS2890.1:2004, Gradients of Access Driveways, the maximum gradient for the first 6m of the access is limited to 5%. Please address.*
- *Site plan showing the location, width and type of all proposed vehicular access;*
- *Geometric designs for each access point / any other point which demonstrate that any conflict between vehicles, cyclists and pedestrians will be minimised, by allowing sufficient sight lines;*
- *elevations showing the height and transparency of any fence, gate or other protrusion within 2m of each access point;*
- *long sections of the access, showing the gradient and elevation of the finished surface level and existing natural surface level, including transitions at change of grades;*
- *elevation or section view showing sufficient headroom;*
- *plan view (and elevation) showing pedestrian sight lines 2.0m either side of the vehicular access (i.e. driveway entrance) at the boundary to the site in accordance with AS/NZS 2890.1:2004 Section 3.2.4. Pedestrian sight lines must be entirely within the subject property;*
- *Clearly indicate any changes to the road infrastructure proposed, including removal/addition of on-street car parking spaces and crossovers.*

Please refer to the updated architectural set, specifically the following sheets in response to the items above:

- Sheet DA – 4201 – NTR Footpath (Ground Floor)
    - Demonstrates no obstructions within 2m either side of driveway entrance.
- Sheet DA – 4202 – Basement Parking Layout
- Sheet DA – 4203 – NTR Driveway / Section
    - Provides further car parking/circulation layout and dimensions

This is also supported by further assessment which is provided in the Traffic Impact Assessment provided with this response.

8. E6.7.5 – Parking and Access Code – Design of Parking Areas

To satisfy the Hobart Interim Planning Scheme 2015 clause E6.7.5, please provide scaled and dimensioned drawings prepared by a suitably qualified expert to address all aspects of the acceptable solution or performance criteria.

Advice:

- *Given the car park holds 61 car parking spaces and is mixed use in nature, two way traffic flow should be provided for access into the lower ground car park. The Traffic Impact Assessment proposes a give way sign and hold line however it is unlikely to be supported due to the conflict such a change proposes. Sight lines are unavailable at the corner (end of entrance ramp), with vehicles travelling in opposing directions unable to see one another. Given the site is not constrained in development area, the ramp and corner should be designed to allow two way traffic flow at the access ramp.*
- *Provide a plan view showing a scaled layout and dimensions of:*
    - *the parking area;*
    - *all parking spaces;*
    - *aisle, circulation roadway and ramp widths and lengths;*
- *plan view showing gradient of the parking area;*
- *elevation or section view showing sufficient headroom available, including the access way and ramp.*
- *drawings with standard single turn B85 (B99 for multi residential with more than two dwellings) swept paths (including 300mm manoeuvring clearance) into and out of all existing and proposed car parking spaces, ensuring swept paths do not conflict with adjacent parking spaces, structures or fixed objects;*

- *plan view showing the extent of proposed vehicle safety barriers and wheelstops, clearly specifying heights of drops from the driveway / parking area to lower levels where vehicle safety barriers and/or wheelstops are not required. This includes bollards and or pedestrian separation for the porte cochere.*

Please refer to the updated architectural set which includes changes that now provide for the basement car parking layout to include 67 car parking spaces (including 2 x DDA spaces), along with 3 x short-term pick-up/drop-off spaces in the port cochere – totalling 70 on-site car parking spaces.

This is also supported by further assessment which is provided in the updated Traffic Impact Assessment.

9. ***ENGrFi2 - Roads - Infrastructure in Road Reservation***

To ensure that the Council's road infrastructure is protected please provide:

- *show and notate on architectural plans the back of the existing footpath (user road) within the title boundary along the New Town Road highway reservation frontage.*
- *dimension width at the back of the existing kerb ramp to the back of the existing footpath (user road)*
- *Provide section through retaining wall adjacent to the New Town Road Highway Reservation and user road as indicated on sheet no DA-220B, show the title boundary and the existing back of footpath (user road) on the section.*

Advice:

The existing footpath width including the portion of user road is required to maintain amenity of the footpath for pedestrians. This is required to be shown on the architectural plans to assess if the development proposes to decrease the existing pedestrian amenity.

The initial response submitted to council on 30 June 2025 provided a revised plan and sections demonstrating the setback between the edge of the footpath/road reservation and the proposed building. This plans demonstrate a minimum footpath width of 2.075m will be retained, increasing to 2.66m and is considered more than sufficient to maintain appropriate pedestrian safety and amenity. This revision has been carried forward into the revised architectural set provided with this response.

10. Sw6 - Stormwater Code

A stormwater drainage design prepared by a suitable qualified person which demonstrates compliance with the following:

- *accommodate a storm with an ARI of 20 years when the land serviced by the system is fully developed*
- *Stormwater runoff will be no greater than pre-existing runoff or any increase can be accommodated within existing or upgraded public stormwater infrastructure.*
- *Please provide a revised DRAINS model for the proposed infrastructure demonstrating the diverted mains will have 5% AEP capacity for a future fully-developed catchment.*
- *Please state the proposed % impervious for the site, as reflected in the landscaping plans.*

Advice: *Fully-developed should be taken in consideration of the Planning Zone, over the life of the stormwater assets.*

Please refer to the updated Concept Civil Engineering Design drawings and Storm Water Management and Flood Hazard Report which provide the response to this item.

11. Sw7 - Stormwater Code

A stormwater drainage design prepared by a suitable qualified person which demonstrates compliance with the following:

- *designed to accommodate a storm with an ARI of 100 years.*

Advice: *see below Inundation request and advice.*

Please refer to the updated Concept Civil Engineering Design drawings and Storm Water Management and Flood Hazard Report which provide the response to this item.

12. Sw7 - IND 1 - Inundation Prone Area Code

An inundation risk management plan and associated calculations prepared by a suitably qualified engineer in accordance with ***best practice guidelines that details:***

1. The risk of inundation to the site, proposed buildings and building floor levels (based on a predicted 1% Annual Exceedance Probability flood event for the year 2100 including consideration of climate change. Clearly state the vertical clearance between the proposed finished floor level of any habitable rooms and the flood level.

2. The impact of the proposed development upon the risk of inundation of other land, buildings and infrastructure (including frequency, extent, depth and velocity); and

3. Any inundation control measures or design features proposed to be employed to reduce the risk, and the resultant level of risk

4. clearly show pre and post overland flow paths through and around the property, justifying their location.

- *Council notes the proposed 3mx1m swale along the western boundaries may have potential clashes with existing and proposed walls, drops, and landscaping. The indicative long-section of the stormwater pipe suggests grades outside the range looked at for the swale. Please clarify.*

The report is unclear re % of flows entering from the direction of 46 New Town vs those entering at the Clare St entrance. Should flows be entering from Clare St, briefly demonstrate how these will be directed to the swale with no impact on third-party land.

- *Council notes an overland flow path is shown entering the site from New Town Rd in Council modelling, but the DRAINS model has this bypassing the site and entering the neighbours land. Please justify the altered overland flow route, and clarify how this path will be diverted safely around the building site to maintain 300mm freeboard and no impact on third party land, particularly noting the proposed tiered retaining walls and associated cut/fill.*
- *Please clarify the overland flow depth in the road reserve and whether it will enter the driveway.*
- *It appears likely floor levels of the building (particularly the lower ground carpark) will not be 300mm above the adjacent flood levels. Please address the provisions of E15.7.4 A1.*
- *Please provide all inputs and assumptions used in the DRAINS model, including but not limited to inlets, ponding, and overland flow shapes and depths. Council notes the DRAINS results provided but requires the associated map to identify the pipes and overflow paths. Please submit the DRAINS model via email.*

Council notes the suggestion to postpone 2D analysis to detailed design stage. Council recommends this is carried out at Planning stage, to clarify actual flow paths, depths and hazard.

Please refer to the updated Concept Civil Engineering Design drawings and Storm Water Management and Flood Hazard Report which provide the response to this item.

13. IND 3 - Inundation Prone Area Code

If landfill or solid walls are proposed within the modelled flood area, provide an assessment by a suitably qualified person, accompanied by any necessary engineering detail, outlining:

- *How no adverse affect on flood flow over other property through displacement of overland flows;*
- *How any proposed infrastructure and techniques will ensure the net discharge of stormwater and the rate of stormwater discharge does not exceed pre-development levels; and*
- *How stormwater quality from the development site would compare with pre-development levels.*

Please refer to the Storm Water Management and Flood Hazard Report which accompany this response which provide the response to this item.

14. IND 4 - Inundation Prone Area Code

If buildings or works are proposed within the modelled flood area, provide evidence from a suitably qualified person that proposed buildings or works will be designed and constructed to resist hydrostatic and hydrodynamic forces as a result of inundation.

For a response to this item, please refer to the Storm Water Management and Flood Hazard Report which accompany this response - including results from stormwater and inundation modelling.

15. INFsw 1 - Protection of council Infrastructure - Stormwater

1. Provide indicative cross-sections of the proposed stormwater mains, swales and easements; clearly showing existing and proposed walls, clearances from works and other services including electrical, freeboard, natural and design ground level (including immediately beyond the property line), and suitable batter slopes.

2. Provide confirmation from TasNetworks of minimum clearances (vertical and horizontal) for the stormwater main and swale from any high voltage lines, and demonstrate these can be achieved.

3. Clarify if the design surface level shown over the mains on the indicative long-sections includes the proposed swale and other works including but not limited to the tiered retaining walls and associated cut/ fill, existing crib-lock wall, loading bay and walls.

Please refer to the updated Concept Civil Engineering Design drawings accompanying this response which address this item.

16. Potentially Contaminated Land Code

Please submit an amended Environmental Site Assessment with the following updates and clarifications:

1. *The submitted ESA includes a number of references to the proposed use being an 'independent living development', 'retirement home' and 'supported living facility'. The ESA should be updated to reflect the current proposal, which includes residential and visitor accommodation.*
2. *The submitted ESA makes reference to a different owner/client /developer. The ESA should be updated to reflect the current owner/client/developer.*
3. *The development plans included in the submitted ESA have been superseded by the development plans submitted with the application. The plans included in the ESA should be updated. Figure 7 should also be updated to reflect the current proposal.*
4. *The ESA should be updated to reflect current site conditions (e.g. section 3.2).*
5. *Clarification as to whether the on-site UPSS infrastructure has been decommissioned and removed, or remains in-situ and will be removed as part of the proposed development.*
6. *The ESA (and CMP) recommend that consideration be given to the use of personal air monitoring devices by construction workers. Please include guidance on what should be considered when determining if air monitoring devices should be worn or not. Please also ensure that the ESA is consistent with regard to these recommendations (Table 65 states '*as a precaution the CMP should be followed, and workers should follow best practices for working in confined spaces including a buddy system and specalised air monitoring equipment*'.)*
7. *Please clarify recorded groundwater levels at the site and the depth of excavation proposed relative to likely groundwater levels. Section 6.2.3 states '*the surface of the site is proposed to be excavated to 55.35 m AHD which is above the groundwater level in MW1 at 55.8, above groundwater in MW2 at 55.2 m AHD and below the groundwater in MW3 at 58.6 m AHD*'. How is 55.35m above 55.8m? Also 55.35m is the lowest proposed finished floor level, not the maximum excavation depth (slab and footings etc.).*
8. *It is noted that groundwater has been recorded above 2m BGS in MW3 and that vapour probe testing is therefore recommended, but does not appear to have*

been undertaken. Please clarify why this has not been undertaken, and if this is part of the post-excavation soil and groundwater sampling required under the CMP.

9. *Table 65 states '*once the new building is complete, if it is deemed necessary indoor vapour monitoring may be required to ensure that the spaces are safe to inhabit*'. Please clarify if this will be determined as part of the post-excavation soil and groundwater sampling required under the CMP.*
10. *Table 65 states '*although groundwater contamination has been identified, no vapour risk has been identified*' whereas section 14.4 states '*these exceedances indicate that there may be a risk to human health including indoor vapour risk'*. Please clarify.*
11. *The ESA states that '*once the UPSS infrastructure is removed then the risk from the groundwater will be mitigated'*. Please include justification for this conclusion, noting that the report also states that it is plausible that there is secondary groundwater contamination from off-site sources.*

For a response to sub-items 1 through 11, please refer to the revised updated ESA and CMP prepared by GES, which accompany this response.

We trust that this response provides sufficient information to allow council to undertake its assessment of the proposal. However, if you have any further questions in relation to the above, please do not hesitate to contact me on 6234 9281.

Yours sincerely,



Kate Heckelmann

Senior Planner
IRENEINC PLANNING & URBAN DESIGN

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PLANNING & URBAN DESIGN



23 September 2025

Hobart City Council
GPO Box 503
HOBART, TAS 7000

FURTHER INFORMATION RESPONSE - 48-52 NEW TOWN ROAD

The following has been prepared in response to the request for further information received on the 15/08/2025, regarding the application on the abovementioned site (PLN-2024-0716).

In addition to information provided to council on 30 June 2025 and 7 August 2025, the following documents accompany this response:

- Updated Architectural Package (rev E_250910)
- Updated Civil Engineering Set (rev. B 19/09/2025)
- PDAs accompanying letter ***Response to Stormwater -Related Items of RFI***
- Updated Traffic Impact Assessment (September 2025)
- Updated Planning Report (September 2025).

A summary addressing each further information request is provided below and should be read in conjunction with the documents above.

Information to satisfy the enclosed additional information re uest from TasWater TasWater Reference No. TASWASPANH B- 2025-0050 dated 2 April 2025 . To discuss these points please call TasWater on 13 6 2.

Enclosed information:

TasWater s re uests for additional information are not yet satisfied. The outstanding item is No 5 on the original RAI, repeated on the 7th of uly. A summary of our concern is below:

Currently the sub ect site and surrounding properties are serviced for sewer. The developer has re uested to relocate TasWater sewer infrastructure to accommodate their proposed development. The current PDA plans 53851M D C 030, 036 Rev A dated 04 07 2025 show that an e isting sewer main will be replaced and regraded deeper in the same location, and a 4m deep sewer will be installed across New Town Rd. This has been described as a " TasWater re uest" , with the work to be done by TasWater at our cost, which is not

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accurate. As stated in the first RAI, TasWater does not accept duplicate sewer mains if alternatives are available. The developer is responsible for the design and construction of the new sewer, at their cost, and any disruption to e isting TasWater customers must be minimised. The following re uest points must be completed in order for TasWater to provide planning approval:

1: A concept CM P must be provided, to the satisfaction of TasWater, outlining how the sewer diversion s will be completed with minimal impact to e isting customers. It is not clear why the new sewer main S2 5 to S2 3 needs to be 4m deep, or how S2 5 to S2 4 will be constructed in the same location as the e isting.

2: Appropriate cross sections must be provided showing the new sewer main S1 2-S1 1-S 3, the new stormwater, and any e isting or proposed fences retaining wall structures on boundaries.

3: Plans must be updated as re uired.

All of the above items have been previously re uested. The developer is welcome to discuss this RAI with TasWater prior to submission via PlanBuild.

Please refer to the updated Civil Engineering Set provided as part of this response which addresses the issues identified by TasWater. Revisions provided in these updates have been guided by PDA s liaison with TasWater.

To satisfy the Hobart Interim Planning Scheme 2015 clause E6.7.2, please provide scaled and dimensioned drawings prepared by a suitably ualified e pert to address all aspects of the acceptable solution or performance criteria.

In accordance with section 3.3 of AS28 0.1:2004, Gradients of Access Driveways, the ma imum gradient for the first 6m of the access is limited to 5 . Please address. Additionally, vehicular control points should be provided inline with section 3.3. The proposed boom gate location does not appear feasible.

