Submission to Planning Authority Notice

Council Planning Permit No.	PLN-18-770	Council notice date	30/10/2018

TasWater details

TasWater Reference No.	TWDA 2018/01768-HCC		Date of response	14/12/2018
TasWater Contact	Anthony Cengia	Phone No.	(03) 6237 8243	

Response issued to

Council name	HOBART CITY COUNCIL
Contact details	coh@hobartcity.com.au

Development details

Address	209-213 HARRINGTON ST, HOBART	Property ID (PID)	5665239
Description of development	Residential Apartment and Retail Complex (52394/1, 52395/1, 232390/1, 203787/1, 197488/1 & 247958/1)		

Schedule of drawings/documents

Prepared by	Drawing/document No.	Revision No.	Date of Issue
6ty°	17.275 Sheets Ap01, Ap02, Ap05, Ap06, Ap07		06/12/2018
6ty°	17.275 Sheets Ap03, Ap09, Ap10, Ap11, Ap12	A	06/12/2018
6ty°	17.275 Sheets Ap03	B	06/12/2018

Conditions

SUBMISSION TO PLANNING AUTHORITY NOTICE OF PLANNING APPLICATION REFERRAL

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

CONNECTIONS, METERING & BACKFLOW

1. A suitably sized water supply with metered connections / sewerage system and connection to the development must be designed and constructed to TasWater's satisfaction and be in accordance with any other conditions in this permit.

   Advice: TasWater will not accept direct fire boosting from the network unless it can be demonstrated that the periodic testing of the system will not have a significant negative effect on our network and the minimum service requirements of other customers serviced by the network. To this end break tanks may be required with the rate of flow into the break tank controlled so that peak flows to fill the tank do not also cause negative effect on the network.

2. Any removal/supply and installation of water meters and/or the removal of redundant and/or installation of new and modified property service connections must be carried out by TasWater at the developer's cost.

3. Prior to commencing construction/use of the development, any water connection utilised for construction/the development must have a backflow prevention device and water meter installed, to the satisfaction of TasWater.

TRADE WASTE

4. Prior to the commencement of operation the developer/property owner must obtain Consent to discharge Trade Waste from TasWater.

5. The developer must install appropriately sized and suitable pre-treatment devices prior to gaining Consent to discharge.

6. The Developer/property owner must comply with all TasWater conditions prescribed in the Trade Waste Consent.

INFRASTRUCTURE WORKS

7. Plans submitted with the application for Certificate(s) for Certifiable Work (Building and/or Plumbing) / Engineering Design Approval must, to the satisfaction of TasWater show, all existing, redundant and/or proposed property services and mains.
    a. Where 31 or more apartments are connected to the TasWater sewer system this minimum DN150mm connection must be to a suitable sewer maintenance structure; *Advice: Review standard Plan MRWA-S-104A*

8. The application for Certificate(s) for Certifiable Work (Building and/or Plumbing) / Engineering Design Approval must include engineering design plans prepared by a suitably qualified person showing the hydraulic servicing requirements for water and sewerage to TasWater's satisfaction.

9. The developer must take all precautions to protect existing TasWater infrastructure. Any damage caused to existing TasWater infrastructure during the construction period must be promptly reported to TasWater and repaired by TasWater at the developer's cost.

FINAL PLANS, EASEMENTS & ENDORSEMENTS

10. Prior to the Sealing of the Final Plan of Survey, a Consent to Register a Legal Document must be obtained from TasWater and the certificate must be submitted to the Council as evidence of compliance with these conditions when application for sealing is made.

DEVELOPMENT ASSESSMENT FEES

11. The applicant or landowner as the case may be, must pay a development assessment and Consent to Register a Legal Document fee to TasWater, as approved by the Economic Regulator and the fees will be indexed, until the date they are paid to TasWater, as follows:
    a. $1,139.79 for development assessment; and
    b. $149.20 for Consent to Register a Legal Document

The payment is required within 30 days of the issue of an invoice by TasWater.

Advice

General

For information on TasWater development standards, please visit http://www.taswater.com.au/Development/Development-Standards

For application forms please visit http://www.taswater.com.au/Development/Forms

Water Connection

This proposed development is in the Hobart City Low Level zone supplied from the Domain reservoirs with a top water level (TWL) of 106m AHD. The proposed connection point from the DN150 CICL main in Harrington is an approximate elevation of 33m. With the flows specified the total boundary heads at this point are:

	Total boundary head (m)
Domestic demand	87

Domestic+10 L/s Fire	87

It should be noted that these are the boundary heads in the water main itself at the proposed connection point and do not include losses through the actual connection or associated pipework

Service Locations

Please note that the developer is responsible for arranging to locate the existing TasWater infrastructure and clearly showing it on the drawings. Existing TasWater infrastructure may be located by a surveyor and/or a private contractor engaged at the developers cost to locate the infrastructure.

- A permit is required to work within TasWater's easements or in the vicinity of its infrastructure. Further information can be obtained from TasWater
- TasWater has listed a number of service providers who can provide asset detection and location services should you require it. Visit www.taswater.com.au/Development/Service-location for a list of companies
- TasWater will locate residential water stop taps free of charge
- Sewer drainage plans or Inspection Openings (IO) for residential properties are available from your local council.

Trade Waste

Prior to any Building and/or Plumbing work being undertaken, the applicant will need to make an application to TasWater for a Certificate for Certifiable Work (Building and/or Plumbing). The Certificate for Certifiable Work (Building and/or Plumbing) must accompany all documentation submitted to Council. Documentation must include a floor and site plan with:

Location, type and if applicable, volume, of all pre-treatment devices as specified within and that satisfy the requirements of the Commercial Customers Pre-treatment Guidelines which is available from www.TasWater.com.au

Plumbing layout showing all fixtures connected to sewer and the pre-treatment; and

Note to specify basket strainers will be fitted to floor wastes, wash-up and food prep sinks; and

Location of an accessible trade waste sampling point; and

Location of a hose tap within 6m of any grease arrestor/s to facilitate of cleaning the pre-treatment device. Backflow protection is required as per the relevant Australian Standard.

Details of the types of food that will be prepared and estimated number of meals on a daily basis.

At the time of submitting the Certificate for Certifiable Work (Building and/or Plumbing) a Trade Waste Application form is also required; available from http://www.taswater.com.au/Your-Account/Forms

If the nature of the business changes or the business is sold, TasWater is required to be informed in order to review the pre-treatment assessment.

For more information: http://www.taswater.com.au/Customers/Liquid-Trade-waste/Commercial

Declaration

The drawings/documents and conditions stated above constitute TasWater's Submission to Planning Authority Notice.