Please refer to the updated Architectural Package and Traffic Impact Assessment which propose a revised ramp access layout for the proposal which provides for a more effective access and vehicle movement within the site. The revised Traffic Impact Assessment identifies that the access design as now proposed will satisfy Performance Criteria P1 of Clauses E6.7.2 of the Planning Scheme, as while ramp gradients exceed AS2890.1 prescriptive requirements due to site constraints, the design provides safe and convenient access appropriate for the intended residential use.

To satisfy the Hobart Interim Planning Scheme 2015 clause E6.6.1, please provide the following:

To comply with the acceptable solution A1, provide a site plan showing the number of spaces re uired by Table E6.1.

Alternatively, to comply with the performance criteria P1, address each of the re uirements in E6.6.1 P1 by a suitably ualified

Advice:

A traffic impact assessment has been provided which assesses the proposed number of on-site car parking spaces with regard to 61 Residential nits. The proposal comprises of 38 isitor Accommodation units, 23 M ultiple Dwellings, Commercial Tenancies, Wellness Centre and Consulting rooms. The details listed in the TIA conflict with the Planning Report.

Please clearly identify car parking space allocation within the lower ground car park, clearly specifying the number of car parking spaces allocated to each unit, visitor accommodation and use s.

Given the proposal is deficient by over 45 car parking spaces, a parking survey to identify the level of impact of the proposal, and the on-street parking networks ability to accommodate this deficiency, in accordance with the Department of State Growth Traffic Impact Assessment Guidelines August 2020.

There is no allocation of car parking spaces for the short term accommodation component, instead the documentation regards 32 spaces for visitor s. This creates a large deficiency that has not been addressed within the TIA. Please clarify how parking will be designated to the uses of the development.

Please refer to the updated Architectural Package which includes a Parking Layout Plan which clarifies the intended allocation of parking to be associated with the proposal. The intended allocation of parking as set out in the Architectural Package provides for the proposed 70 car parks to be allocated as follows:

Residential - R01-35	35	Basement
Visitor (residential) - V01 -V02	2	Basement
Visitor (accessible) – V03-04	2	Basement
Visitor (drop-off pick up) – V05-07	3	Port Cochere

Short stay accommodation guest - H01-25	25	Basement
Staff – S01-03	3	Basement
To al	**70**	

This layout and parking configuration is reflected and considered in the revised Traffic Impact Assessment which confirms the parking provision proposed satisfies Performance Criteria P1 of Clause E6.6.1. A revised planning report has also been provided to ensure parking is consistently reflected within the planning application materials.

To satisfy Hobart Interim Planning Scheme 2015 clause E6.7.5, please provide scaled and dimensioned drawings prepared by a suitably ualified e pert to address all aspects of the acceptable solution or performance criteria.

Advice:

Given the car park holds 67 car parking spaces and is mi ed use in nature, two way traffic flow should be provided for access into the lower ground car park. The Traffic Impact Assessment proposes a give way sign and hold line, however it is not detailed. Sight lines are unavailable at the corner end of entrance ramp , with vehicles travelling in opposing directions unable to see one another. Given the site is not constrained in development area, the ramp and corner should be designed to allow two way traffic flow at the access ramp, or mitigation methods proposed to avoid conflicts. The swept paths provided show conflicts between vehicle passing swept paths.

Provide a plan view showing a scaled layout and dimensions of:

Aisle, circulation roadway and ramp widths and lengths

Please provide a numbering system for the car parking spaces to allow allocation assessment.

Please refer to the updated Architectural Package which propose a revised ramp access and adjusted internal basement layout for the proposal which address this item. This layout is reflected and considered in the revised Traffic Impact Assessment which confirms the proposal satisfies Performance Criteria P1 of Clause E6.7.5.

1. *Provide indicative cross-sections of the proposed stormwater mains, swales and easements clearly showing e isting and proposed walls, clearances from works and other services including electrical, freeboard, natural and design ground level including immediately beyond the property line , and suitable batter slopes.*
2. *Provide confirmation from TasNetworks of minimum clearances vertical and hori ontal for the stormwater main and swale from any high voltage lines, and demonstrate these can be achieved.*

Advice for plans submitted 7 8 25: No cross-sections have been provided.

Council notes the new note on Site Demolition Plan Rev C - please clarify the future location of the substation and associated underground cables. Please contact Council s Technical fficer Environmental, Sarah ehmeister, on 6238 2 12 to discuss the above Inundation and Stormwater re uests.

Please refer to the updated Civil Engineering Set and PDAs letter ***Response to Stormwater -Related Items of RFI*** which confirms the revisions which have been undertaken to address this item.

An inundation risk management plan and associated calculations prepared by a suitably ualified engineer in accordance with best practice guidelines that details:

1. *The risk of inundation to the site, proposed buildings and building floor levels based on a predicted 1 Annual E ceedance Probability flood event for the year 2100 including consideration of climate change. Clearly state the vertical clearance between the proposed finished floor level of any habitable rooms and the flood level,*
2. *The impact of the proposed development upon the risk of inundation of other land, buildings and infrastructure including fre uency, e tent, depth and velocity and*
3. *Any inundation control measures or design features proposed to be employed to reduce the risk, and the resultant level of risk*
4. *clearly show pre and post overland flow paths through and around the property, ustifying their location.*

Advice for documents submitted 7 8 25:

Thank you for the Flood study. The following additional information is re uired.

The lower ground carpark is a floor in a habitable building albeit nonhabitable itself . As such, E15.7.4 A1 is not met, and risk to the building, user, third-party land and remediation must be briefly addressed to demonstrate compliance with E15.7.4 P1.

The flood depth and ha ard mapping appear to suggest an alteration in flooding at the rear of 15 Seymour St. Due to the large depth bands mapped, it is difficult for Council to assess its significance. Please provide further detail and discussion demonstrating no adverse impact on third-party property. Please provide a differences map indicating change of flood characteristics eg depth, ha ard, " was wet now dry" , " was dry now wet" . Clarify the reason for any increased flows - has the removal of the substation from the model affected the flow path at the end of the swale

Please clarify the ma imum modelled depths against the proposed building appro imately behind Clare St, against the impervious fence behind 13 Seymour St, and at the outbuilding in the rear yard of 15 Seymour St.

Please refer to the updated Civil Engineering Set and PDAs letter ***Response to Stormwater -Related Items of RFI*** which confirms the revisions which have been undertaken to address this item.

To ensure that the Council s road infrastructure is protected please provide:

1. ***met - 30 une 2025***
2. ***dimension width at the back of the e isting kerb ramp to the back of the e isting footpath user road***
3. ***met - 30 une 2025.***

Advice The e isting footpath width including the portion of user road is re uired to maintain amenity of the footpath for pedestrians. This is re uired to be shown on the architectural plans to assess if the development proposes to decrease the e isting pedestrian amenity.

Please contact the Council s Road Services Engineer, Te Adapa on 6238 2883 for further advice in relation to this re uest

Please refer to the updated Civil Engineering Set which respond to this item.

We trust that this response provides sufficient information to allow council to finalise its assessment of the proposal.

Yours sincerely,

Kate Heckelmann

Senior Planner
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7 November 2025

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FURTHER INFORMATION RESPONSE - 48-52 NEW TOWN ROAD

The following has been prepared in response to the request for further information received on 3 ctober 2025, regarding the application on the abovementioned site (PLN-2024-0716).

The following documents accompany this response:

- Updated Civil Engineering Set (rev. C 6/11/2025)
- Updated Traffic Impact Assessment (ctober 2025)
- Updated Architectural Package (rev F_251028)

A summary addressing each further information request is provided below and should be read in conjunction with the documents above.

1. TW1 - TasWater - Add Info

Information to satisfy the enclosed additional information request from TasWater (TasWater Reference No. TASWASPAN-HOB-2025-0155 dated 13 August 2025). To discuss these points please call TasWater on 13 69 92.

Please note that all additional information intended to satisfy these points should be submitted to the City of Hobart, not TasWater.

Council advised on 9 ctober 2025 that TasWater has confirm it was satisfied with the previous RFI response and that no further information is required in relation to this matter.

2. ENGrFi2 - Roads - Infrastructure in Road Reservation

To ensure that the Council's road infrastructure is protected please provide:

1. met - 30 une 2025

2. dimension width at the back of the existing kerb ramp to the back of the existing footpath (user road)

3. met - 30 une 2025.

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Advice: The existing footpath width including the portion of user road is required to maintain amenity of the footpath for pedestrians. This is required to be shown on the architectural plans to assess if the development proposes to decrease the existing pedestrian amenity .

Please see the revised Civil Engineering Set, specifically drawing sheet 020 which provides dimensions of the footpath width from the back of existing crossover to the back of the existing footpath relevant to the existing portion of footpath which extends into the site. This plan also confirms the intended retention of this area as user road.

3. E6.6.1 - Road and Rail Assets Code - Number of Car Parking Spaces

To satisfy the Hobart Interim Planning Scheme 2015 clause E6.6.1, please provide the following:

To comply with the acceptable solution A1, provide a site plan showing the number of spaces required by Table E6.1.

Alternatively, to comply with the performance criteria P1, address each of the requirements in E6.6.1 P1 by a suitably qualified

Advice:

A traffic impact assessment has been provided which assesses the proposed number of on-site car parking spaces with regard to 61 Residential Units. The proposal comprises of 38 Visitor Accommodation units, 23 Multiple Dwellings, Commercial Tenancies, Wellness Centre and Consulting rooms. The details listed in the TIA conflict with the Planning Report.

If the Wellness Centre, gym and Consulting rooms are to be considered as commercial tenancies and not ancillary the associated parking demand must be captured within the theoretical parking demand calculations of the TIA, and capacity within the road network is required to be shown by way of parking survey.

~~*Please clearly identify car parking space allocation within the lower ground car park, clearly specifying the number of car parking spaces allocated to each unit, visitor accommodation and use's.*~~ *MET*

Given the proposal is deficient by over 45 car parking spaces, a parking survey to identify the level of impact of the proposal, and the on-street parking networks ability to accommodate this deficiency, in accordance with the Department of State Growth Traffic Impact Assessment Guidelines August 2020.

~~*There is no allocation of car parking spaces for the short term accommodation component, instead the documentation regards 32 spaces for visitor's. This creates a large deficiency that has not been addressed within the TIA. Please clarify how parking will be designated to the uses of the development.*~~ *MET*

Please refer to the revised Traffic Impact Assessment (dated 15 ctober) prepared by Midson Traffic which further clarifies the matters raised by Council in relation to the provision of onsite parking.

In relation to the undertaking of an on street parking survey, section 5.4.3 of the TIA provides a response to this matter which concludes that such surveys would not provide meaningful or representative data because the existing kerbside parking along New Town Road operates under unrestricted conditions and is almost entirely occupied by long-stay commuter vehicles throughout business hours.

The TIA concludes that parking surveys under current unrestricted conditions would not yield any new or useful data. Instead, the recommended parking-management approach – the introduction of 2-hour limits along the site frontage combined with the identified surplus of 10–20 available spaces in nearby Clare Street, provides a pragmatic and sustainable means of accommodating the small residual parking shortfall associated with the development.

4. INFsw 1 - Protection of council Infrastructure - Stormwater

Provide indicative cross-sections of the proposed stormwater mains, swales and easements; clearly showing existing and proposed walls, clearances from works and other services including electrical, freeboard, natural and design ground level (including immediately beyond the property line), and suitable batter slopes.

Advice for plans submitted 23/9/25:

Thank you for providing cross-sections over the mains and swales. The sections do not appear to reflect design ground levels and all walls and works. Council particularly notes the tiered retaining walls shown on the ground floor plan extending from the gym towards 54 New Town Rd, and the wellness centre's sundeck. Council assumes the swale at section K will not be cut in with retaining structures, but the sundeck wall shown on the

architectural section for 11 Seymour St will instead extend low enough to permit a suitable batter. This is not however clear as the north-west elevation appears to only show batter - please clarify with an amended section K.

Confirm the extent of retaining wall required along the boundary to support the cut shown as section F, and its maximum height.

Council is still unclear of the nature and extent of the retaining walls/ cuts along the northern boundary shown on the site plans. No cut or retaining walls are shown on the long-section of SW2, or sections M. Please clarify the proposed heights and nature (eg low interlocking block walls, concrete walls with piered footings?) of any walls in this area and their relationship with the diverted stormwater main and easement. Please provide a section between M, 10m from the New Town Rd boundary, extending from the building on 54 New Town to the proposed gym, showing existing proposed ground level and

retaining walls (including footings); and their relationship to the stormwater main. Show any walls/ cut on the long-section and section M.

Council notes the existing boundary wall in sections B-D will likely require reconstruction to minimise its intrusion (including any footings) into the easement and provide access to Council's mains. Any retaining walls required for the swale will be private infrastructure, covered by ongoing s73 Building Act and s13 Urban Drainage Act agreements.

Please contact Council's Technical Officer Environmental, Sarah Zehmeister, on 6238 2912 to discuss the above Stormwater requests.

Please refer to the revised Civil Engineering Set, in which indicative cross sections have been updated to provide additional detail and clarification in relation to the matters raised by council in this item.

f particular note, these updates incorporate adjustments to the landscaping walls proposed in the north eastern corner of the site to provide a more effective design solution. This adjustment has also been reflected in the revised Architectural Package that also accompanies this response.

We trust that this response provides sufficient information to allow council to finalise its assessment of the proposal.

Yours sincerely,

Kate Heckelmann

Senior Planner
IRENEINC PLANNING & URBAN DESIGN

CULTURAL HERITAGE REPORT

Date Completed:	22 December 2025
Application No:	PLN-HOB-2024-0716
Address:	48-50, 52 and 46 New Town Road, 7a, 9, 9a and 11 Clare Street, 5, 7, 9, 11, 13 and 15 Seymour Street and Adjacent Road Reserve
Proposal:	Demolition, New Buildings for Multiple Dwellings (23 Units), Visitor Accommodation (38 Units), Food Services, Business and Professional Services (Consulting Rooms), Sport and Recreation, and Associated Works
Performance criteria:	E13.7.1 P1, E13.7.2 P1, P2 E13.8.1 P1, E13.8.2 P1
Assessment Officer:	Nicole Manley Cultural Heritage Officer
Recommendation:	Acceptable *The development has been assessed under the Hobart Interim Planning Scheme 2015.*

REPORT

1. Local Historic Heritage Significance

Works are proposed across 48-50, 52 and 46 New Town Road, 7a, 9, 9a and 11 Clare Street, 5, 7, 9, 11, 13 and 15 Seymour Street and Adjacent Road Reserve.

- The majority of the works are located on 48-50 and 52 New Town Road. A portion of this site is located within the NT7 Fraser Street Heritage Precinct in Table E13.2 of the *Hobart Interim Planning Scheme 2015,* shown in Figure 1 below.
- 46 New Town Road is a heritage listed place in Table E13.1 of the Scheme.
- 11 Clare Street and 5-15 Seymour Street are also located within the NT7 Fraser Street Heritage Precinct.

The Fraser Street Heritage Precinct is significant for reasons including:

1. *It contains a collection of residential buildings of historic and architectural merit including Federation Queen Anne, Interwar and Victorian Georgian architectural styles.*
2. *They have a high degree of integrity and consistency, many in original condition with a strong, consistent character in terms of size, height, materials, setback, bulk, garden setting and fencing.*
3. *It demonstrates a pattern of suburban development with consistent streetscapes representing the rise of suburban expansion and housing demand in New Town.*

As per the assessment in PLN-20-795, 'the house at 46 New Town Road is a 19th century inn called the Harvest Home Hotel which, according to the entry in the publication *Here's Cheers* by Colin Dennison, was built in 1840. Photos show it with a verandah to the front. It was located on what was the road north out of Hobart Town to cater for travellers. It is a two-storey masonry building with a hipped roof. It has been modified over time with bay windows added to the upper storey in the 1910-1920s.'