Authorised by

Jason Taylor

Development Assessment Manager

TasWater Contact Details			
Phone	13 6992	Email	development@taswater.com.au
Mail	GPO Box 1393 Hobart TAS 7001	Web	www.taswater.com.au

Planning: #164687

Property

209-213 HARRINGTON STREET HOBART TAS 7000

People

Applicant
*
6ty Pty Ltd

PO Box 63
RIVERSIDE TAS 7250
0363323300
gwalker@6ty.com.au

Owner
*
Chau Nominees

149 Macquarie Street
HOBART TAS 7000
0409311556
steve@verdant.com.au

Entered By
GEORGE WALKER
6332 3300
gwalker@6ty.com.au

Use

Cafe

Details

Have you obtained pre application advice?

- ☐ No

If YES please provide the pre application advice number eg PAE-17-xx

Are you applying for permitted visitor accommodation as defined by the State Government Visitor Accommodation Standards? Click on help information button for definition. If you are not the owner of the property you MUST include signed confirmation from the owner that they are aware of this application.
*

- ☐ No

Is the application for SIGNAGE ONLY? If yes, please enter $0 in the cost of development, and you must enter the number of signs under Other Details below.
*

- ☐ No

If this application is related to an enforcement action please enter Enforcement Number

Details

What is the current approved use of the land / building(s)?
*

Car Parking + Business and Professional Services

Please provide a full description of the proposed use or development (i.e. demolition and new dwelling, swimming pool and garage)
*

Please Refer to Planning Submission

Estimated cost of development
*

6000000.00

Existing floor area (m2)	Proposed floor area (m2)	Site area (m2)

Carparking on Site

Total parking spaces	Existing parking spaces	N/A
		☐ Other (no selection chosen)

Hours of Business

Are the proposed hours of business different from the existing?
-

What days and hours of operation are proposed for the business?

Existing **Proposed**

	From	To		From	To
Monday to Friday			Monday to Friday		
Saturday			Saturday		
Sunday			Sunday		

Number of Employees

List the total number of people who will be working on the site.

Proposed number of employees	Existing number of employees

Goods Deliveries

Will there be any commercial vehicles accessing the site?
-

Type of Vehicle	Trips per Week
Very Large (Semi trailer)	
Large	
Medium	
Small	

Outdoor storage / seating / number of beds

Is outdoor storage proposed?
-

Other Details

Does the application include signage?
*

☐ No

How many signs, please enter 0 if there are none involved in this application?
*

0

Tasmania Heritage Register

Is this property on the Tasmanian Heritage Register?

-

Documents

Required Documents

Title (Folio text and Plan and Schedule of Easements)
*
Appendix A - Titles.pdf

Plans (proposed, existing)
*
Appendix B - Development Plans.pdf

Covering Letter
17.275 - Cover Letter - October 2018.pdf

Supporting Documents

Archaeological Report
Appendix E - SoHAP.pdf

Planning Report
17.275 - Planning Submission - October 2018.pdf

environmental site assessment
Appendix D - Environmental Site Assessment.pdf

City of HOBART

Enquiries to: Emily Burch
☎: (03) 6238 2108
✉: coh@hobartcity.com.au
Our Ref: R0554; R0743 (F18/128282)
EB:SLW
DA-18-59549

27 November 2018

Mr George Walker
6ty°
Tamar Suite 103, The Charles
287 Charles Street
LAUNCESTON TAS 7250

Via Email: gwalker@6ty.com.au

Dear Mr Walker

NOTICE OF LAND OWNER CONSENT TO LODGE A PLANNING APPLICATION

Site Address:	**Harrington Street and Patrick Street Highway Reservations at 209-215 Harrington Street, Hobart**
Description of Proposal:	**Awnings over Harrington Street and Patrick Street**
Applicant Name:	**Mr George Walker – 6ty°**
PLN *(if applicable)*:	**N/A**

I write to advise that pursuant to Section 52 of the *Land Use Planning and Approvals Act 1993*, I grant my consent on behalf of the Hobart City Council as the owner/administrator of the above land for you to make application to the City for a planning permit for the development described above and as per the attached documents.

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 or as the owner/administrator of the land.

Yours sincerely

(N. D. Heath)
GENERAL MANAGER

Attachments:	Site Plan Ap03 and Elevation Plan Ap10 by 6ty° Land Owner Consent Memo

City *of* **HOBART**

R0554; R0743
EB:SLW
DA-18-59549

LAND OWNER CONSENT TO LODGE A PLANNING APPLICATION

Site Address: **Harrington Street and Patrick Street Highway Reservations at 209-215 Harrington Street, Hobart**

Description of Proposal: **Awnings over Harrington Street and Patrick Street**

Applicant Name: **Mr George Walker – 6ty°**

PLN *(if applicable)*: **N/A**

The land indicated above is owned or is administered by the Hobart City Council.

The applicant proposes to lodge an application for a permit, pursuant to the *Land Use Planning and Approvals Act 1993,* in respect to the proposal described above.

Part or all of the application proposes use and/or development on land owned or administered by the City located at Harrington Street and Patrick Street as shown on the attached plans.

Being and as General Manager of the Hobart City Council, I provide written permission to the making of the application pursuant to Section 52(1B)(b) of the *Land Use Planning and Approvals Act 1993.*

(N. D. Heath)
GENERAL MANAGER

Date: 26/11/18

This consent is for the making of a planning application only, and does not constitute landlord consent for the development to occur.

Attachments/Plans: Site Plan Ap03 and Elevation Plan Ap10 by 6ty°

6ty°

Postal Address
PO Box 63
Riverside
Tasmania 7250
W 6ty.com.au
E admin@6ty.com.au

Tamar Suite 103
The Charles
287 Charles Street
Launceston Tasmania
P (03) 6332 3300