Figure 1. Aerial image of the subject site showing 52 New Town Road outlined in blue. Note the accessway section from Seymour Street is included within the NT7 Heritage Precinct (shaded blue with purple outline). 46 New Town Road is to the bottom of the image, with a red overly indicating the heritage listed status. Source: Council GIS.

2. Proposal

Works to 52 New Town Road include the construction of 23 multiple dwellings, 38 visitor accommodation units, commercial spaces for food services and business services, sports facilities and associated ground and stormwater and sewer works, including excavation for carparking.

Works to 46 New Town Road, 11 Clare Street and 5-15 Seymour Street are limited to stormwater and sewer works.

It is noted that the previous approval PLN-20-795 included soil nails extending into 46 New Town Road. The applicant has confirmed that the current scope of works does not include soil nails.

3. Representation

Eight (8) representations were received during the statutory advertising period. Most representations did not raise concerns relating to heritage matters. The table below summarises all the heritage related concerns raised by representors during the statutory advertising period.

Concerns	Response
"It is unclear how the substantial earthworks and excavation required as part of the development	A condition is recommended for a construction management plan which details that the heritage

will structurally impact upon the 189 year old building, particularly given that such works are proposed within metres of the boundary shared with 46 New Town Road and are extremely extensive in terms of the depth and extent of excavation… The building at 46 New Town Road is constructed of early to mid 19th century handmade bricks with sandstone foundations. There is considerable concern for the owner that the structural integrity of this Colonial era building may be severely compromised due to the extent, scale and proximity of excavation and construction works required by the proposed development."	listed house and its foundations will not be negatively impacted on by vehicular movements, excavation, construction and vibration; and which shows how construction and excavation will be undertaken without causing damage to the heritage listed house and its foundations.

4. Assessment

This application is for works to 48-50 and 52 New Town Road. The proposed works are largely contained within the main parcel of 52 New Town Road, the majority of which is outside of the NT7 Fraser Street Heritage Precinct and is not heritage listed (see Figure 1 above). As such, the scope of works for the residential and commercial building does not require assessment against the Historic Heritage Code of the *Hobart Interim Planning Scheme 2015*.

The proposed stormwater and sewerage works, however, extend into the access corridor to Seymour Street and the adjacent properties, which are covered by Tables E13.1 and E13.2 of the Scheme. The stormwater and sewerage works are not exempt under Clause E13.4.1 of the Historic Heritage Code in the *Hobart Interim Planning Scheme 2015* and therefore require assessment against the Historic Heritage Code.

E13.7 Development Standards for Heritage Places	
E13.7.1 Demolition	
A1 No acceptable solution	**P1** Demolition must not result in the loss of significant fabric, form, items, outbuildings or landscape elements that contribute to the historic cultural heritage significance of the place unless all of the following are satisfied; (a) there are, environmental, social, economic or safety reasons of greater value to the community than the historic cultural heritage values of the place; (b) there are no prudent and feasible alternatives; (c) important structural or façade elements that can feasibly be retained and reused in a new structure, are to be retained; (d) significant fabric is documented before demolition.

E13.8 Development Standards for Heritage Precincts	
E13.8.1 Demolition	
A1 No acceptable solution	Demolition must not result in the loss of any of the following: (a) buildings or works that contribute to the historic cultural heritage significance of the precinct; (b) fabric or landscape elements, including plants, trees, fences, paths, outbuildings and other items, that contribute to the historic cultural heritage significance of the precinct; unless all of the following apply; (i) there are, environmental, social, economic or safety reasons of greater value to the community than the historic cultural heritage values of the place; (ii) there are no prudent or feasible alternatives; (iii) opportunity is created for a replacement building that will be more complementary to the heritage values of the precinct.
Assessment:	The proposed trenching for stormwater and service works does not require removal of significant fabric, forms, items or landscape elements that contribute to the listed place or precinct. Some vegetation to the rear of 46 New Town Road may be affected, however this is not considered to contribute to the significance of the place. There are no proposed changes to the existing house at 46 New Town Road, however due to the age of this building, it was not constructed to the current constructed standards. It is possible that vibration from the excavation, construction and vehicle movements along the northern boundary may result in negative impacts for the structural stability of the c. 1840s building. It is noted that the proposal includes a 3 m setback of the new building from this boundary, resulting in approximately 5 m between the side wall of 46 New Town Road and the new development. No excavation plan has been provided to indicate the proximity of excavation to the boundary. A condition is recommended to prepare a Construction Management Plan which addresses this part of the site and how the house at 46 New Town Road and its footings will be protected from vehicular movement, vibration and other associated construction impacts such as excavation and soil removal. This condition was previously included in PLN-20-795. A retaining wall is proposed to the west of the swale, which is along the boundary line with the properties of 5 to 15 Seymour Street. As this is to the rear of the dwellings, it is unlikely that it will be visible or prominent in the streetscape. Subject to the inclusion of the above condition, the proposal is considered to satisfy E13.7.1 P1 and E13.8.1 P1.

E13.7 Development Standards for Heritage Places
E13.7.2 Building and Works other than Demolition

A1 No acceptable solution	**P1** Development must not result in any of the following: (a) loss of historic cultural heritage significance to the place through incompatible design, including in height, scale, bulk, form, fenestration, siting, materials, colours and finishes; (b) substantial diminution of the historic cultural heritage significance of the place through loss of significant streetscape elements including plants, trees, fences, walls, paths, outbuildings and other items that contribute to the significance of the place.
A2 No Acceptable Solution.	**P2** Development must be designed to be subservient and complementary to the place through characteristics including: (a) scale and bulk, materials, built form and fenestration; (b) setback from frontage; (c) siting with respect to buildings, structures and listed elements; (d) using less dominant materials and colours.
E13.8 Development Standards for Heritage Precincts	
E13.8.2 Building and Works other than Demolition	
A1 No acceptable solution	**P1** Design and siting of buildings and works must not result in detriment to the historic cultural heritage significance of the precinct, as listed in Table E13.2.
Assessment:	The proposed works associated with the sewer line and stormwater line extensions will likely be underground and will therefore result in minor ground changes that are largely invisible alterations to the listed place and heritage precinct. The swale along the rear boundary of 50-52 New Town Road will continue into the rear of 46 New Town Road by approximately 2 m. This is to the rear north western corner and will be physically and visually separate from the dwelling. It will introduce only a minor change in the garden setting and will not affect the significance of the place. It is therefore considered that there is no loss of significance to the listed place or precinct. Works satisfy E13.7.2 P1 and P2, and E13.8.2 P1.

5. Conclusion

The proposed Demolition, New Buildings for Multiple Dwellings (23 Units), Visitor Accommodation (38 Units), Food Services, Business and Professional Services (Consulting Rooms), Sport and Recreation, and Associated Works at 48-50, 52 and 46 New Town Road, 7a, 9, 9a and 11 Clare Street, 5, 7, 9, 11, 13 and 15 Seymour Street and Adjacent Road Reserve for the reasons outlined in the officer's report is recommended for approval, subject to the conditions contained within in Attachment A – Conditions.

Nicole Manley
Cultural Heritage Officer
22 December 2025

Reviewed
Sarah Waight
Senior Cultural Heritage Officer
23 December 2025

ATTACHMENT A: CONDITIONS

A Construction Management Plan must be provided for that part of the application site of 46 New Town Road and along the northern boundary of that property, to ensure that the heritage listed house and its foundations are not negatively impacted on by vehicular movements, excavation, construction and vibration.

Prior to the issue of any approval under the *Building Act 2016* for each stage, a Construction Management Plan must be submitted and approved by Council showing how construction and excavation will be undertaken without causing damage to the heritage listed house and its foundations. It must examine vehicular movement, excavation, construction and vibration and any other relevant or applicable construction method.

DEVELOPMENT ENGINEERING

ASSESSMENT SUMMARY:

CLAUSE	DESCRIPTION	ASSESSMENT
E5.0 Road and railway access code – DOES NOT APPLY / DOES APPLY		
E5.5.1	Existing road accesses and junctions	Acceptable Solution
E5.5.2	Existing level crossings	N/A
E5.6.1	Development adjacent to roads and railways	N/A
E5.6.2	Road accesses and junctions	Performance Criteria
E5.6.3	New level crossings	N/A
E5.6.4	Sight distance at accesses, junctions and level crossings	Acceptable Solution
E6.0 Parking and Access Code - DOES NOT APPLY / DOES APPLY		
E6.6	Parking number assessment	Performance Criteria
E6.7.1	Number of vehicle accesses	Performance Criteria
E6.7.2	Design of vehicle accesses	Performance Criteria
E6.7.3	Vehicle passing area along an access	Acceptable Solution
E6.7.4	On-site turning	Acceptable Solution
E6.7.5	Layout of parking areas	Acceptable Solution
E6.7.6	Surface treatment of parking areas	Acceptable Solution
E6.7.7	Lighting of parking areas	Acceptable Solution Planner to assess
E6.7.8	Landscaping of parking areas	N/A Planner to assess
E6.7.9	Design of motorcycle parking areas	Acceptable Solution
E6.7.10	Design of bicycle parking areas	Acceptable Solution
E6.7.11	Bicycle end trip facilities	P1 - Planner to assess
E6.7.12	Siting of car parking	Planner to assess
E6.7.13	Facilities for commercial vehicles	Acceptable Solution
E6.7.14	Access to a road	Acceptable Solution
E6.7.15	Access to Niree Lane Sandy Bay	N/A
E7.0 Stormwater - DOES APPLY – assessed by EEU		

RECOMMENDATION:

Approval with conditions

REPRESENTATIONS:

Any representations to be directed to the responsible referral Group / officer for a detailed response.

COMMENTS:

Due to the scope of the proposal, the application has been referred to the Council's Manager Waterways, Manager City Infrastructure, Manager City Mobility, Manager Open Space and Manager Surveying Services. The delegated officers' responses, including recommendations are inserted in the respective referral reports.

CONDITIONS:

- ENG1: Pay Costs
- ENG 2a: Vehicular barriers compliant with the Australian Standard AS/NZS 1170.1:2002 must be installed
- ENG 3b: The access driveway and parking area must be constructed in accordance with the approved detailed designs approved as a condition endorsement
- ENG 3c: A suitably qualified engineer must certify that the access driveway and parking area has been constructed in accordance with design drawings approved by Condition ENG 3b
- ENG 4: Surface treatment ratified for timing
- ENG 5a: The number of car parking spaces approved on the site, for use is 70

- ENG 12: Construction waste management plan
- ENG tr1: design
- ENG tr2: Construction traffic management plan
- S1 lighting
- S2 turning bays

ADVICE:

- Dial before you dig
- Fees and charges
- Building Permit
- Plumbing Permit
- Occupation of the Public Highway
- Driveway surfacing over highway reservation
- Condition endorsement engineering
- Work in the highway reservation
- Stormwater
- New service connection
- Work Place Health and Safety
- Title adhesion
- Access
- Crossover construction
- Right of way

DETAILED ASSESSMENT:

E5.0 Road and Railway Assets Code

E5.2 Application of this Code	YES		This Code applies to use or development of land:
	Yes		(a) that will require a new vehicle crossing, junction or level crossing; or
	Yes		(b) that intensifies the use of an existing access; or
			(c) that involves a sensitive use, a building, works or subdivision within 50m metres of a Utilities zone that is part of:
		No	(i) a rail network;
		No	(ii) a category 1 - Trunk Road or a category 2 - Regional Freight Road, that is subject to a speed limit of more than 60km/h kilometres per hour.

Clause for Assessment	Comments / Discussion (In bold)
Clause E5.5.1: Existing road accesses and junctions	The existing road access must comply with the Acceptable Solutions or meet the Performance Criteria (where applicable) for each clause of the *Hobart Interim Planning Scheme 2015 (HIPS 2015)*.

ACCEPTABLE SOLUTION	**Documentation submitted to date does comply with the Acceptable Solution for clause E5.5.1 (A3)** Acceptable Solution A3: - **DOES COMPLY: (10 Daily vehicle trips < 40 vehicle movements per day at the #### Road access)** The annual average daily traffic (AADT) of vehicle movements, to and from a site, using an existing access or junction, in an area subject to a speed limit of 60km/h or less, must not increase by more than 20% or 40 vehicle movements per day, whichever is the greater. **All three accesses fronting Newtown Road will be newly constructed; therefore, this clause is not applicable to them. The service access from Claire Street, however, is existing. The traffic generated via this service access is anticipated to be substantially below the threshold of 40 vehicle movements per day (VPD) required to exceed the acceptable solution under this clause.**
Clause E5.5.2: Existing level crossings NOT APPLICABLE	Documentation submitted to date does not invoke clause E5.5.2. No intensification of an existing level crossings proposed.
Clause E5.6.1: Development adjacent to roads and railways NOT APPLICABLE	Documentation submitted to date does not invoke clause E5.6.1. No development adjacent to category 1 or category 2 road proposed.
Clause E5.6.2: Road accesses and junctions **PERFORMANCE CRITERIA**	The road and access junctions must comply with the Acceptable Solutions or meet the Performance Criteria (where applicable) for each clause of the *Hobart Interim Planning Scheme 2015 (HIPS 2015)*. **Documentation submitted to date does not comply with the Acceptable Solution; therefore assessment against the Performance Criterion is relied on for clause E5.6.2.** Acceptable solution - A1 No new access or junction to roads in an area subject to a speed limit of more than 60km/h. - **N/A** Acceptable solution - A2 - **DOES NOT COMPLY** No more than one access providing both entry and exit, or two accesses providing separate entry and exit, to roads in an area subject to a speed limit of 60km/h or less. **- Submitted documentation indicates one access providing both entry and exit and *two accesses providing separate entry and exit,* to a road in an area subject to a speed limit of 60km/h or less** Performance Criteria - P1: For roads in an area subject to a speed limit of more than 60km/h. - **N/A** Performance Criteria - P2: - **ACCEPTED AS MEETING THE PERFORMANCE CRITERIA** For roads in an area subject to a speed limit of 60km/h or less, accesses and junctions must be safe and not unreasonably impact on the efficiency of the road, having regard to: (a) the nature and frequency of the traffic generated by the use; **- A traffic impact assessment prepared by MIDSON traffic pty ltd titled " The House Family Office 48-52 New Town Rd, New Town Traffic Impact Assessment October 2025" that provided the following response:**

	The traffic generation will be residential in nature, consistent with the general nature of traffic in the surrounding network. The peak traffic generation will be 45 vehicles per hour, which represents an average of less than one vehicle movement every 1.3 minutes. (b) the nature of the road; - **A traffic impact assessment prepared by MIDSON traffic pty ltd titled " The House Family Office 48-52 New Town Rd, New Town Traffic Impact Assessment October 2025" that provided the following response:** **New Town Road is a major collector road that provides access to residential and commercial frontages along its length through the New Town area** (c) the speed limit and traffic flow of the road; - **A traffic impact assessment prepared by MIDSON traffic pty ltd titled " The House Family Office 48-52 New Town Rd, New Town Traffic Impact Assessment October 2025" that provided the following response:** **The general urban speed limit of 50-km/h is applicable to New Town Road. It carries a traffic volume of approximately 15,100 vehicles per day near the subject site** (d) any alternative access to a road; - **A traffic impact assessment prepared by MIDSON traffic pty ltd titled " The House Family Office 48-52 New Town Rd, New Town Traffic Impact Assessment October 2025" that provided the following response:** **The Clare Street access provides access for service vehicles, which effectively separates commercial and residential traffic, providing safety benefits for the access arrangements**. (e) the need for the access or junction; - **A traffic impact assessment prepared by MIDSON traffic pty ltd titled " The House Family Office 48-52 New Town Rd, New Town Traffic Impact Assessment October 2025" that provided the following response:** **The accesses are required to service various components of the proposed development. The separation of commercial traffic, pick-up/ drop-off traffic and car park traffic provides a safe and efficient access configuration commensurate with the scale of the proposed development.** (f) any traffic impact assessment; and -**A traffic impact assessment prepared by MIDSON traffic pty ltd titled " The House Family Office 48-52 New Town Rd, New Town Traffic Impact Assessment October 2025" has been submitted** (g) any written advice received from the road authority. - **A traffic impact assessment prepared by MIDSON traffic pty ltd titled " The House Family Office 48-52 New Town Rd, New Town Traffic Impact Assessment October 2025" that provided the following response:** **Consultation was undertaken with Council staff in the preliminary stages of the development proposal. The consultation guided the final design associated with the development in terms of the access and parking requirements.** **Based on the above assessment and given the submitted documentation, the proposed access arrangement meets the requirements may therefore be accepted under *Performance Criteria P2:E5.6.2* of the Planning Scheme. Further, the application was referred to Council's City Mobility Unit for comment.**

	A Traffic Impact Assessment prepared by MIDSON Traffic Pty Ltd, titled "The House Family Office, 48–52 New Town Road, New Town – Traffic Impact Assessment, October 2025", provided a summary of trip generation in relation to the estimation of traffic movements at the new New Town Road accesses. **Council's Development Engineering Officer has reviewed the methodology used to calculate the estimated trip generation and finds it to be sound and appropriate. The officer is supportive of the estimated number of trips presented in the assessment; summary of assessment below.** **Traffic Generation Summary** **Total Estimated Traffic Generation** • **Daily: 369 vehicles/day** • **AM Peak: 33 vehicles/hour** • **PM Peak: 45 vehicles/hour** **Access Distribution** **New Town Road – Basement Car Park Access:** • **232 vehicles/day;** • **AM peak 23 vph,** • **PM peak 33 vph** **New Town Road – Porte Cochere:** • **36 vehicles/day;** • **AM peak 2 vph,** • **PM peak 4 vph** **Kerbside (Café & Fitness External):** • **Café: 45 vpd,** • **Fitness/wellness: 50 vpd** **Clare Street (Service Vehicles):** • **6 vpd** **Based on the documentation submitted to date and given the above assessment, the proposed access / access junction is accepted as meeting the *Performance Criteria P2:E5.6.2* of the Planning Scheme.**
Clause E5.6.3: New level crossings NOT APPLICABLE	Documentation submitted to date does not invoke clause E5.6.3. No new level crossings proposed.
Clause E5.6.4: Sight distance at accesses, junctions and level crossings **ACCEPTABLE SOLUTION**	The sight distance at access and junctions must comply with the Acceptable Solutions or meet the Performance Criteria (where applicable) for each clause of the *Hobart Interim Planning Scheme 2015 (HIPS 2015)*. **Documentation submitted to date does comply with the Acceptable Solution for clause E5.6.4.** Acceptable solution - A1: - **DOES COMPLY** Sight distances at: (a) an access or junction must comply with the Safe Intersection Sight Distance shown in Table E5.1; and (b) rail level crossings must comply with AS1742.7 Manual of uniform traffic control devices - Railway crossings, Standards Association of Australia. - **N/A**

E6.0 Parking and Access Code

E6.2 Application of this Code	This code applies to all use and development.
Clause for Assessment	**Comments / Discussion (In Bold)**
Clause(s) 6.6's are all to do with parking number assessment **PERFORMANCE CRITERIA**	The parking number assessment must comply with the Acceptable Solutions or meet the Performance Criteria (where applicable) for each clause of the *Hobart Interim Planning Scheme 2015 (HIPS 2015)*. **Documentation submitted to date does not comply with the Acceptable Solution, therefore assessment against the Performance Criterion is relied on for clause E6.6.1 (a).** Acceptable solution - A1: - **DOES NOT COMPLY:** The number of on-site car parking spaces must be: (a) No less than the number specified in Table E6.1, minus the number of car parking spaces that cannot be provided due to the site including container refund scheme space; Except if: (i) The site is subject to a parking plan for the area adopted by Council, in which case parking provision (spaces or cashin-lieu) must be in accordance with that plan. (ii) The site is subject to clauses E6.6.5, E6.6.6, E6.6.7, E6.6.8, E6.6.9 or E6.6.10 of this planning scheme. - T**able E6.1 requires the following parking provision for the residential component of the development:** • **Multiple dwellings, 1-bedroom 1 space per dwelling = 11 spaces** • **Multiple dwellings, 2 or more bedrooms 2 spaces per dwelling = 24 spaces** • **Visitor parking 1 space per 4 dwellings = 6 spaces** **▪ TOTAL 41 spaces** **The visitor accommodation component requires 1 space per unit, which is a requirement for 38 spaces** **Table E6.1 requires the following parking provision for the Café component:** • **15 spaces per 100m2 23 spaces** **The business and professional services component of the development requires 1 space per 30m2 of floor area.** **The consulting rooms are approximately 100m2 , thereby requiring 4 spaces.** **The fitness centre requires 4.5 spaces per 100m2 of floor area, thereby requiring 18 spaces.** **The total parking requirements in accordance with Table E6.1 is therefore 122 spaces.** **The total parking provision of 70 spaces (67 spaces in the lower ground level and 3 spaces in the Porte cochere) does not satisfy the requirements of Table E6.1 and the Acceptable Solution A1 of Clause E6.6.1of the Planning Scheme is not met, with a shortfall of 52 spaces.**

A Traffic Impact Assessment prepared by MIDSON Traffic Pty Ltd, titled "The House Family Office, 48–52 New Town Road, New Town – Traffic Impact Assessment, October 2025", provided a summary of first principal parking calculation for the proposed development.

Council's Development Engineering Officer has reviewed the methodology used to calculate the estimated parking calculations and finds it to be sound and appropriate. The officer is supportive of the estimated parking spaces presented in the assessment; summary of assessment below.

Parking Demand Summary

Component	Rate (TfNSW Guide)	Calculation	Total Spaces
Residential	0.7 per 1-bedroom unit	11 units × 0.7 = 7.7	7.7
	1.0 per 2-bedroom unit	8 units × 1.0 = 8.0	8.0
	1.6 per 3-bedroom unit	4 units × 1.6 = 6.4	6.4
	1 per 5 units (visitor parking)	23 units ÷ 5 = 4.6	4.6
Subtotal – Residential			27
Short-Stay Accommodation	1 per unit + 1 per 2 employees	38 units + 2 employees = 40	40
Wellness Centre	3.0 spaces per 100 m² GFA	400 m² ÷ 100 × 3.0 = 12	12
Café	15 spaces per 100 m² or 1 per 3 seats	150 m² → 23 spaces × 50% reduction = 12	12
Total Demand			91
On-Site Provision		67 lower ground + 3 porte cochere	70
Shortfall			21

Performance Criteria - P1: - **ACCEPTED AS MEETING THE PERFORMANCE CRITERIA**
The number of on-site car parking spaces must be sufficient to meet the reasonable needs of users, having regard to all of the following:

(a) car parking demand;
- A traffic impact assessment prepared by MIDSON traffic pty ltd titled " The House Family Office 48-52 New Town Rd, New Town Traffic Impact Assessment October 2025" that provided the following response:

The parking demand has been calculated to be 91 spaces. The provision of 70 spaces is a shortfall of 21 spaces. The on-site parking is designated for the residential and short-stay accommodation components of the proposed development, with commercial components relying on the availability of on-street parking or alternative transport modes (noting that the commercial components are mostly ancillary to the residential and short-stay accommodation components).

	(b) the availability of on-street and public car parking in the locality; **A traffic impact assessment prepared by MIDSON traffic pty ltd titled " The House Family Office 48-52 New Town Rd, New Town Traffic Impact Assessment October 2025" that provided the following response:** **There is a relatively large pool of available parking in New Town Road and connecting streets in the surrounding area. Whilst this parking is typically in high demand, it is recommended that some short-term time restrictions be applied to adjacent on-street parking to better accommodate short-duration visits to the site. This is detailed in Section 5.4.** **The development's commercial components (wellness centre and consulting rooms) are designed primarily as ancillary facilities serving residents and short-stay accommodation guests. External use of these facilities will be occasional and limited, making on-street parking an appropriate solution for this demand.** **Specific Considerations Supporting On-Street Parking Reliance:** • **Wellness Centre Access Control:** **The swimming pool, sauna, gymnasium, and fitness areas operate as private facilities accessible only to residents and their guests through secure access systems, fundamentally limiting external patronage.** • **Consulting Rooms Scale:** **The ~100m² consulting rooms represent a small-scale practice that will generate minimal external traffic, typically 10–15 appointments per day.** • **Temporal Distribution:** **External visits to consulting rooms occur throughout business hours rather than concentrated peaks, allowing efficient use of available on-street spaces with recommended 2-hour time limits.** • **Walking Accessibility:** **The site's location within an established residential area means many potential users of ancillary services can walk or cycle, reducing parking demand.** • **Existing Parking Management:** **Implementation of 2-hour parking restrictions will optimise turnover of the 13 on-street spaces directly adjacent to the site, plus an additional 10–20 spaces available within 100m on Clare Street during business hours.** **The combination of limited external access to wellness facilities, small-scale consulting operations, and managed on-street parking supply provides adequate provision for the minimal external parking demand anticipated.** **As noted in Section 5.4, the unrestricted nature of existing kerbside parking results in full occupancy by commuter vehicles, meaning that any survey data would merely confirm a static condition of over-utilisation. The underlying constraint is therefore management-based rather than capacity-based, and implementation of time-restricted parking remains the appropriate mechanism to ensure turnover and availability for short-stay users of the proposed development.** (c) the availability and frequency of public transport within a 400m walking distance of the site; **- A traffic impact assessment prepared by MIDSON traffic pty ltd titled " The House Family Office 48-52 New Town Rd, New Town Traffic Impact Assessment October 2025" that provided the following response:** **Metro Tasmania operate frequent bus services along New Town Road. Bus stops are located immediately adjacent and opposite the New Town Road frontage of the site**.

	(d) the availability and likely use of other modes of transport; **- A traffic impact assessment prepared by MIDSON traffic pty ltd titled " The House Family Office 48-52 New Town Rd, New Town Traffic Impact Assessment October 2025" that provided the following response:** **The site is located near residential and commercial catchments. Walking and cycling modes of transport are likely to be utilised from New Town and North Hobart areas** (e) the availability and suitability of alternative arrangements for car parking provision; **- No alternative parking provision is available or considered necessary.** (f) any reduction in car parking demand due to the sharing of car parking spaces by multiple uses, either because of variation of car parking demand over time or because of efficiencies gained from the consolidation of shared car parking spaces; - **Not applicable.** (g) any car parking deficiency or surplus associated with the existing use of the land; - **Not applicable.** (h) any credit which should be allowed for a car parking demand deemed to have been provided in association with a use which existed before the change of parking requirement, except in the case of substantial redevelopment of a site; - **Not applicable.** (i) the appropriateness of a financial contribution in lieu of parking towards the cost of parking facilities or other transport facilities, where such facilities exist or are planned in the vicinity; - **Not applicable.** (j) any verified prior payment of a financial contribution in lieu of parking for the land; **- The City's current position is not to support a financial contribution in lieu of parking for developments.** (k) any relevant parking plan for the area adopted by Council; - **Not applicable.** (l) the impact on the historic cultural heritage significance of the site if subject to the Local Heritage Code; and - **Not applicable.** (m) whether the provision of the parking would result in the loss, directly or indirectly, of one or more significant trees listed in the Significant Trees Code. - **No impact.** **Based on the documentation submitted to date and given the above assessment, the parking provision is accepted as meeting the Performance Criteria P1:E6.6.1 of the Planning Scheme. This is particularly due to the actual parking demands that will be generated by the development.** **E6.6.2 Number of accessible parking spaces** **The need for accessible parking spaces is not required for a residential development.** **The National Construction Code provides the requirements for the number of disabled spaces. The Code classifies the building as a Class 2 building (multi-**

	unit residential buildings). No disabled parking provision is required for Class 2. The commercial components of the development include the café, consulting rooms and wellness centre. These are classified as a 'Class 9b' building. This requires 1 disabled parking space for every 100 car parking spaces. This is a requirement for 1 disabled space, with 2 disabled spaces provided. **The Acceptable Solution A1 of Clause E6.6.2 of the Planning Scheme is met.** **E6.6.3 the Number of motorcycle parking spaces with the development site providing more than 20 on-site car parking spaces is one per 20 spaces.** **This is a requirement for 3 motorcycle parking spaces. The provision of 4 motorcycle parking spaces therefore satisfies the requirements of Acceptable Solution A1 of Clause E6.6.3 of the Planning Scheme.** **E6.6.4 Number of bicycle parking spaces** **On-site bicycle parking is provided in the lower ground car parking area in the form of a dedicated compound. The bicycle parking will service the overall site, with provision for the residential units as well as the commercial components of the development.** **6 required for all uses – 30 provided** **The City Transport Group are comfortable that the TIA meets the performance criteria – P1.** **Based on the documentation submitted to date and given the above assessment, the parking provision is accepted as meeting the Performance Criteria P1:E6.6.1 of the Planning Scheme. This is particularly due to the actual parking demands that will be generated by the development.**
Clause E6.7.1: Number of vehicle accesses NOT APPLICABLE	The design of the vehicle access must comply with the Acceptable Solutions or meet the Performance Criteria (where applicable) for each clause of the Hobart Interim Planning Scheme 2015 (HIPS 2015). **Documentation submitted to date does not invoke clause E6.7.1.** **Documentation submitted to date does not indicate any vehicle access requirement.**
Clause E6.7.1: Number of vehicle accesses **PERFORMANCE CRITERIA**	The parking number assessment must comply with the Acceptable Solutions or meet the Performance Criteria (where applicable) for each clause of the *Hobart Interim Planning Scheme 2015 (HIPS 2015).* **Documentation submitted to date does not comply with the Acceptable Solution, therefore assessment against the Performance Criterion is relied on for clause E6.7.1.** Acceptable solution: - **DOES NOT COMPLY** The number of vehicle access points provided for each road frontage must be no more than 1 or the existing number of vehicle access points, whichever is the greater. Performance Criteria - P1: - **ACCEPTED AS MEETING THE PERFORMANCE CRITERIA** The number of vehicle access points for each road frontage must be minimised, having regard to all of the following: (a) access points must be positioned to minimise the loss of on-street parking and provide, where possible, whole car parking spaces between access points; - **Acceptable, documentation submitted to date can meet this requirement by accepting the analysis / statements provided by the applicant's traffic engineer contained within the Traffic Impact Assessment**