57 Best Street
Devonport Tasmania
P (03) 6424 7161

6ty Pty Ltd
ABN 27 014 609 900

Architectural
ABP No. CC4874I
Structural / Civil
ABP No. CC1833I

APPROVED COMPANY
ISO 9001
Quality
Management Systems
QMS Certification Services

SITE BREAKDOWN

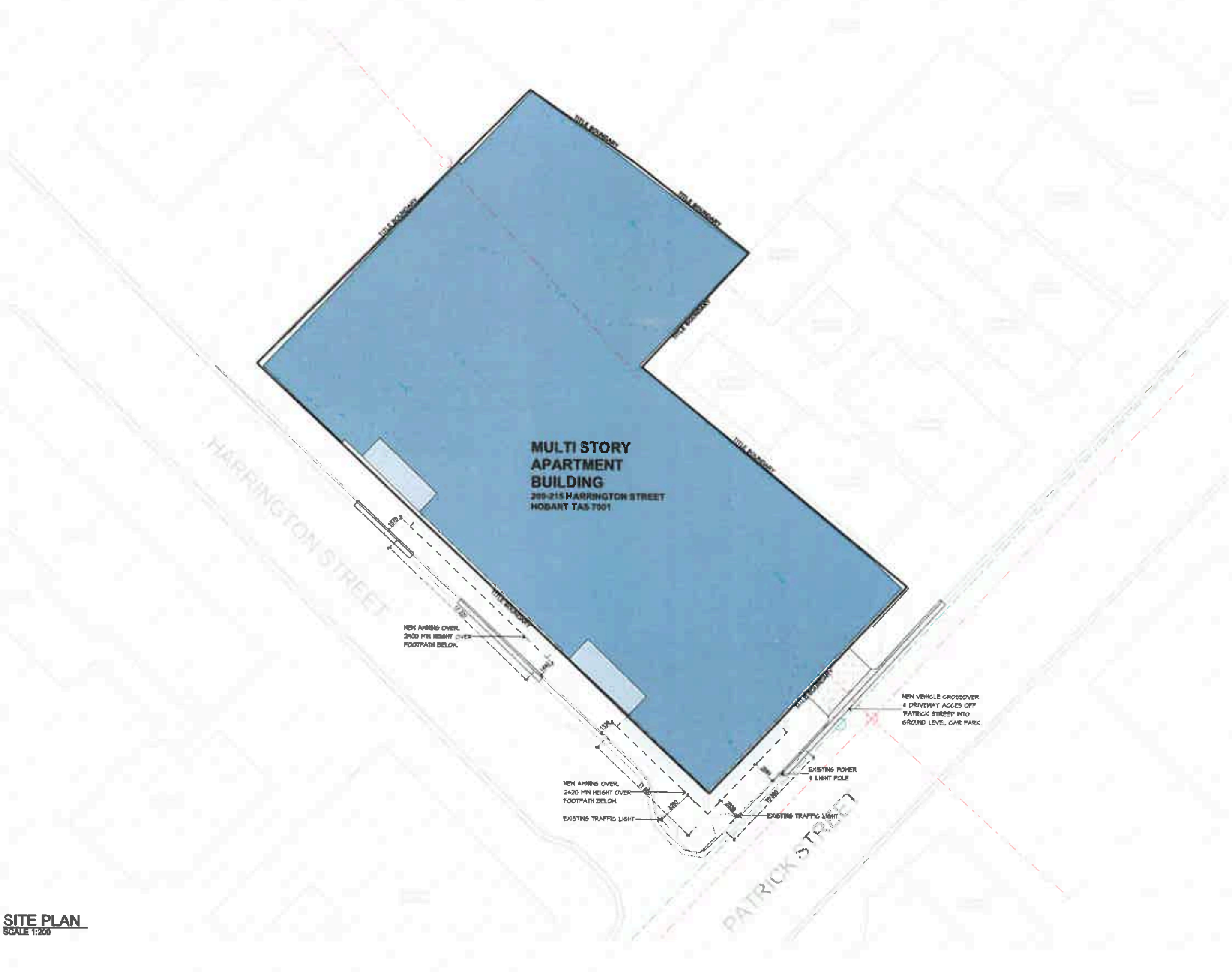
AREAS

SITE:	1795m²
GROUND FLOOR:	1629m²
FIRST FLOOR:	1362m²
BALCONY:	204m²
SECOND FLOOR:	1362m²
BALCONY:	161m²
THIRD FLOOR:	1362m²
BALCONY:	161m²

APARTMENT BREAKDOWN

FIRST FLOOR	
1 BED APARTMENTS:	3
2 BED APARTMENTS:	9
3 BED APARTMENTS:	1
TOTAL:	13
SECOND FLOOR	
1 BED APARTMENTS:	3
2 BED APARTMENTS:	9
3 BED APARTMENTS:	1
TOTAL:	13
THIRD FLOOR	
1 BED APARTMENTS:	3
2 BED APARTMENTS:	9
3 BED APARTMENTS:	1
TOTAL:	13

CARPARKING
35 SPACES
1 ACCESS SPACE
13 BIKE CAGES



SITE PLAN
SCALE 1:200

PLANNING DOCUMENT

ISSUE	DATE	ISSUED FOR	REV.
01	06.10.18	DEVELOPMENT APPLICATION	
02	07.11.18	AWNING DIMENSIONS ADDED	

TRUE NORTH

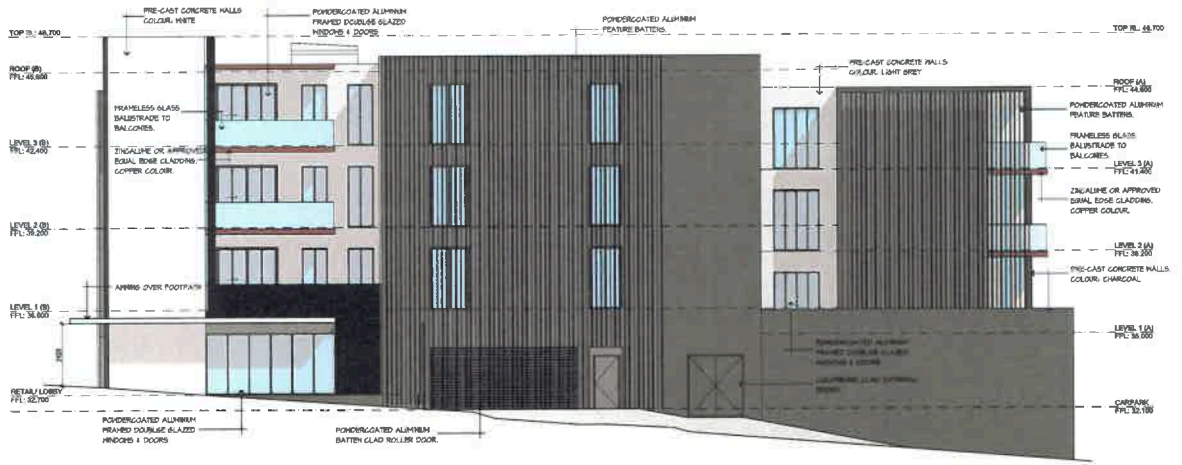
DIMENSIONS ARE IN MILLIMETRES. DO NOT SCALE. CHECK AND VERIFY ALL DIMENSIONS ON SITE. REFER DISCREPANCIES TO THE SUPERINTENDENT. ALL WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH: BUILDING CODE OF AUSTRALIA. APPLICABLE AUSTRALIAN STANDARDS & LOCAL AUTHORITY REQUIREMENTS.

PROJECT HARRINGTON STREET
APARTMENTS
AT 209-215 HARRINGTON ST
HOBART TAS
FOR CHAU NOMINEES PTY LTD

DRAWING SITE PLAN

DESIGNED DVG DRAWN ADB CHECKED:
SCALES 1:200 AT A1 SIZE DRAWING SHEET

PROJECT No. 17.275 DRAWING No. Ap03 REV. -



SOUTH/ EAST ELEVATION
SCALE 1:100

SOUTH/ WEST ELEVATION
SCALE 1:100

6ty°

Postal Address
PO Box 63
Riverside
Tasmania 7250
W 6ty.com.au
E admin@6ty.com.au

Tamar Suite 103
The Charles
287 Charles Street
Launceston Tasmania
P (03) 6332 3300

57 Best Street
Devonport Tasmania
P (03) 6424 7161

6ty Pty Ltd
ABN 27 014 609 900

Architectural
ABP No. CC4674I
Structural / Civil
ABP No. CC1633I

APPROVED COMPANY
ISO 9001
Quality
Management Systems
QMS

PLANNING DOCUMENT

ISSUE	DATE	ISSUED FOR	REV.
01	05.10.18	DEVELOPMENT APPLICATION	-
02	07.11.18	AWNING DIMENSIONS ADDED	-

DIMENSIONS ARE IN MILLIMETRES. DO NOT SCALE. CHECK AND VERIFY ALL DIMENSIONS ON SITE. REFER DISCREPANCIES TO THE SUPERINTENDENT. ALL WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH: BUILDING CODE OF AUSTRALIA, APPLICABLE AUSTRALIAN STANDARDS & LOCAL AUTHORITY REQUIREMENTS.

PROJECT. HARRINGTON STREET
APARTMENTS
AT 209-215 HARRINGTON ST
HOBART TAS

DRAWING ELEVATIONS

DESIGNED: DVG DRAWN: ADB CHECKED: DVG
SCALES. 1:100 AT A1 SIZE DRAWING SHEET

PROJECT No. 17.275 DRAWING No. Ap10 REV. -

RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
52394	1
EDITION	DATE OF ISSUE
8	10-Jul-2017

SEARCH DATE : 11-Nov-2017
SEARCH TIME : 02.58 PM

DESCRIPTION OF LAND

City of HOBART
Lot 1 on Diagram 52394
Derivation : Part of 0A-0R-24Ps Granted to R. Everett
Prior CT 4835/42

SCHEDULE 1

M639371 TRANSFER to CHAU NOMINEES PTY LTD Registered 10-Jul-2017 at noon

SCHEDULE 2

Reservations and conditions in the Crown Grant if any

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

OS-K 3910

Owner: L.T.ACT 1980

Title Reference: A.10007

Grantee: PART OF 0-0-24 GTD. TO ROBERT EVERETT.

PLAN OF TITLE

of land situated in the

CITY OF HOBART
SEC Ww

COMPILED FROM 37/84 D. O.

SCALE 1: 250 MEASUREMENTS IN METRES

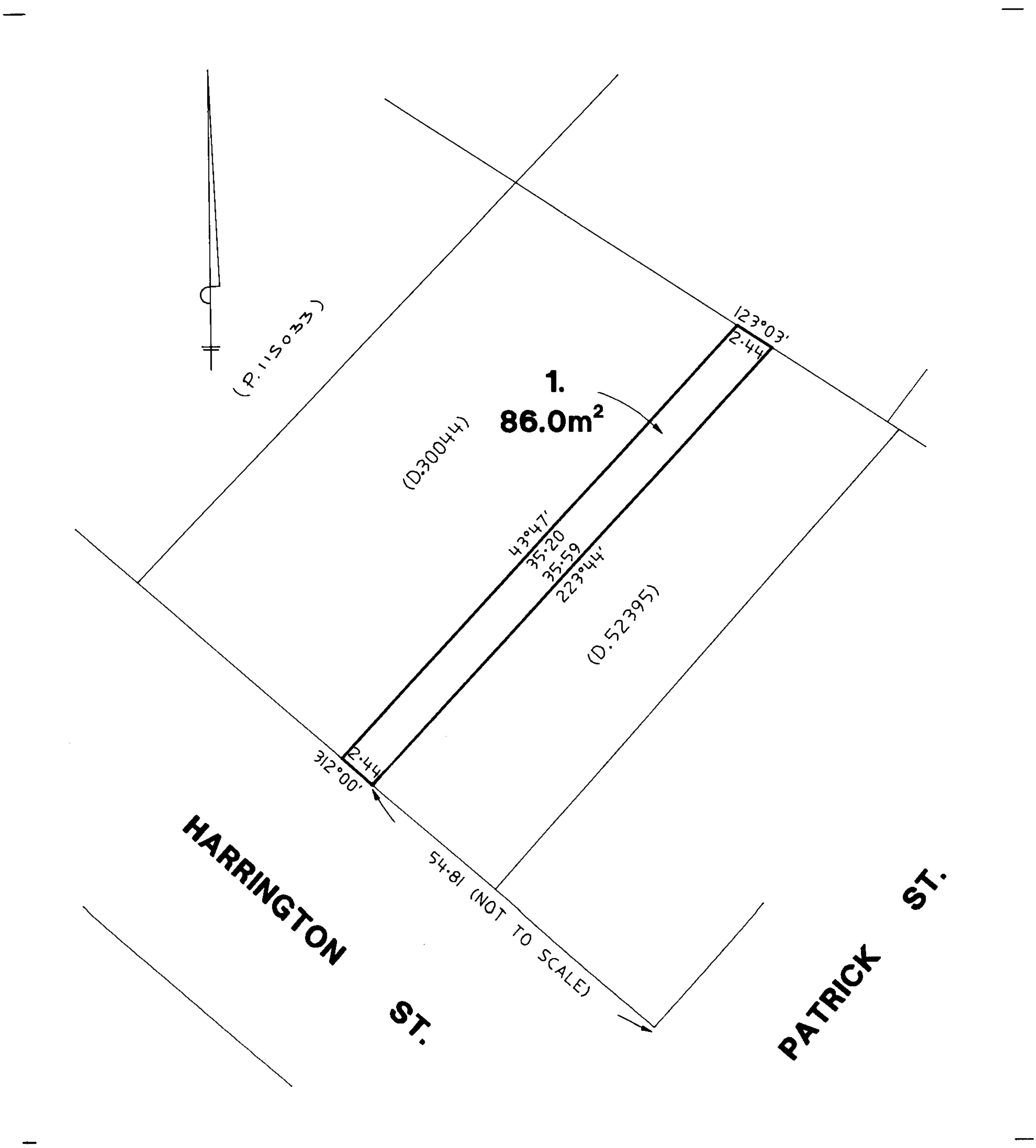
Registered Number:

D.52394

2 DEC 1991

Approved

Recorder of Titles



RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
52395	1
EDITION	DATE OF ISSUE
8	10-Jul-2017

SEARCH DATE : 11-Nov-2017
SEARCH TIME : 02.57 PM

DESCRIPTION OF LAND

City of HOBART
Lot 1 on Diagram 52395
Derivation : Part of 0A-0R-13.1/2Ps Granted to J. Palsley
Prior CT 4835/43

SCHEDULE 1

M639371 TRANSFER to CHAU NOMINEES PTY LTD Registered 10-Jul-2017 at noon

SCHEDULE 2

Reservations and conditions in the Crown Grant if any

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

OS-K 3910

Owner: L.T.ACT 1980

Title Reference: A.10007

Grantee: WHOLE OF 0-0-13½ GTD. TO JOHN PALSLEY.