	(b) whether the additional access points can be provided without compromising any of the following: (i) pedestrian safety, amenity and convenience; - **Acceptable, documentation submitted to date can meet this requirement by accepting the analysis / statements provided by the applicant's traffic engineer contained within the Traffic Impact Assessment** (ii) traffic safety; - **Acceptable, documentation submitted to date can meet this requirement by accepting the analysis / statements provided by the applicant's traffic engineer contained within the Traffic Impact Assessment** (iii) residential amenity on adjoining land; **- Not a Development Engineering consideration, planner to assess in conjunction with Council's traffic engineer (if required)** (iv) streetscape; **- Not a Development Engineering consideration, planner to assess** (v) cultural heritage values if the site is subject to the Local Historic Heritage Code; and **- Not a Development Engineering consideration, planner to assess** (vi) the enjoyment of any 'al fresco' dining or other outdoor activity in the vicinity. **- Not a Development Engineering consideration, planner to assess** **Based on the documentation submitted to date and given the above assessment, the number of vehicle accesses is accepted as meeting the *Performance Criteria P1:E6.7.1* of the Planning Scheme.**
Clause E6.7.2: Design of vehicle accesses **PERFORMANCE CRITERIA**	The design of the vehicle access must comply with the Acceptable Solutions or meet the Performance Criteria (where applicable) for each clause of the *Hobart Interim Planning Scheme 2015 (HIPS 2015)*. **Documentation submitted to date does not comply with the Acceptable Solution, therefore assessment against the Performance Criterion is relied on for clause E6.7.2 (a).** **Submitted plans indicate 2m x 2.5m sight triangle areas abutting the driveway are not kept clear of obstructions to visibility due to proposed 1.2m high front fence *and gate*.** Acceptable Solution - A1: - **DOES NOT COMPLY: Sight distance: 2m x 2.5m sight triangles - These areas to be kept clear of obstructions to visibility] and as such, shall be assessed under Performance Criteria.** Design of vehicle access points must comply with all of the following: (a) in the case of non-commercial vehicle access; the location, sight distance, width and gradient of an access must be designed and constructed to comply with section 3 – "Access Facilities to Off-street Parking Areas and Queuing Areas" of AS/NZS 2890.1:2004 Parking Facilities Part 1: Off-street car parking. Performance Criteria - P1: - **ACCEPTED AS MEETING THE PERFORMANCE CRITERIA** Design of vehicle access points must be safe, efficient and convenient, having regard to all of the following: (a) avoidance of conflicts between users including vehicles, cyclists and pedestrians; - **Acceptable, documentation submitted to date can meet this requirement**

	(b) avoidance of unreasonable interference with the flow of traffic on adjoining roads; - **Acceptable, documentation submitted to date can meet this requirement** (c) suitability for the type and volume of traffic likely to be generated by the use or development; and - **Acceptable, documentation submitted to date can meet this requirement** (d) ease of accessibility and recognition for users. - **Acceptable, documentation submitted to date can meet this requirement** **Based on the documentation submitted to date and given the above assessment, the sight lines are accepted as meeting the *Performance Criteria P1:E6.7.2* of the Planning Scheme.** **The gradient non-compliance results from site constraints where the significant level difference between New Town Road and the basement car park cannot be accommodated within the available horizontal distance using compliant gradients. The design represents an appropriate engineering solution that achieves the performance objectives of safe, efficient and convenient access within the physical limitations of the site.**
Clause E6.7.3: Vehicle passing area along an access **ACCEPTABLE SOLUTION**	Vehicle passing must comply with the Acceptable Solutions or meet the Performance Criteria (where applicable) for each clause of the *Hobart Interim Planning Scheme 2015 (HIPS 2015)*. **Documentation submitted to date does comply with the Acceptable Solution for clause E6.7.3.** Acceptable solution - A1: - **DOES COMPLY** Vehicular passing areas must: (a) be provided if any of the following applies to an access: (i) it serves more than 5 car parking spaces; - **Yes** (ii) is more than 30 m long; - **Yes** (iii) it meets a road serving more than 6000 vehicles per day; - **No** (b) be 6 m long, 5.5 m wide, and taper to the width of the driveway; - **Documentation submitted to date can meet this requirement** (c) have the first passing area constructed at the kerb; - **Documentation submitted to date can meet this requirement** (d) be at intervals of no more than 30 m along the access. - **Documentation submitted to date can meet this requirement**
Clause E6.7.4: On-site turning **ACCEPTABLE SOLUTION**	On-site turning must comply with the Acceptable Solutions or meet the Performance Criteria (where applicable) for each clause of the Hobart Interim Planning Scheme 2015 (HIPS 2015). **Documentation submitted to date does comply with the Acceptable Solution for clause E6.7.4.** Acceptable solution - A1: - **DOES COMPLY** On-site turning must be provided to enable vehicles to exit a site in a forward direction, except where the access complies with any of the following: (a) it serves no more than two dwelling units; - **COMPLIES** (b) it meets a road carrying less than 6000 vehicles per day. – **COMPLIES**
Clause E6.7.5: Layout of parking areas **ACCEPTABLE SOLUTION**	The layout of the parking area must comply with the Acceptable Solutions or meet the Performance Criteria (where applicable) for each clause of the Hobart Interim Planning Scheme 2015 (HIPS 2015). **Documentation submitted to date does comply with the Acceptable Solution for clause 6.7.5.** Acceptable Solution A1: - **DOES COMPLY** The layout of car parking spaces, access aisles, circulation roadways and ramps must

	be designed and constructed to comply with section 2 "Design of Parking Modules, Circulation Roadways and Ramps" of AS/NZS 2890.1:2004 Parking Facilities Part 1: Off-street car parking and must have sufficient headroom to comply with clause 5.3 "Headroom" of the same Standard. • Car Parking Space Dimensions (AS2890.1 Fig 2.2 = 2.4x5.4m Class 1A): **- Documentation submitted to date can meet this requirement** • Car Parking Space Design Envelope (AS2890.1 Fig 5.2 300mm clearance on side): **- Documentation submitted to date can meet this requirement** • Headroom: (AS2890.1 Fig 5.3 = 2.2m clearance): **- Documentation submitted to date can meet this requirement** • Parking Space Gradient (5%): **- Documentation submitted to date can meet this requirement** • Aisle Width (AS2890.1 Fig 2.2 = 5.8m Class 1A): **- Documentation submitted to date can meet this requirement** • Garage Door Width & Apron (AS2890.1 Fig 5.4 = 2.4m wide => 7m wide apron): - **Documentation submitted to date can meet this requirement** • Parking Module Gradient (manoeuvring area 5% Acceptable Soln, 10% Performance): **- Documentation submitted to date can meet this requirement** • Driveway Gradient & Width (AS2890.1 Section 2.6 = 25% and 3m): **- Documentation submitted to date can meet this requirement** • Transitions (AS2890.1 Section 2.5.3 = 12.5% summit, 15% sag => 2m transition): **- Documentation submitted to date can meet this requirement** • Vehicular Barriers (AS2890.1 Section 2.4.5.3 = 600mm drop, 1:4 slope): **- Documentation submitted to date can meet this requirement** • Blind Aisle End Widening (AS2890.1 Fig 2.3 = 1m extra): - **N/A** • "Jockey Parking" (Performance Assessment): - **Not indicated**
Clause E6.7.6: Surface treatment of parking areas **ACCEPTABLE SOLUTION**	The surface treatment must comply with the Acceptable Solutions or meet the Performance Criteria (where applicable) for each clause of the Hobart Interim Planning Scheme 2015 (HIPS 2015). **Documentation submitted to date does comply with the Acceptable Solution for clause E6.7.6**. Acceptable Solution - A1: - **DOES COMPLY** Parking spaces and vehicle circulation roadways must be in accordance with all of the following; (a) paved or treated with a durable all-weather pavement where within 75m of a property boundary or a sealed roadway; and (b) drained to an approved stormwater system, unless the road from which access is provided to the property is unsealed. **Documentation submitted to date indicates a concrete surface treatment, able to be drained to an approved stormwater system. Condition on Planning Permit to ratify timing.**

Clause E6.7.7: Lighting of parking areas NOT APPLICABLE	The lighting of parking areas must comply with the Acceptable Solutions or meet the Performance Criteria (where applicable) for each clause of the Hobart Interim Planning Scheme 2015 (HIPS 2015). **Documentation submitted to date does not invoke clause E6.7.7.** Acceptable Solution A1: Parking and vehicle circulation roadways and pedestrian paths serving 5 or more car parking spaces, used outside daylight hours, must be provided with lighting in accordance with clause 3.1 "Basis of Design" and clause 3.6 "Car Parks" in AS/NZS 1158.3.1:2005 Lighting for roads and public spaces Part 3.1: Pedestrian area (Category P) lighting. **Documentation submitted to date indicates no new (> 5 spaces) parking area(s).** *(Planner to assess)*
Clause E6.7.8: Landscaping of parking areas NOT APPLICABLE	The landscaping of parking areas must comply with the Acceptable Solutions or meet the Performance Criteria (where applicable) for each clause of the Hobart Interim Planning Scheme 2015 (HIPS 2015). **Documentation submitted to date does not invoke clause E6.7.8.** Acceptable Solution A1: Landscaping of parking and circulation areas must be provided where more than 5 car parking spaces are proposed. This landscaping must be no less than 5 percent of the area of the car park, except in the Central Business Zone where no landscaping is required. **Documentation submitted to date indicates no new (> 5 spaces) parking area(s).** *(Planner to assess)*
Clause E6.7.9: Design of motorcycle parking areas ACCEPTABLE SOLUTION	The motor bike parking must comply with the Acceptable Solutions or meet the Performance Criteria (where applicable) for each clause of the Hobart Interim Planning Scheme 2015 (HIPS 2015). **Documentation submitted to date does comply with the Acceptable Solution for clause E6.7.9**. Acceptable Solution A1: - **DOES COMPLY** The design of motorcycle parking areas must comply with all of the following: (a) be located, designed and constructed to comply with section 2.4.7 "Provision for Motorcycles" of AS/NZS 2890.1:2004 Parking Facilities Part 1: Off-street car parking; and (b) be located within 30 m of the main entrance to the building. **Submitted documentation indicates adequate motorcycle parking provisions on-site.**
Clause E6.7.10: Design of bicycle parking areas ACCEPTABLE SOLUTION	The bicycle parking must comply with the Acceptable Solutions or meet the Performance Criteria (where applicable) for each clause of the Hobart Interim Planning Scheme 2015 (HIPS 2015). **Documentation submitted to date does comply with the Acceptable Solution for clause E6.7.10**. Acceptable Solution A1: - **DOES COMPLY** The design of bicycle parking facilities must comply with all of the following; (a) be provided in accordance with the requirements of Table E6.2.; (b) be located within 30m of the main entrance to the building. Acceptable Solution A2: - **DOES COMPLY**

	The design of bicycle parking spaces must be to the class specified in table 1.1 of AS2890.3-1993 Parking facilities Part 3: Bicycle parking facilities in compliance with section 2 "Design of Parking Facilities" and clauses 3.1 "Security" and 3.3 "Ease of Use" of the same Standard. *Table E6.2 sets out the number of bicycle parking spaces required. The requirement for spaces for a use or development listed in the first column of the table is set out in the second and forth columns of the table with the corresponding class set out in the third and fifth columns. If the result is not a whole number, the required number of (spaces) is the nearest whole number. If the fraction is one-half, the requirement is the next whole number.* User Class: **Visitor Accommodation** **Visitor Accommodation = 1 for each 40 accommodation rooms (Employee/resident bicycle parking requirement) and 1 for each 30 accommodation rooms (Visitor/customer/student bicycle parking requirement)**
Clause E6.7.11: Bicycle end trip facilities NOT APPLICABLE	The bicycle end trip facilities must comply with the Acceptable Solutions or meet the Performance Criteria (where applicable) for each clause of the Hobart Interim Planning Scheme 2015 (HIPS 2015). **Documentation submitted to date does not invoke clause E6.7.11.** Acceptable Solution A1: For all new buildings where the use requires the provision of more than 5 bicycle parking spaces for employees under Table E6.2, 1 shower and change room facility must be provided, plus 1additional shower for each 10 additional employee bicycle spaces thereafter. **Documentation submitted to date indicates no new (> 5 spaces) bicycle parking area(s).** *(Planner to assess)*
Clause 6.7.12: Siting of car parking NOT APPLICABLE	The siting of car parking must comply with the Acceptable Solutions or meet the Performance Criteria (where applicable) for each clause of the Hobart Interim Planning Scheme 2015 (HIPS 2015). **Documentation submitted to date does not invoke clause E6.7.12.** Acceptable Solution A1: Parking spaces and vehicle turning areas, including garages or covered parking areas in the Inner Residential Zone, Urban Mixed Use Zone, Village Zone, Local Business Zone and General Business Zone must be located behind the building line of buildings located or proposed on a site except if a parking area is already provided in front of the building line of a shopping centre. **Documentation submitted to date indicates no new parking area(s) within the respective zones.** *(Planner to assess based on DE assessment of Clause 6.7.5 layout of parking area)*
Clause E6.7.13: Facilities for commercial vehicles **ACCEPTABLE SOLUTION**	The facilities for commercial vehicles must comply with the Acceptable Solutions or meet the Performance Criteria (where applicable) for each clause of the Hobart Interim Planning Scheme 2015 (HIPS 2015). **Documentation submitted to date does comply with the Acceptable Solution for clause E6.7.13.** Acceptable Solution A1: - **DOES COMPLY**

	Commercial vehicle facilities for loading, unloading or manoeuvring must be provided on-site in accordance with Australian Standard for Off-street Parking, Part 2 : Commercial. Vehicle Facilities AS 2890.2:2002, unless: (a) the delivery of all inward bound goods is by a single person from a vehicle parked in a dedicated loading zone within 50 m of the site; and (b) the use is not primarily dependent on outward delivery of goods from the site.
Clause E6.7.14: Access to a road **ACCEPTABLE SOLUTION**	The access to a road must satisfy the Acceptable Solutions of the Hobart Interim Planning Scheme 2015 (HIPS 2015). **Documentation submitted to date does comply with the Acceptable Solution for clause E6.7.14.** Acceptable Solution A1: - **DOES COMPLY** Access to a road must be in accordance with the requirements of the road authority. Performance Criteria - P1: **No Performance Criteria** **Documentation submitted to date indicates an access to a road in accordance with relevant LGAT drawings.** **Referred to the City Mobility Group for determination and conditioning.**
Clause E6.7.15: Access to Niree Lane Sandy Bay **NOT APPLICABLE**	The access to Niree Lane must comply with the Acceptable Solutions or meet the Performance Criteria (where applicable) for each clause of the Hobart Interim Planning Scheme 2015 (HIPS 2015). **Documentation submitted to date does not invoke clause E6.7.15.** **Documentation submitted to date does not indicate any proposed development within Niree Lane.**

City of HOBART

INTERNAL REFERRAL

Reference
PLANNA-HOB-2025-1103

Application Reference
PLN-HOB-2024-0716

Address
52 NEW TOWN RD NEW TOWN TAS 7008

Titles
252465/1

Referral Report Type

Referral Report
-

Referral Recommendation

Recommendation
Acceptable Subject to Conditions

Referral Officer Name
Sarah Zehmeister

Referral Officer Role
Stormwater Services Environmental Officer

Date Completed
09/12/2025

Applicable Codes

Select Applicable Codes/Provisions
E7.0 - Stormwater Management Code, E15.0 - Inundation Prone Areas Code

Overview

Overview
Diversion of Council mains, flood swale to manage flood path, construction of apartments and commercial development

Summary

Assessment Summary
Site history:
GMC-HOB-2024-0064 - Internal Referral - Summary
See previous applications CEP-22-98 and PLN-20-795.

Note civil drawings were not included in advertised documents.
Also note civil design changed significantly post-planning due to upstream diversion of Clare St mains, soil nails, 'quarry' excavation style requiring suspended mains, and connections of Clare/ Seymour St properties, as well as the discovery of the DN600 brick main and poor fill quality.