PLAN OF TITLE

of land situated in the

CITY OF HOBART

SEC Ww

COMPILED FROM **S.B.P28 L.O.**

SCALE 1: **250** MEASUREMENTS IN METRES

Registered Number:

D.52395

Approved - 2 DEC 1991

Recorder of Titles

RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
197488	1
EDITION	DATE OF ISSUE
5	10-Jul-2017

SEARCH DATE : 11-Nov-2017
SEARCH TIME : 02.53 PM

DESCRIPTION OF LAND

City of HOBART
Lot 1 on Plan 197488
Derivation : part of 31.1/2Ps, Section Ww Gtd to H Wright & Anor
Prior CT 2073/49

SCHEDULE 1

M639371 TRANSFER to CHAU NOMINEES PTY LTD Registered 10-Jul-2017 at noon

SCHEDULE 2

Reservations and conditions in the Crown Grant if any
BENEFITING EASEMENT: a right of carriageway over the land marked "Roadway" on Plan No. 197488

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

OWNER

FOLIO REFERENCE FR 2073/49

GRANTEE

PLAN OF TITLE

LOCATION

CITY OF HOBART
(SEC. Ww)

FIRST SURVEY PLAN No. 5/44 HOB

COMPILED BY LTO

SCALE 1:125

LENGTHS IN METRES

Registered Number

P197488

APPROVED 12 DEC 1996

Recorder of Titles

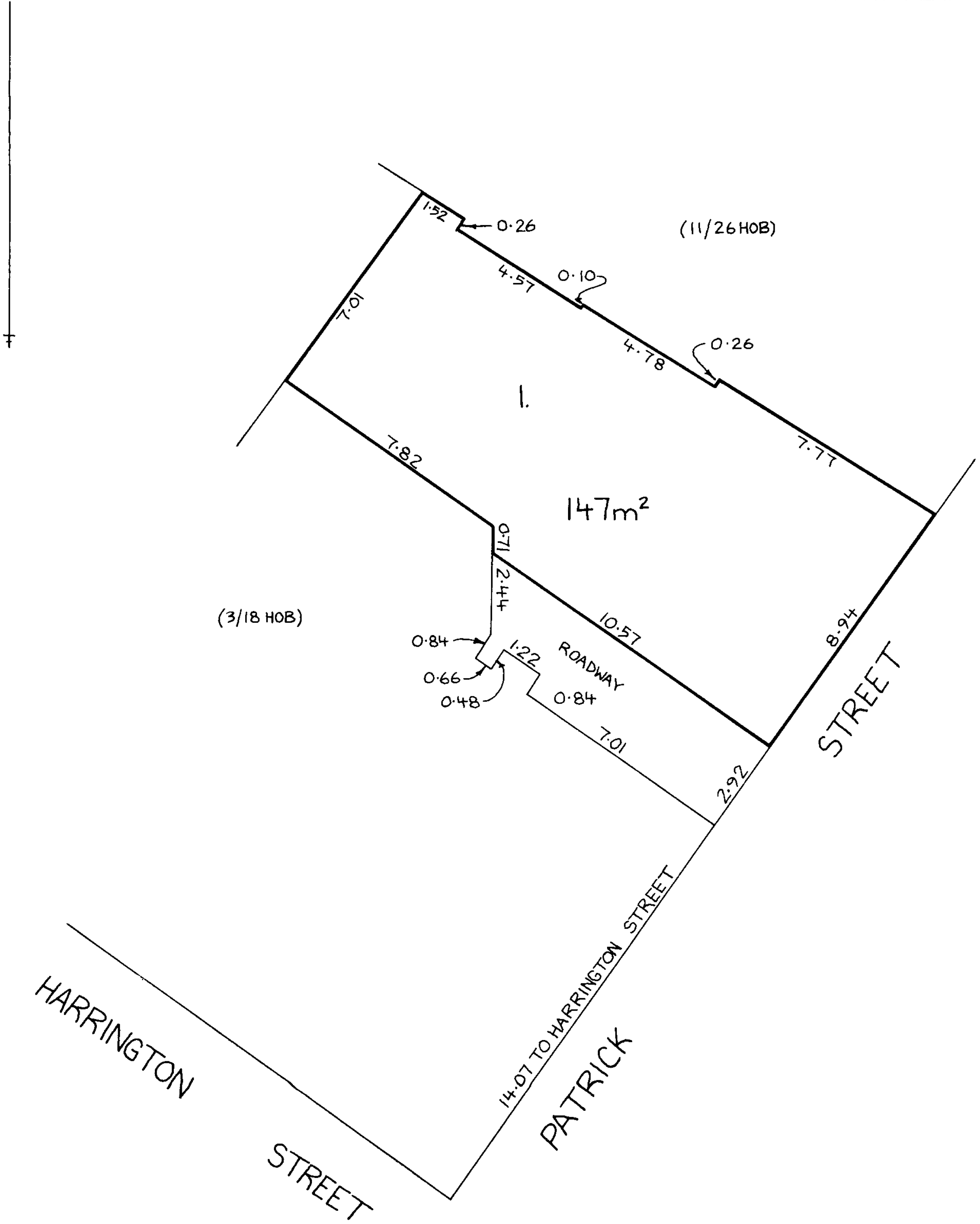
MAPSHEET MUNICIPAL CODE No. 114

LAST UPI No

LAST PLAN No. 5/44 HOB

ALL EXISTING SURVEY NUMBERS TO BE CROSS REFERENCED ON THIS PLAN

BALANCE PLAN



A-143

RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
203787	1
EDITION	DATE OF ISSUE
5	10-Jul-2017

SEARCH DATE : 11-Nov-2017
SEARCH TIME : 02.56 PM

DESCRIPTION OF LAND

City of HOBART
Lot 1 on Plan 203787
Derivation : Portion of 31 1/2P Sec. W.w. Gtd. to H. Wright & Anr.
Prior CT 2262/54

SCHEDULE 1

M639371 TRANSFER to CHAU NOMINEES PTY LTD Registered 10-Jul-2017 at noon

SCHEDULE 2

Reservations and conditions in the Crown Grant if any

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

54

ORIGINAL – NOT TO BE REMOVED FROM TITLES OFFICE

12294 03

TASMANIA

REAL PROPERTY ACT, 1862, as amended

CERTIFICATE OF TITLE

Register Book
Vol. Fol.
2262 54

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.