GMC summary -
Called Owen Gervasoni 17/12 to give heads up re depth of main and dodgy fill in road. For excavation 5m deep, would likely need to close the main road. Short distance, but uneven fill and brick main may add time.
Nearly identical proposal to JSA's design last time.
Main would be diverted in DN600 (as now know is DN600 brick).
Clare St main is shown as DN225 as per Council records, upsized to DN300- JSA has stated it was a DN300.
Both mains are however flattening to 0.9% and 1% respectively.
Reduction in capacity?
The existing Clare St pipe is 1.28-11% grade. Assuming is DN300 as per JSA, a slight reduction, however with proposed swale and fresh pipe, improved overall. Appears to be scope to lower the flattest section.
DN600 is currently quite steep at 4-5% - but brick and reduced to DN375. Whilst a technical increase over the current DN375, it is a significant decrease from if Council replaced the DN375 on the current alignment. Council will not be able to easily upgrade this section in the future, so its capacity should be carefully compared to the new ARR climate change scenarios, and potential flooding looked at. Given depth in manholes, HGL may be significantly higher than Manings capacity.
Will need to ask if steeper grade possible, impact/ interaction on 1%+CC flows (how much in pipe vs swale), and advise re constructability at Planning.
High voltage line along northern boundary is not shown as high voltage, nor proposed to be moved unlike JSA version.
Given proposed depth of mains, is std clearance enough?

Ask for indicative cross-section and TasNetworks agreeance at Planning.

However must investigate whether possible to raise the DN600 - need to confirm depth of upstream mains (which are listed as 100yrs old), whether DN600 is partially abandoned on its current alignment, and whether it needs to be this deep to take groundwater.
Dale from Surveying had tried to locate the two manholes immediately upstream of the DN600, and could not find them.
Conquest to Laurie to camera, locate and record depth and size, from Warragul Ave.

Protection of infrastructure (inc during construction, and maintained capacity), Stormwater code and Inundation Code required at Planning.

Pre-lodgement discussions - see email 3/12/24.

Discussed extreme high level nature of reports at Services meeting Mon 31/3. Whilst we believe much can be dealt with at detailed design stage, some additional info is required.

E7
A1 - carpark/ gym level 55.35m. Exitsing stormwater manhole is SL51.05m, invert 49.4m.
Can drain all development to this manhole via gravity. New cnxn required.
P2 - treatment required. Propose 200um litter baskets in carpark and cost contribution for rest.

A3 - using previous site impervious cover of 72%. This was agreed upon in pre-dev meetings. Have not said what proposed impervious area is - just that if it exceeds 72%, will install detention storage in form of rainwater tanks.
Have modelled existing system for current 5% event - propose to upsize some pipes. Has not modelled proposed system for 5% of any CC scenario. States drains model run for various durations, but does not provide chart or say which duration was critical. Use default ARR IL/CL values - 28mm and 3.7mm are very large for urban drained area! Does not account for pond at 56 - but equally not account for pressurised input. Why only 376L/s in DN600? This section could take >1000L/s - until it hits the DN375, but even this has a higher free-flow capacity, let alone pressurised. Tons of water going down street, and modelled as entering the neighbour. Neighbour has solid fence, and there is kerb with fall. Would be better to drain through this land, over the main. No OFP provided though. Why not? Tiered retaining walls. Also high voltage cables and sewer main - how all fit? Put inlet pit here over new main? - very deep. Where flows enter site from NT Rd? Do they not?
OFP 3m wide, 1m deep swale provided along clare/ seymour bdy. Indic calcs say enough capacity - but how construct 1m deep swale over mains only 730cover? Only 1% slope in first section- not the 3.8% modelled - less flow though here. What level is swale vs floor? Excavation? removal of bdy walls? Need indicative sections. Plunge over cliff and 90o bend. What happening with criblock wall?
Has said new pipes will be bigger. Some reduction in capacity possible though due to flattening. Any relocation of spill points?

A4 -

IND
A1 ??? Say 300mm above - is this true? Where is OFP from road? Swale height?
P1 - New walls proposed -1 swale provided. None for other path. Enough to guarantee not pushed onto neighbours? Swale end point mimic current OFP? Need to provide IND add inf.

Add info required:

Add info received 7/8/25
52 NEW TOWN RD NEW TOWN TAS 7008 - Request for Information - Planning

Proposed stormwater main has <1% grade- could easily be improved.
Only 200mm cover under bdy ret wall
Negative cover stated under deliver ramp

Contaminated groundwater reported at levels similar to FFL of lower carpark - CMP doesn't really seem to address ag drains as a direct path to Maypole Riv. It does seem likely from the report that the fill and USPS, which will be removed, are the key sources of this contamination. CONDITION for clear statement. Maybe testing post removal?

Planning report says building meets A1, and P3. Where are the outbuildings?

BB not sat, sent 15/8 PLANNA-HOB-2025-3176
INFsw 1 - Protection of council Infrastructure - Stormwater
1. Provide indicative cross-sections of the proposed stormwater mains, swales and easements; clearly showing existing and proposed walls, clearances from works and other services including electrical, freeboard, natural and design ground level (including immediately beyond the property line), and suitable batter slopes.
2. Provide confirmation from TasNetworks of minimum clearances (vertical and horizontal) for the stormwater main and swale from any high voltage lines, and demonstrate these can be achieved.
Advice for plans submitted 7/8/25: No cross-sections have been provided.
Council notes the new note on Site Demolition Plan Rev C - please clarify the future location of the substation and associated underground cables.
Please contact Council's Technical Officer Environmental, Sarah Zehmeister, on 6238 2912 to discuss the above Inundation and Stormwater requests.

IND 1 - Inundation Prone Area Code
An inundation risk management plan and associated calculations prepared by a suitably qualified engineer in accordance with best practice guidelines that details:
1. The risk of inundation to the site, proposed buildings and building floor levels (based on a predicted 1% Annual Exceedance Probability flood event for the year 2100 including consideration of climate change. Clearly state the vertical clearance between the proposed finished floor level of any habitable rooms and the flood level,
2. The impact of the proposed development upon the risk of inundation of other land, buildings and infrastructure (including frequency, extent, depth and velocity); and
3. Any inundation control measures or design features proposed to be employed to reduce the risk, and the resultant level of risk
4. clearly show pre and post overland flow paths through and around the property, justifying their location.
Advice for documents submitted 7/8/25:
Thank you for the Flood study. The following additional information is required.
The lower ground carpark is a floor in a habitable building (albeit non-habitable itself). As such, E15.7.4 A1 is not met, and risk to the building, user, third-party land and remediation must be briefly addressed to demonstrate compliance with E15.7.4 P1.
The flood depth and hazard mapping appear to suggest an alteration in flooding at the rear of 15 Seymour St. Due to the large depth bands mapped, it is difficult for Council to assess its significance. Please provide further detail and discussion demonstrating no adverse impact on third-party property. Please provide a 'differences' map indicating change of flood characteristics (eg depth, hazard, "was wet now dry", "was dry now wet"). Clarify the reason for any increased flows - has the removal of the substation from the model affected the flow path at the end of the swale?
Please clarify the maximum modelled depths against the proposed building approximately behind 9 Clare St, against the

impervious fence behind 13 Seymour St, and at the outbuilding in the rear yard of 15 Seymour St.

Add info submitted 23/9/25.
Inundation - answers and afflux map provided. Pipe size has altered, now showing positive impact. Report also states inputs and dem have altered - more detailed survey along Clare St. Note flood waters 500mm deep behind 9 Clare- constrained by ret wall and building! Will need to have extensive conditions.
IND1 met for planning.

Sewer design has altered extensively - now propose 5m deep in footpath (ie hard along building). Shown under bdy retaining wall on LHS.

New substation location has been shown. Cables are shown from it to the main building - none up to New Town Rd. Have to assume there are none proposed. 500mm envelope shown on section. Confirm at detailed design.

Sections show the 3m wide easement is actually 2.5m between building and bdy retaining wall.
Cross-sections provided do not have all works in them - note the lack of sun deck (and associated walls/ slopes) on sections G-K, and retaining walls on sections L & M. Sections G-K are acceptable for planning stage as they are supported by architectural sections for 11 Seymour et al.
However no similar section through 54 New Town Rd has been provided. Sections L & M do not extend past the property boundary or show the relationship between the main, the neighbouring building, and proposed walls.
The walls are also not shown on the long-section of the stormwater main.
Section F shows a 0.79m cut and bdy wall for the swale. Is this the highest point? How far does this extend?





BB not sat
INFsw 1 - Protection of council Infrastructure - Stormwater

1. Provide indicative cross-sections of the proposed stormwater mains, swales and easements; clearly showing existing and proposed walls, clearances from works and other services including electrical, freeboard, natural and design ground level (including immediately beyond the property line), and suitable batter slopes.

Advice for plans submitted 23/9/25:
Thank you for providing cross-sections over the mains and swales.
The sections do not appear to reflect design ground levels and all walls and works.
Council particularly notes the tiered retaining walls shown on the ground floor plan extending from the gym towards 54 New Town Rd, and the wellness centre's sundeck.
Council assumes the swale at section K will not be cut in with retaining structures, but the sundeck wall shown on the architectural section for 11 Seymour St will instead extend low enough to permit a suitable batter. This is not however clear as the north-west elevation appears to only show batter - please clarify with an amended section K.
Confirm the extent of retaining wall required along the boundary to support the cut shown as section F, and its maximum height. Council is still unclear of the nature and extent of the retaining walls/ cuts along the northern boundary shown on the site plans. No cut or retaining walls are shown on the long-section of SW2, or sections L & M. Please clarify the proposed heights and nature (eg low interlocking block walls, concrete walls with piered footings?) of any walls in this area and their relationship with the diverted stormwater main and easement. Please provide a section between L&M, ~10m from the New Town Rd boundary, extending from the building on 54 New Town to the proposed gym, showing existing & proposed ground level and retaining walls (including footings); and their relationship to the stormwater main. Show any walls/ cut on the long-section and section M.

Council notes the existing boundary wall in sections B-D will likely require reconstruction to minimise its intrusion (including any footings) into the easement and provide access to Council's mains. Any retaining walls required for the swale will be private infrastructure, covered by ongoing s73 Building Act and s13 Urban Drainage Act agreements.

Please contact Council's Technical Officer Environmental, Sarah Zehmeister, on 6238 2912 to discuss the above Stormwater requests.

Add info received 7/11
PLANNA-HOB-2025-3821
Amended sections and wall layout have been provided.
All walls are called landscaping walls - as one is 1.6m tall, will need proper design and footings.
All three walls will cross Council's new main, and some sections run parallel
Amended design is better.

Swale will have its own landscape retaining walls - not preferred option but OK.
Swale requires 0.77m cut on bdy.

Will need FAR more detail at detailed design - now have some idea of what is intended and conditions required.

BB sat

SZ 5/12/25

Advertised docs do not include the initial report (DRAINS model). Revised calcs are required at detailed design regardless.

Conditions

#	Condition	Origin
1	ENG 1A - Development Engineering - Protection of Council Assets Any damage to council infrastructure resulting from the implementation of this permit, must, at the discretion of the Council: 1. Be met by the owner by way of reimbursement (cost of repair and reinstatement to be paid by the owner to the Council); or 2. Be repaired and reinstated by the owner to the satisfaction of the Council. A photographic record of the Council's infrastructure adjacent to the subject site should be provided to the Council prior to any commencement of works. A photographic record of the Council's infrastructure (e.g. existing property service connection points, roads, buildings, stormwater, footpaths, driveway crossovers and nature strips, including if any, pre-existing damage) will be relied upon to establish the extent of damage caused to the Council's infrastructure during construction. In the event that the owner/developer fails to provide to the Council a photographic record of the Council's infrastructure, then any damage to the Council's infrastructure found on completion of works will be deemed to be the responsibility of the owner.	LUPAA 1993
2	ENV 2 - Stormwater - Erosion & Sediment Control Plan Sediment and erosion control measures, sufficient to prevent sediment from leaving the site and in accordance with an approved Erosion & Sediment Control Plan (ESCP), must be installed prior to the commencement of work and maintained until such time as all disturbed areas have been stabilised and/or restored or sealed to the Council's satisfaction. An ESCP for each relevant stage must be submitted and approved as a Condition Endorsement prior to the issue of any approval under the Building Act 2016 or the commencement of work, whichever occurs first. The ESCP must be prepared by a suitably qualified person and be in accordance with *a) Erosion And Sediment Control, The Fundamentals for Development in Tasmania* and associated guideline documents *(TEER &DEP, 2023)*, available from the Derwent Estuary Program's website; and b) recommendations in the Contamination Management Plan and Environmental Site Assessments for the site. The ESCP must include (but not be limited to) details of temporary site drainage, groundwater dewatering, and overland flow paths. If the site or controls change, an updated ESCP must be submitted. All work required by this condition must be undertaken in accordance with the approved ESCP. Advice: *This condition requires further information to be submitted as a Condition Endorsement. Refer to the Condition Endorsement advice at the end of this permit.* Reason for Condition: To avoid the pollution and sedimentation of roads, drains and natural watercourses that could be caused by erosion and runoff from the development; and to comply with relevant State legislation.	LUPAA 1993
3	ENG SW1 - Stormwater - Design All stormwater from the proposed development (including but not limited to: roofed areas, ag drains, and impervious surfaces such as driveways and paved areas) must be drained to a lawful point of discharge to the public stormwater system with sufficient receiving capacity prior to occupancy or commencement of use (whichever occurs first). Services to third-party land must be maintained. *Advice:* *Under section 23 of the* Urban Drainage Act 2013 *it is an offence for a property owner to direct stormwater onto a neighbouring property.* Reason for condition To ensure that stormwater from the site will be discharged to a suitable Council-approved outlet.	LUPAA 1993
4	SW 1 - Stormwater - Protection of Hobart City Council Assets Prior to the issue of any approval under the *Building Act 2016* or the commencement of work on the site (whichever occurs first), a pre-construction structural condition assessment and visual record (eg video and photos) of the Hobart City Council's stormwater infrastructure within and adjacent to the proposed development must be submitted to and accepted by the City of Hobart as a Condition Endorsement. The condition assessment must include at least: 1. a site plan clearly showing the location of the investigation, with access points and all segments and nodes shown and labelled, with assets found to have a different alignment from that shown on the City of Hobart's plans to be marked on the ground and on the plan, 2. a digital recording of a CCTV inspection and written condition assessment report in accordance with WSA 05-2013 Conduit Inspection Reporting Code of Australia, in a 'Wincan' compatible format; 3. clearly identify all third-party connections and 4. photos of any existing drainage structures connected to or modified as part of the development. The pre-construction condition assessment will be relied upon to establish the extent of any damage caused to Hobart City Council's stormwater infrastructure during construction. If the owner/developer fails to provide the City of Hobart with an adequate pre-construction condition assessment then any damage to the City of Hobart's infrastructure identified in the post--construction condition assessment will be the responsibility of the owner/developer. *Advice: This condition requires further information to be submitted as a Condition Endorsement. Refer to the Condition Endorsement advice at the end of this permit.* *The CCTVs must extend to the upstream manhole beyond the area of works (eg to the eastern side of New Town Rd and in 46 New Town Rd).*	LUPAA 1993

5	SW 2 - Stormwater - Protection of Hobart City Council Assets Prior to occupancy or the commencement of the approved use (whichever occurs first), a post-construction structural condition assessment and visual record (eg video and photos) of the Hobart City Council's stormwater infrastructure within and adjacent to the proposed development must be submitted to and accepted by the City of Hobart as a Condition Endorsement. The condition assessment must include at least: 1. a site plan clearly showing the location of the investigation, with access points and all segments and nodes shown and labelled, with assets found to have a different alignment from that shown on the City of Hobart's plans shall be marked on the ground and on the plan, 2. a digital recording of a CCTV inspection and written condition assessment report in accordance with WSA 05-2013 Conduit Inspection Reporting Code of Australia, in a 'Wincan' compatible format; and 3. photos of any existing drainage structures connected to or modified as part of the development. The post-construction condition assessment will be relied upon to establish the extent of any damage caused to the Hobart City Council's stormwater infrastructure during construction. If the owner/developer fails to provide the City of Hobart with an adequate pre-construction condition assessment then any damage to the Hobart City Council's infrastructure identified in the post-construction CCTV will be deemed to be the responsibility of the owner/developer. The post-construction CCTV must be taken after the completion of all works. *Advice: This condition requires further information to be submitted as a Condition Endorsement. Refer to the Condition Endorsement advice at the end of this permit.* *Please note additional CCTVs will be required under the Permit to Construct Public Infrastructure. Depending on the construction timeframe, a single CCTV may be able to be used to meet both requirements.*	LUPAA 1993
6	SW 3 - Protection of City Stormwater Assets The proposed works (including landscaping, foundations and overhangs) must be designed to ensure the long term protection of and access to the Council's stormwater infrastructure. A detailed design certified by a suitably qualified engineer must be submitted and approved as a Condition Endorsement prior to issue of any consent under Building Act or commencement of works for each stage on site (whichever occurs first). The detailed design must: 1. Demonstrate how the design will maintain the overland flow path, provide adequate access to the main, impose no additional loads onto the main and that the structure will be fully independent of the main and its trenching. 2. Include multiple cross-sections (including at the worst case locations) clearly showing the relationship both vertically and horizontally between Council's stormwater infrastructure and the proposed works (including footings), and stating the minimum setbacks from the works to the nearest external surface of the main. 3. Include long-sections over the main demonstrating adequate cover is maintained. 4. Be certified by a suitably qualified engineer. Prior to issue of any Certificate of Completion a suitably qualified engineer must confirm the installation of the works within the zone of influence or two metres (whichever is greater) of Council's stormwater main is in accordance with the approved drawings and complies with this condition. Should any remediation works be required, these must be carried out at the developer's cost. All work required by this condition must be undertaken in accordance with the approved design. *Advice: This condition requires further information to be submitted as a Condition Endorsement. Refer to the Condition Endorsement advice at the end of this permit.* *The proposal is generally acceptable. You will need specific permission from Council's Stormwater Unit under s73 of the Building Act 2016 and s13 of the Urban Drainage Act for the final certified detailed design plans. This permission will be conditional upon ongoing indemnities and access.*	LUPAA 1993
7	SW 4 - Stormwater - Protection of Hobart City Council Assets No contaminated water may be directed to Council's stormwater system, either during construction or during the lifetime of the development via ag drains etc. Prior to connection of any groundwater or potentially contaminated surface runoff to Council's stormwater system, a statement from a suitably qualified person must be submitted to and accepted by Council which confirms the water is not contaminated. *Advice: Council notes that the submitted ESA noted contaminated groundwater was found onsite, potentially at levels similar to any excavation or ag drains.*	LUPAA 1993

8	SW 6 - Stormwater - Design The new stormwater infrastructure must be designed and constructed prior to occupancy or the commencement of the approved use (whichever occurs first). Prior to the issuing of any approval under the *Building Act 2016* or commencement of works (whichever occurs first), detailed engineering drawings must be submitted and approved as a Condition Endorsement. The detailed engineering drawings must: 1. be certified by a suitably qualified and experienced civil engineer; 2. be substantially in accordance with the Local Government Association of Tasmania: Tasmanian Municipal Standard Drawings, as varied by the City of Hobart's published departures from those Drawings, and the Local Government Association of Tasmania, Tasmanian Subdivision Guidelines (October 2013); 3. clearly distinguish between public and private infrastructure; 4. show in both plan and long-section the proposed stormwater mains and connections, including but not limited to, connections, flows, velocities, hydraulic grade lines, clearances, cover, gradients, sizing, material, pipe class, adequate working platforms around manholes, easements and inspection openings; 5. Connections for all potentially affected third-party land must be clearly identified and detailed. Any existing connections must be reinstated to Council standards. Provisions for servicing all titles draining towards the replaced mains must be included 6. include the associated calculations/ modelling and catchment area plans. The stormwater system (including defined overland flow paths) must cater for all 1% AEP event flows as at 2100 (i.e including climate change loading) from a fully developed catchment. The main itself must be sized to accommodate at least the 5% AEP event flows including climate change loading from a fully-developed catchment. Calculations and long-sections demonstrating this must extend upstream of the proposed realignment, demonstrating no significant reduction upstream of the works. The proposed stormwater network layout must be demonstrated to be as hydraulically efficient as practicable; 7. the pipe material and capacity must reflect the reduced access to the mains. 8. include a construction plan for the mains diversions, demonstrating how services to external land will be maintained and detailing trenching and dewatering methodology. The trenching plan must clearly demonstrate the proposed easement provides sufficient space and access to facilitate future repairs/ replacement after the development has been built. A digital recording of a CCTV inspection and written condition assessment report and site map must be submitted prior to Practical Completion. All work required by this condition must be undertaken in accordance with the approved detailed engineering drawings. *Advice: This condition requires further information to be submitted as a Condition Endorsement. Refer to the Condition Endorsement advice at the end of this permit.* *A permit to construct public infrastructure will be required, including a 12 month maintenance period, bonds and CCTVs.*	LUPAA 1993
9	SW 8 Prior to occupancy or the commencement of the approved use (whichever occurs first), stormwater pre-treatment for stormwater discharges from the development must be installed. A stormwater management report and design must be submitted and approved as a Condition Endorsement, prior to the issue of any approval under the Building Act 2016 or the commencement of work on the site (whichever occurs first). The stormwater management report and design must be prepared by a suitably qualified engineer and must either: 1. Include detailed design of the proposed treatment train, including final estimations of contaminant removal meeting the State Stormwater Strategy Targets and the supporting MUSIC model; and 2. Include a supporting maintenance plan, which specifies the required maintenance measures to check and ensure the ongoing effective operation of all systems, such as: inspection frequency; cleanout procedures; descriptions and diagrams of how the installed systems operate; details of the life of assets and replacement requirements. All work required by this condition must be undertaken and maintained in accordance with the approved stormwater management report and design. *OR* A cost estimate for the design, provision and installation of a system that meets the State Stormwater Strategy targets for the whole proposed development must be provided and agreed upon. A sum equivalent to the cost estimate is to be paid to the Council in accordance with Councils Stormwater Policy. If this option is selected the contribution must be paid prior to the issue of any approval under the Building Act 2016 or the commencement of work on the site (whichever occurs first). *Advice:* *This condition requires further information to be submitted as a Condition Endorsement. Refer to the Condition Endorsement advice at the end of this permit.* *Please submit the MUSIC model in a MUSIC-X compatible format via email.* *Council will accept a partial cost-contribution for this site. Some treatment of the basement carpark/ waste areas is required to capture gross pollutants and hydrocarbons.* *Council encourages the applicant to consider Water Sensitive Urban Design, such as harvesting roofwater for irrigation.*	LUPAA 1993

10	SW 11 - Stormwater - Inundation Prior to the commencement of use or completion of each stage (whichever occurs first), safe and adequate overland flow paths must be provided through the site to convey the flows for the 1% AEP (Annual Exceedance Probability) storm event as at 2100 (including climate change loading) with no adverse impact on third-party land. Detailed design drawings, report and supporting calculations for each stage prepared and certified by a suitably qualified and experienced Engineer that meet the above requirement must be submitted to and approved by Council as a Condition Endorsement prior to issue of any consent under the Building Act 2016 or commencement of works on site (whichever occurs first) for that stage. These must include (but are not limited to): 1. Certification from an accredited and qualified engineer that all proposed structures within the flood zones are designed to resist inundation, erosion, undermining and likely forces from a flood event. 2. Details of measures to prevent sediment transport and erosion from the inundated land. 3. Full detailed design of the final overland flow paths (eg swale, bunds/ walls, pipes, inlets, landscaping, and fencing) in general accordance with the reports and engineering plans lodged at Planning stage. 4. A revised flood study for the final engineering design, confirming no adverse impact on third-party land via afflux mapping. 5. Details of management of the flood zones including measures to prevent blockage of the overland flow paths. 6. A final Flood Management Summary Plan from a qualified and experienced person that outlines the obligations for future property owners to flood and overland flow management, including: ◦ The flood risk to the site, including depth, extent and hazard ratings for the 1% AEP at 2100 event; ◦ Identification of all measures to convey the overland flow path through the site and their maintenance, including noting no future works or landscaping which may alter the flow of water to be carried out without approval by Council. ◦ Identification of all flood management measures and their required maintenance, including but not limited to: landscaping, waterproofed basement levels, swale, bunds, pipes, walls (including if hydraulically permeable or flush), and signage. All work required by this condition must be undertaken and maintained in accordance with the approved drawings and report at the Owner's expense. *Advice: This condition requires further information to be submitted as a Condition Endorsement. Refer to the Condition Endorsement advice at the end of this permit.*	LUPAA 1993
11	SW 13 - Stormwater - Inundation The overland flow path and any flood mitigation measures must be inspected by a suitably qualified and accredited engineer. Certification from a suitably qualified and accredited engineer that the installation has been constructed in accordance with the approved certified design (including dimensions and grades of the swale and bunds, and final landscaping) must be provided to the City of Hobart prior to occupancy or commencement of use (whichever occurs first).	LUPAA 1993
12	Part 5 1 - Part 5 Agreement - New The owner(s) of the property must enter into an agreement with the Hobart City Council pursuant to Part 5 of the *Land Use Planning and Approvals Act 1993* prior to the issue of any approval under the *Building Act 2016* or the commencement of work on the site (whichever occurs first) The Agreement must: 1. prohibit any development, works or use of the land which alters the level of the land or interferes with the free flow of water within the identified overland flow path beyond that approved under this planning permit without the written permission of Council; 2. agree to maintain the overland flow path and comply with the approved Flood Management Summary Plan; 3. indemnify Council against any costs or claims arising from the works within the identified 1% AEP flood extent; 4. indemnify Council against any costs or claims arising from building over or within two metres of the Council's stormwater mains or for damages incurred in the act of performing operation, maintenance, or replacement tasks on the stormwater mains 5. not perform any future works to the structures within two metres of the main, including replacement of footings without written permission from Council 6. maintain any structures providing structural side support to Council infrastructure or the overland flow path. All costs for the preparation and registration of the Part 5 Agreement must be met by the owner. The owner must comply with the Part 5 Agreement which will be placed on the property title. *Advice: Please note the Flood Management Summary plan is that referred to in condition SW11. This will need to be submitted and approved prior to the Part 5.*	LUPAA 1993
13	SURV s1 - Survey - Easements Easements in favour of the Hobart City Council over all public stormwater mains and overland flow paths passing through the property at 48 to 52 New Town Road are to be created by transfer of easement in accordance with the Land Titles Act 1980, to the satisfaction of Council. These drainage easements must be created prior to the issue of any completion, occupancy, commencement of use or Practical Completion of the public infrastructure (whichever occurs first). *Advice:* *The applicant is to be responsible for all survey and legal costs involved in the registration of the drainage easements.* *A larger variable width easement is required over the New Town Rd stormwater main due to its depth. See Condition SW6.* *A non-standard easement will be required over the Clare St stormwater main and the private swale conveying flood flows.*	LUPAA 1993

Detailed Assessment

Detailed Assessment

CODE	Applicable	Exempt	Permitted	Discretionary

E7.0 Stormwater Management Code	Y	N		Y
E11.0 Waterway and Coastal Protection Code	N			
E15.0 Inundation Prone Areas Code	Y	N		Y
Protection of Infrastructure	Y			
Subdivision	N			

Stormwater Management Code

Clause E7.7.1	Discussion
A1/P1 – Disposal	A1 met - all stormwater to be drained by gravity to Council infrastructure
A2/P2 – Treatment	P2 met by condition. P2 is triggered due to both the size of fresh impervious area and the large basement carpark. Partial cost contribution proposed, along with some rainwater harvesting for irrigation and unspecified gross pollutant removal. Applicant acknowledges a base-level of treatment at the development site itself is required.
A3/P3 – Capacity	A3 met by condition. The immediate downstream Council main has been upgraded to take 5% flows. Further downstream infrastructure does not have capacity. The applicant will be relaying Council infrastructure- these must have 5% AEP capacity for the future fully-developed catchment. The applicant has proposed (but not detailed) rainwater harvesting and reuse, which will further reduce the loading on the existing infrastructure. A3a met by condition. The existing site has been agreed to be 72% impervious. The proposal is ~60% impervious, reducing flows from the site. A3b is therefore met.
A4/P4 – OFP	**Met - See inundation.**

Inundation Prone Areas Code (Riverine)

The title of 46 New Town shows a historical watercourse entering the main development ~1/3 down the shared boundary. Council's CARDNO modelling showed concentrated overland flow entering the site from multiple approaches, with some areas of ponding. A flood report was therefore requested.

Clause E7.7.1	Discussion
E15.6 A1/P1 – Use	N/A
E15.7.4 A1/P1 - New Building	New building built within identified 1%+CC flood path. Minor outbuildings such as the substation which currently block the flow path will be removed, and flood waters will be channeled into a new swale running behind the building. Private landscaping retaining walls (including a new cut of 777mm high on the boundary) will contain the flows, and the upgraded main will have grated pits to let the flow in. The flow path from New Town Rd was not found to enter the site in the more accurate modelling carried out by the applicant. Floor levels (basement carpark) will not be 300mm above the water level in this swale - A1 not met. P1 met. The risk to the site, (users and buildings) is low- whilst the freeboard is not achieved, there are no entrances to this basement carpark (so flood waters will be well excluded), and this floor does not contain habitable rooms. The flood modelling shows high hazard (H5) within the swale itself, which will be designed to withstand these flows. All other flood on the site is low hazard. The swale is largely in a landscaped area - only pedestrian risk is at the rear loading area. The modelling shows no additional risk to other land - the proposed swale will slightly reduce flood depths on third-party property. The swale will need to be maintained by the site owner, as part of the landscape maintenance, to reduce risk of blockage and maintain capacity. Given the semi-commercial strata nature of the building, this is much more likely to be done than for a single dwelling.
E15.7.4 A3/P3 - Outbuildings	N/A

E15.7.5 A1/P1 - Fill & wall	P1 met - Building walls >5m long will be built in the current flood zone - however future flows within the property will be directed to the proposed swale. Full details of the swale and works over/ near it are required at detailed design. Walls over swale will need to be hydraulically permeable (ie open at base) or flush, to not interfere with the flow of floodwaters. The modelling shows no adverse impact on neighbouring property. The walls themselves will not affect stormwater discharge rate nor quality. Floodwaters will be concentrated, but through a vegetated swale vs hardstand. The grassed swale should not pose a sediment source once established except in the largest floods, and stormwater treatment is proposed, a net improvement from previous hardstand area.
E15.7.4 A2/P2 - Extensions	N/A
E15.7.5 A2/P2 - Mitigation	P2 met- the concentration of the flow path in the swale greatly reduces the likelihood of floodwaters entering habitable rooms. Sea level rise will not affect the flood level, and climate change related rainfall intensity increase has been included in the modelling. The channelisation of flow through the site is not shown to adversely impact neighbouring private property.
E15.7.5 A3/P3 - Onsite Sewage	N/A
E15.8.3 A1/P1 - Subdivision	N/A

Protection of Council Infrastructure & Contaminated Site - drainage
The site is noted to have contaminated soil and groundwater. This groundwater is at roughly the level of the proposed carpark level. CMP doesn't really seem to address ag drains as a direct path to Maypole Riv. It does seem likely from the report that the fill and USPS, which will be removed, are the key sources of this contamination. CONDITION for clear statement. Maybe testing post removal?