~~Witness~~

Recorder of Titles.

RECORDER OF TITLES TASMANIA

DESCRIPTION OF LAND

CITY OF HOBART
TWELVE PERCHES AND SEVEN TENTHS OF A PERCH on the Plan hereon.

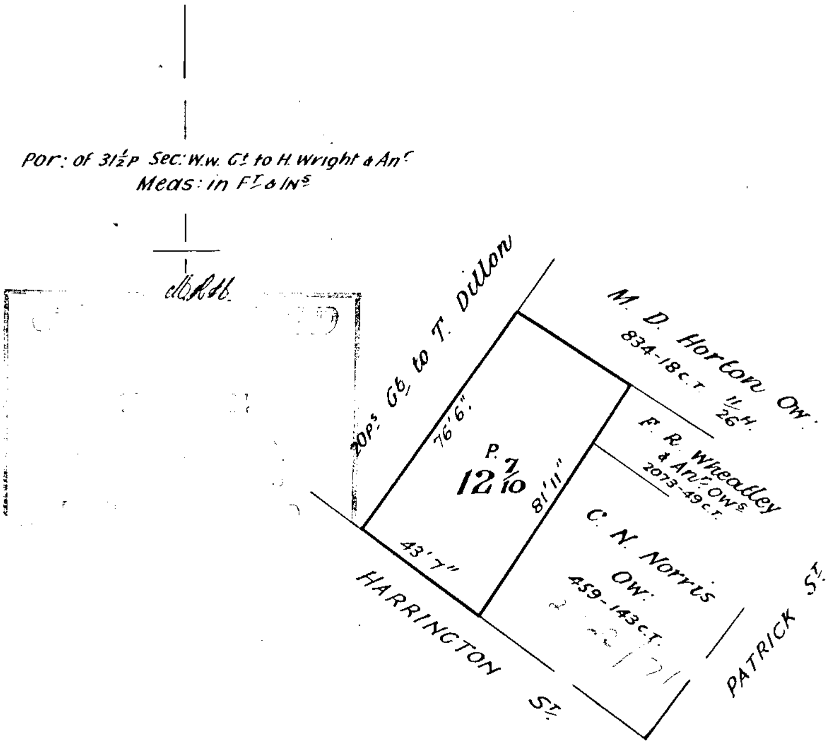
FIRST SCHEDULE (continued overleaf)

NEIL BERG BASSTIAN of Sandy Bay, Tyre Retreader.

ENTRY CANCELLED
Recorder of Titles

SECOND SCHEDULE (continued overleaf)

NIL



1st Edition. Registered 25 AUG 1967
Derived from C.T. Vol. 238 Fol. 99 Application Sec. 80 11910 R.P.

RE OF THE RECORDER OF TITLES ARE NO LONGER SUBSISTING.

REGISTERED NUMBER
203787

Lot 1 of this plan consists of all the land comprised in the above-mentioned cancelled folio of the Register

RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
232390	1
EDITION	DATE OF ISSUE
8	10-Jul-2017

SEARCH DATE : 11-Nov-2017
SEARCH TIME : 02.56 PM

DESCRIPTION OF LAND

City of HOBART
Lot 1 on Plan 232390
Derivation : Whole of 20Ps. in (Section W.w.) Gtd. to T. Dillon
Prior CT 3190/3

SCHEDULE 1

M639371 TRANSFER to CHAU NOMINEES PTY LTD Registered 10-Jul-2017 at noon

SCHEDULE 2

Reservations and conditions in the Crown Grant if any

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

ORIGINAL – NOT TO BE REMOVED FROM TITLES OFFICE

R.P. 1469
TASMANIA
REAL PROPERTY ACT, 1862, as amended
NOTE—REGISTERED FOR OFFICE
CONVENIENCE TO REPLACE

CERTIFICATE OF TITLE

Register Book
Vol. Fol.
3190 3

Cert. of Title Vol. 691 Fol. 12.

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 PERCHES on the Plan hereon.

FIRST SCHEDULE (continued overleaf)

ELLA MILLIE MYRA LUCAS of Hobart, Widow

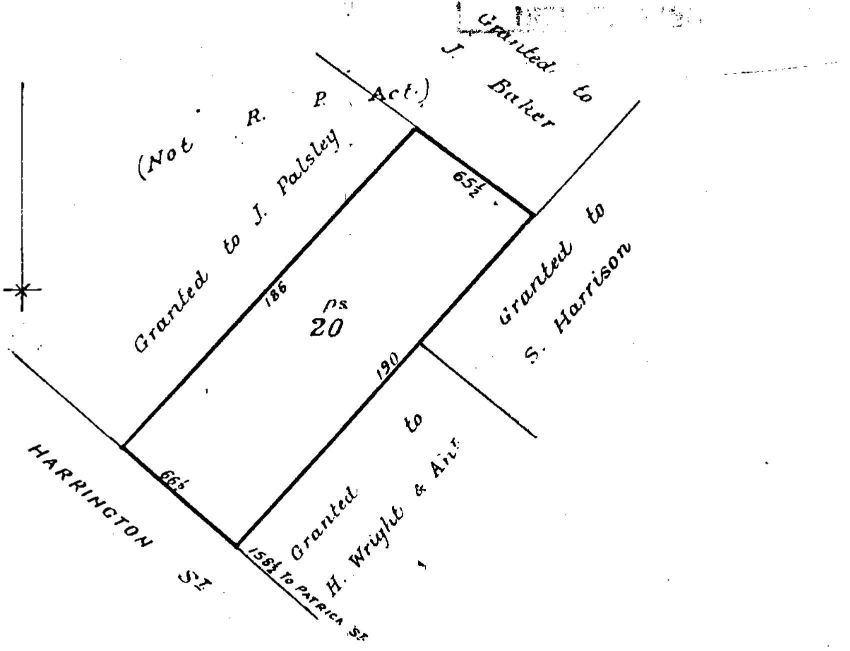
SECOND SCHEDULE (~~continued~~ overleaf)
NIL

CANCELLED

RECORDER OF TITLES ARE NO LONGER SUBSISTING.

Lot 1 of this plan consists of all the land comprised in the above-mentioned cancelled folio of the Register.

REGISTERED NUMBER
232390



Whole of 20 Perches in Section W.w. Gtd. to T.Dillon. Meas. in Links.

FIRST Edition. Registered 1971

Derived from C.T.Vol.691 Fol.12. Transfer A55458- Perp. Trustees Execs. and Agency Co. of Tas.Ltd.

RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
247958	1
EDITION	DATE OF ISSUE
5	10-Jul-2017

SEARCH DATE : 11-Nov-2017
SEARCH TIME : 02.54 PM

DESCRIPTION OF LAND

City of HOBART
Lot 1 on Plan 247958
Derivation : Part of 31 1/2 perches Gtd to H Wright and Anor.
Prior CT 2768/71

SCHEDULE 1

M639371 TRANSFER to CHAU NOMINEES PTY LTD Registered 10-Jul-2017 at noon

SCHEDULE 2

Reservations and conditions in the Crown Grant if any

BURDENING EASEMENT: a right of way and carriage for William Langford over the land marked Right of Way on D89852

BURDENING EASEMENT: the right for the owners and occupiers for the time being of the land comprised in Certificate Title Volume 31 Folio 79 to use the drain one foot wide shown on D89852 running through the said land within described with the right at all times to repair the said drain for that purpose to enter with workmen and others upon such part of the said land within described as may be necessary to effect such repairs but doing so unnecessary damage thereby.

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

FOLIO PLAN

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

OS 512

VOL. 2768 **FOL.** 71

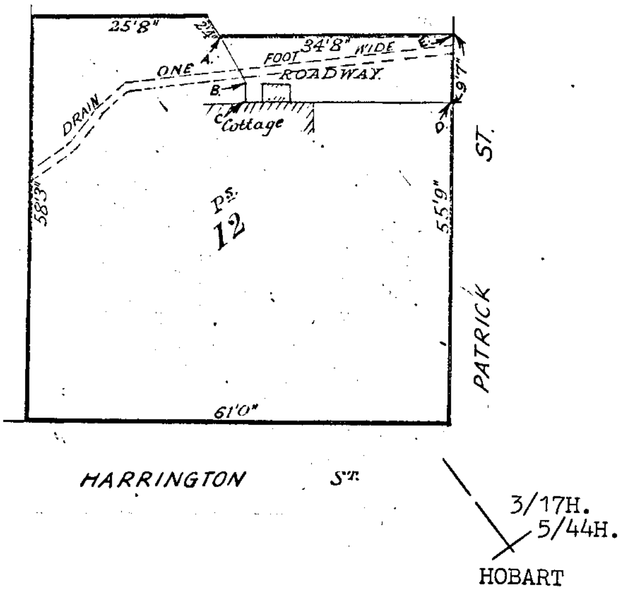
ANNEXURE TO CERTIFICATE OF TITLE

Recorder of Titles

REGISTERED NUMBER

247958

Lot 1 of this plan consists of all the land comprised in the above-mentioned cancelled folio of the Register.



Our Ref: 17.275

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22 October 2018

Planning Department
Hobart City Council
Town Hall, Macquarie Street
HOBART TAS 7001

Dear Sir/Madam,

HARRINGTON STREET RESIDENTIAL APARTMENT AND RETAIL COMPLEX

Please find enclosed a development application for an apartment and retail complex located at 209-215 Harrington Street, Hobart.

Please be advised that a Traffic Impact Assessment is being prepared and will be provided to Council as soon as it is complete.

Yours faithfully
6ty Pty Ltd

George Walker
Planning Consultant

Our Ref: 17.275

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6 December 2018

Mr Ben Ikin
Senior Statutory Planner
Hobart Council Centre
16 Elizabeth Street
HOBART TAS 7000

Dear Ben,

RESPONSE TO ADDITIONAL INFORMATION REQUEST - APPLICATION NO. PLN-18-770 - 209-213 HARRINGTON STREET AND 215-217 HARRINGTON STREET, HOBART

I refer to your request for additional information dated 27 November 2018 in relation to development application PLN-18-770.

This letter responds to each of the items listed within the additional information request.

TasWater

1. Sewer Main and Servicing

   The Site Plan has been revised to:

   a. show the location of the existing DN150mm sewer main;

   b. indicate how the sewer main is proposed to be treated;

   The Ground Floor Plan has been revised to detail the proposed location and size of water and sewer connections relative to site boundaries.

2. Flow Calculations

   The proposal is for 39 residential units which will comprise the following configurations:

   - 3 three-bedroom units;
   - 27 two-bedroom units; and
   - 9 single bedroom units.

   There will also be approximately 212m^2 of retail space at ground level over two separate tenancies.

Using the rates from Appendix A of the Supplement, the following Equivalent Tenements (ET) can be calculated:

Development	**No.**	**Water**	**Sewer**	**Water ET**	**Sewer ET**
3-bedroom	3	0.67	1	2.01	3
2-bedroom	27	0.50	0.75	13.5	20.25
1-bedroom	9	0.33	0.50	2.97	4.5
Retail (m^2)	212	0.002	0.003	0.424	0.636
Total				**18.904**	**28.386**

The potable simultaneous water demand (PSD) calculation for the proposed development is structured on Table 3.2.3 of AS/NZS 3500.1 which for 39 dwellings gives a peak flow rate of 0.54 l/sec.

There is to be internal fire hydrants for the building with the highest floor level being at 42.4 AHD. That is, we require a fire flow rate of 10.0 l/sec at 330 kPa at the Harrington Street frontage for an un-boosted supply. However, provision for booster connections have been made. The intention is to have the water meter connection and meter assembly inside the Patrick Street driveway access.

Planning

3. PLN Fi 1

Each elevation and section plan has been updated to depict a line 15m above natural ground level. The plans indicate that each elevation will be under the 15m maximum building height limit required by clause 23.4.1 A1(a).

3D Mass Representation images from various perspectives have also been prepared. The envelope is depicted by a transparent surface which is projected 15m above natural ground level. The selected perspectives show pertinent sections of the building that are proximate to the envelope but do not extend past the envelope.

4. PLN Fi 2

We can confirm that the street trees and on-street dining illustrated within the visualisations are indicative features only and are not proposed to be installed.

5. PLN Fi 3

All proposed external materials and finishes have been annotated on each Elevation Plan. Images showing examples of the proposed materials and finishes have also been included.

Parking and Access

6. PA 2.1 and PA 2.2

A Traffic Impact Assessment has been prepared by Howarth Fisher and Associates for the proposal which addresses the matters raised in points PA2.1 and PA2.2. A copy of the TIA was submitted to Council via the ePlanning portal on 27 November 2018.

The Ground Floor Plan has bee revised to provide sight triangles on either side of the garage door. This has been achieved by recessing the garage door into the building.