Mains through the site will be diverted to be clear of the new building.
DN600 brick main from New Town Rd will be realigned under and along several tiered retaining walls. This introduces a 90o bend and flattens the system. Whilst a technical increase over the current DN375, it is a significant decrease from if Council replaced the DN375 on the current alignment. Council will not be able to easily upgrade this section in the future, so its capacity should be carefully compared to the new ARR climate change scenarios, and potential flooding looked at. Given depth in manholes, HGL may be significantly higher than Manings capacity.

The replacement Clare St main is shown as DN300 StormPro at only 0.67% grade. There does appear to be some scope to increase the grade whilst still maintaining the shown >500mm clearance from TasNetworks cable. The main runs in a nominal 3m easement - however the boundary wall intrudes into this setback, and the basement is shown 0.85m from the outside of the pipe. A pipe material which can be patch relined to extend its lifespan is therefore preferred. The size of this main should be considered to include allowance for reduction in internal diameter from future relining, and capacity to take additional overland flow/ flood waters. Main modelling was carried out with climate change loading included, as per Council's Policy.

Previous applications have proposed main realignment in 46 New Town, which necessitated realignment in 44 New Town. This is not proposed in this application. The realigned DN300 should still be designed to facilitate this in the future.

Conditions required:
ENG1
ENV2 +contaminated site
ENGsw1
SW1 pre (for both anything which remains, and identifying connections which will be replaced
SW2 post works CCTV + advice re combining with maintenance CCTV dep on timing
SW3 sections of new mains and swale vs building and walls
SW6 relocated mains, capacity including relining as <1m clearance, TasNetwork cables,
maintenance of service, upstream capacity not affected
SW8 treatment and rainwater tanks
SW11 OFP design & maintenance plan, bunds, inlet pits etc
SW13 confirm construction of OFP and flood mitigation to design levels and grades
s2 **easements by transfer** - note the depth means extra width required. Variable width, to be supported by trenching plan and associated accessibility requirements. Likely from building to boundary above the ret walls, back to more std below walls.

Part 5 maintain OFP / flood mitigation features, maintain supporting walls, access to mains

Recommended Advice:
s73/ 13 consent will be required
Permit to Construct will be required, including permission of landowners & bonds.

Additional Documents

No Documents.

Submitted on **10/12/2025**

Form published: 18/06/2024 15:50

ENVIRONMENTAL DEVELOPMENT PLANNER ASSESSMENT (2025-1231)

48-52 New Town Road (PLN-HOB-2024-0716)

Summary:

Code	Applicable	Exempt	Permitted	Discretionary
E1.0 Bushfire-Prone Areas	No			
E2.0 Potentially Contaminated Land	**Yes**	**No**	**No**	**Yes – E2.5 P1 & E2.6.2 P1**
E3.0 Landslide	No			
E9.0 Attenuation	No			
E10.0 Biodiversity	No			
E11.0 Waterway & Coastal	No			
E15.0 Inundation Prone Areas	**Yes – Refer to SWU assessment**			
E16.0 Coastal Erosion	No			
E18.0 Wind & Solar Energy	No			
E20.0 Acid Sulfate Soils	No			

Detailed Assessment:

Approval is sought for a mixed-use development at 48-52 New Town Road including:

- 23 multiple dwellings;
- 38 visitor accommodation units;
- a café;
- consulting rooms;
- a wellness centre including pool and gymnasium; and
- communal gardens/courtyards.

The buildings would have five levels with the lower ground floor containing a carpark, wellness centre, consulting room and mechanical plant. The ground floor would include the communal garden and courtyard, café, visitor accommodation and dwellings. The first, second and third floors would be dedicated to visitor accommodation and dwelling units.

Significant excavation of the site is required to construct the proposed lower ground floor.

Potentially Contaminated Land Code

The Code applies because development and sensitive use (residential) is proposed on potentially contaminated land.

No exemptions apply.

The relevant standards are under clauses E2.5 and E2.6.2.

With regard to E2.5, the application does not comply with acceptable solution A1 because the EPA Director or an approved person has not certified the land is suitable for the proposed use or approved a contamination management plan for the proposed use. Performance criterion P1 states the following:

Land is suitable for the intended use, having regard to:

(a) an environmental site assessment that demonstrates there is no evidence the land is contaminated; or

(b) an environmental site assessment that demonstrates that the level of contamination does not present a risk to human health or the environment; or

(c) a plan to manage contamination and associated risk to human health or the environment that includes:
(i) an environmental site assessment;
(ii) any specific remediation and protection measures required to be implemented before any use commences; and
(iii) a statement that the land is suitable for the intended use.

An Environmental Site Assessment (ESA) and Contamination Management Plan (CMP) were submitted with the application. The ESA identified contamination at the site that presents a potential risk to human health and the environment, so E2.5 P1(a) and (b) are not met. Findings of the ESA include:

- the site (48 New Town Road) was used as a service station from before 1957 to approximately 1970 and has hosted a number of underground and above-ground fuel storage tanks;
- soil contaminants including hydrocarbons and metals are present at the site that exceed NEPM ecological screening levels and ecological investigation levels;
- soil hydrocarbon contaminants are present at the site that exceed NEPM health screening levels for dermal contact;
- soil contaminants including hydrocarbons and lead are present at the site that exceed NEPM health investigation levels for dust inhalation and soil ingestion;
- indoor vapour intrusion risk from contaminated soil was not established;
- groundwater hydrocarbon contamination exists at the site however there is no indoor vapour risk for commercial land use which is proposed for the lower ground floor;
- elevated levels of cobalt and copper indicated that some metals in the fill are leaching into the groundwater;
- off-site migration of contaminated groundwater is unlikely to be occurring; and
- underground petroleum storage system infrastructure may still be present on the site.

Conclusions of the ESA include:

- the site assessment has confirmed that soil and groundwater at the site is contaminated and a Contamination Management Plan (CMP) will be required;
- once the CMP is put in place and recommendations are adhered to, the site will be suitable for the proposed use and redevelopment of the site;
- the proposed site redevelopment will involve the excavation of large volumes of fill from the site which will remove most of the contaminated material at site;
- it is anticipated that once the UPSS infrastructure is removed, any residual risk from hydrocarbons (TRH Fractions and naphthalene) in the groundwater will be eliminated; and
- elevated levels of lead and benzo(a)pyrene are present in the fill at the site and without adequate management may pose a risk to human health both onsite and offsite during development works to adjacent residents and commercial workers through dermal contact, dust inhalation and soil ingestion and may adversely impact the environment from sediment erosion into the waterways.

The recommendations of the ESA are:

- the UPSS Infrastructure should be decommissioned as soon as possible in accordance with the decommissioning regulations;
- a Contamination Management Plan is required and should include:
    - soil management including dust, wind, and water erosion in a Soil and Water Management Plan (SWMP);
    - consideration of the duration of stockpile exposure and physical barriers to stockpiles plus standard building site security fencing;
    - soil classification and management advice in accordance with the Environment Protection Authority's Information Bulletin #105;
    - management of contaminated groundwater at the site.
- All construction workers and trench workers should be informed of the site contamination during their site induction as identified within the CMP. The CMP should be made available to all contractors prior to the commencement of excavation works.

- The construction company undertaking the development should be provided with the soil sampling results, as this will assist with soil classification and disposal.

The ESA included the following Statement of Suitability:

The findings from this investigation confirm that soil and groundwater contamination is present at the site which does pose a potential risk to Human Health and the Environment. However, while the surface of the site is undisturbed there is no immediate risk to human or ecological receptors. Providing the following recommendations are implemented then the excavation and construction works will not adversely impact human health or the environment.

When the site is redeveloped and soil and groundwater is disturbed, the following site-specific management measures will be required including a Contamination Management Plan which will include a Soil and Water Management Plan. UPSS infrastructure will require removal in line with the Hobart City Councils planning requirements and EPA Tasmania's UPSS decommissioning Regulations. All excavated material will require waste classification in accordance with EPA Tasmania's IB105.

A Contamination Management Plan (CMP) was submitted with the application. The CMP is consistent with the recommendations of the ESA, however some clarifications and further detailing are required. A condition requiring the implementation of an amended CMP is recommended. The CMP includes a Soil and Water Management Plan (SWMP).

With regard to E2.6.2, there is no acceptable solution for A1. Performance criterion P1 states the following:

Excavation does not adversely impact on health and the environment, having regard to:

(a) an environmental site assessment that demonstrates there is no evidence the land is contaminated; or

(b) a plan to manage contamination and associated risk to human health and the environment that includes:
(i) an environmental site assessment;
(ii) any specific remediation and protection measures required to be implemented before excavation commences; and
(iii) a statement that the excavation does not adversely impact on human health or the environment.

An Environmental Site Assessment (ESA) and Contamination Management Plan (CMP) were submitted with the application. The CMP includes measures required to be implemented prior to, during and following excavation. The CMP includes a statement that the excavation will not adversely impact human health or the environment provided the CMP is implemented.

A condition is recommended requiring some clarifications and further detail in the CMP, and the final CMP to be implemented.

15.3.1 Non-Residential Use

Non-residential uses proposed include visitor accommodation, consulting rooms, a café and a wellness centre.

Acceptable solution A2 states the following:

Noise emissions measured at the boundary of the site must not exceed the following:

(a) 55 dB(A) (LAeq) between the hours of 8.00 am to 6.00 pm;

(b) 5dB(A) above the background (LA90) level or 40dB(A) (LAeq), whichever is the lower, between the hours of 6.00 pm to 8.00 am;

(c) 65dB(A) (LAmax) at any time.

Measurement of noise levels must be in accordance with the methods in the Tasmanian Noise Measurement Procedures Manual, issued by the Director of Environmental Management, including adjustment of noise levels for tonality and impulsiveness.

Noise levels are to be averaged over a 15 minute time interval.

The most significant noise emissions are expected to be from the pool, gymnasium and café.

A Noise Impact Assessment (NIA) was submitted with the application. The NIA indicates that noise modelling was carried out including equipment, vehicles, and activities on site as potential noise sources. Mechanical plant was included in the modelling, noting that much of this equipment would be serving residential uses as well as commercial uses. The modelling assumed that all mechanical plant would be operating continuously at maximum capacity, which is conservative as this is unlikely.

The noise modelling presented in the NIA indicates that the acceptable solution noise criteria are likely to be met for the daytime hours (8am – 6pm).

The noise modelling indicates that the acceptable solution noise criteria may not be met for night time hours at the boundaries of 3 and 5 Seymour Street, where noise levels from the site are predicted to be up to 43dB(A) Leq. A 3dB(A) difference in noise levels is just noticeable to the human ear. The NIA indicates that night time noise levels at this boundary are controlled by a combination of mechanical plant noise and the café (outdoor patrons and background music). The NIA includes recommendations for louvres for the wellness centre plant room to reduce noise emissions from mechanical plant and recommends that outdoor music be prohibited during night time hours. The NIA predicts that overall noise emissions would not exceed 40dB(A) at the residential boundaries if the measures are implemented.

The NIA includes the following recommendations:

- All commercial vehicles are to access site during the daytime only and within the following hours: 7:00AM to 5:00PM Monday to Friday, 8:00AM to 5:00PM Saturday, and 9:00AM to midday Sundays and public holidays. This includes deliveries, servicing, grounds maintenance, or otherwise.
- The louvres for the carpark supply air fans are required to have a minimum manufacturer rated sound reduction of Rw 26.
- If the wellness centre plant room is to have louvres facing the residential boundary, the louvres are to have a minimum manufacturer rated sound reduction of Rw 29.
- Line of sight between mechanical plant units and the residential boundary should be minmised as much as is practicable.
- Outdoor music associated with the cafe must occur within daytime hours (8:00AM to 6:00PM).
- All apartments facing New Town Road are to have minimum 6.38mm laminated single glazing, or 6 mm float glass / 12 mm gap / 6 mm float glass double glazing [this recommendation relates to acceptable solution 15.4.8 A4].

Conditions are recommended requiring implementation of the NIA recommendations.

Acceptable solution A4 states the following:

Commercial vehicle movements, (including loading and unloading and garbage removal) to or from a site must be limited to within the hours of:
(a) 7.00 am to 5.00 pm Mondays to Fridays inclusive;
(b) 8.00 am to 5.00 pm Saturdays;
(c) 9.00 am to 12 noon Sundays and Public Holidays.

The submitted NIA and planning report state that all commercial vehicle movements are proposed to occur within the acceptable solution hours. A condition requiring compliance with the acceptable solution hours is recommended.

15.4.8 Residential Amenity

Acceptable solution A4 states the following:

Habitable rooms of dwellings adjacent to streets carrying more than 6000 vehicle per day must be designed to achieve internal noise levels no more than 45 dBa in accordance with relevant Australian Standards for acoustics control, (including AS3671 - Road Traffic, and AS2107 - Habitable Rooms).

The submitted NIA includes the following findings and conclusions:

- Achieving the recommended noise levels within AS2107 also achieves the requirements of AS3671.
- AS2107 specifies maximum internal noise levels of 45 dB(A) for living areas and 40dB(A) for sleeping areas.
- Assuming rammed earth walls of 250mm thickness and laminated glazing of 6.38mm, internal noise levels of the apartments closest to New Town Road would be 40dB(A), complying with AS2107 and with the acceptable solution.

A condition is recommended requiring the apartments facing New Town Road to have laminated glazing of at least 6.38mm, unless an alternative construction design is adopted that will ensure internal noise levels do not exceed 45dB(A) Leq as specified by a suitably qualified acoustic engineer.

Subject to this condition the application is considered compliant with 15.4.8 A1.

Construction Management

The main construction management issues for the development are noise and contamination management (including soil and water management). A condition is recommended requiring the implementation of a Council approved Construction Environmental Management Plan that includes a construction noise management plan and a copy of the final, approved Contamination Management Plan.

Representations

Issue Raised	Response
The service access from Clare Street and the pump room for the pool/gym will add additional noise for residents.	Commercial vehicle movements are proposed to comply with the acceptable solution hours specified in 15.3.1 A4 so are deemed to be acceptable with regard to impacts on residential amenity under the relevant scheme provisions. Acoustic louvres for the pool plant room will be required as a condition of approval. The submitted Noise Impact Assessment indicates that subject to the acoustic louvres and other noise mitigation recommendations being implemented, commercial noise emissions will comply with the acceptable solution noise levels specified in 15.3.1 A2, so are deemed to be acceptable with regard to impacts on residential amenity under the relevant scheme provisions.

Concern about the extent of excavation of land that is potentially contaminated.	The submitted Environmental Site Assessment identifies potential risks to human health and the environment from excavation of the contaminated soil, but concludes that risks can be mitigated to acceptable levels with implementation of the submitted Contamination Management Plan.
Residents, schools and businesses nearby need to be protected from airbourne hazards with community warnings and protection procedures for at least a 1km radius.	It is unclear exactly what is being recommended here due to the lack of detail. However, the ESA indicates that human health impacts will be avoided with implementation of the dust control measures included in the CMP.

Recommended Conditions:

Refer to ENV conditions

Recommended Advice:

N/A