Stormwater Code

7. Sw 1, Sw 5 and Sw 6

   The Ground Floor Plan has been revised to:

   a. show that stormwater from the building will be disposed via gravity to a new DN225 connection at the Patrick Street boundary. All other existing stormwater connections will be abandoned;

   b. include a note detailing that the surface of the internal car park will be drained to sewer infrastructure.

   The surface of the site is currently 100% impervious. The proposed building will not create any additional impervious area on the site. Stormwater runoff from the site following the construction of the building will therefore be no greater than pre-existing levels.

Please feel free to contact me should any additional information be required.

Yours faithfully
6ty° Pty Ltd

George Walker
Planning Consultant

Our Ref: 17.275

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25 February 2018

Mr Ben Ikin
Senior Statutory Planner
Hobart Council Centre
16 Elizabeth Street
HOBART TAS 7000

Dear Ben,

RESPONSE TO ADDITIONAL INFORMATION REQUEST - APPLICATION NO. PLN-18-770 - 209-213 HARRINGTON STREET AND 215-217 HARRINGTON STREET, HOBART

I refer to your request for additional information dated 17 December 2018 in relation to development application PLN-18-770.

Please find enclosed a Stormwater Management Report which addresses the outstanding matters relating to stormwater management. Our response has been guided by discussions with Council's Senior Development Engineer.

Please feel free to contact me should any additional information be required.

Yours faithfully
6ty° Pty Ltd

George Walker
Planning Consultant

Planning Submission

Residential Apartment and Retail Complex

209-215 Harrington Street, Hobart

Prepared for:

Hobart City Council

Measured form and function 6ty°

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Issue	01
Date	22 October 2018
Project Name	Harrington Street Residential Apartments
Project Number	17.275
Author	George Walker
Document	

Contents

Statement of Historic Archaeological Potential

1.0 Introduction

Planning approval is sought for the construction of a residential apartment and retail complex on land located at the corner of Patrick Street and Harrington Street, Hobart (the site - refer to Image 1).

Image 1 - aerial photo of identifying the site.

1.1 Planning Overview

Element	Overview
Location	209-215 Harrington Street, Hobart
Title Information	*52394/1, 52395/1, 232390/1, 203787/1, 197488/1 and 247958/1*
Land Area	1,705 m^2
Planning Instrument	*Hobart Interim Planning Scheme 2015* (the Scheme)
Proposed Use	Residential, Food Services, General Retail and Hire
Proposed Development	Consolidation of lots, demolition of existing buildings, construction of a building
Zone(s)	23.0 - Commercial
Applicable Code(s)	E2.0 - Potentially Contaminated Lands Code

	E5.0 - Road and Railway Assets Code E6.0 - Parking and Sustainable Transport Code E7.0 - Stormwater Management Code E13.0 - Historic Heritage Code
Status of Application	Discretionary

1.2 Proposed Use and Development

It is proposed to construct a residential apartment and retail complex on land located at 209-2015 Harrington Street, Hobart. The building will be constructed to all property boundaries which will result in a total footprint of 1,670m^2 and will comprise 4 levels. The building will have a maximum height of approximately 14.2m.

1.3 Residential Apartments

The residential apartments will be contained within 3 levels commencing above the ground floor level. The floor plan will be a mirror image over the 3 levels, aside from some of the first floor balconies having a slightly larger area due to the space that is created by the ground floor roof. The configuration of each residential apartment level is summarised as follows:

- 9 x 2-bedroom apartments (27 in total)
- 3 x 1-bedroom apartments (9 in total)
- 1 x 3-bedroom apartments (3 in total)
- access corridors
- 2 separate lift shafts and stairwells which will be located to the north-western and south-eastern end of the building.

In total, the building will support 39 apartments. Pedestrian access will be available from the Harrington Street footpath and from the internal car parking area.

1.4 Retail Tenancies and Car Parking

The ground floor will incorporate 2 retail tenancies, car parking, lobby and pedestrian access and vehicular access. One retail tenancy will be located on the corner of Harrington Street and Patrick Street which will have a floor area of 85m^2. The other retail tenancy will be located parallel to Harrington Street between the two entrance lobbies. The tenancy will have a floor area of 127m^2. Each tenancy will incorporate glazing into the façade elevations. The lobby entrances have been recessed into the building which provides an alcove for weather protection.

Vehicular access to the car park will be from Patrick Street only. A total of 36 car parking spaces will be provided. A dedicated bicycle parking area will be located in the northern corner of the building.

1.5 Incidental Matters

It is proposed to remove all existing buildings that are located in the south-eastern section of the site. All current titles will be consolidated into one lot to facilitate the proposed use and development. Furthermore, an awning will extend from the Harrington Street and Patrick Street facades over the footpath.

2.0 Location

2.1 Subject Site

The subject site is a large distended ‘L’ shaped parcel approximately 1,705m^2 in area and is bound by Harrington Street to the south, Patrick Street to the east, an established residential dwelling and commercial buildings to the north and a commercial carpark to the west. The subject site has a gradient of approximately 5% downhill to the north-west and comprises an existing multi-tenancy single store building within the south-eastern section and a large hardstand car parking area within the western section.

2.2 Description of the Surrounding Area

The subject site is zoned Commercial under the Scheme and is located within a broader Commercial zoned area which encompasses the entire block between Melville Street, Harrington Street, Murray Street and Warwick Street and includes land located on the north-eastern side of Murray Street. The Commercial precinct is located on the south-western outskirts of the Hobart Central Business District (CBD) at the interface with the Inner Residential zone to the south-west.

The subject site is situated on the corner of Harrington Street and Patrick Street and is diagonally opposite St Marys Cathedral and St Virgil’s College and within walking distance to several key attractions and facilities around the City including the CBD, Salamanca, Sullivan’s Cove waterfront, and the North Hobart retail and commercial strip.

The broader area is charactered by a mix of business, office, café, school and residential use and development which is reflective of the interface between the CBD and residential areas. Built form within the surrounding area comprises a diverse range of building types and styles of varying heights, bulk and massing which, coupled with the undulating topography of the surrounding area, creates an eclectic transition between buildings.

Overall, the site is well located for a mixed use residential and retail development in terms of being within walking distance of the CBD and other key facilities and attractions and for its contribution to the transition between the commercial area within the peri-urban interface of the CBD.

2.3 Site Access

Vehicular access will be provided from the Patrick Street frontage. A Traffic Impact Assessment has been prepared by Howarth Fisher and Associates which addresses the adequacy of the access points in terms of traffic safety and operational efficiency. A copy of the Traffic Impact Assessment is contained within ***Appendix C***.

2.4 Site Servicing

The subject site is located within a fully serviced urban area. Reticulated water and sewerage mains are located along Harrington Street and Patrick Street. It is observed that an existing sewerage main is located diagonally through the north-western section of the subject site. It is expected that this main will be removed as part of development of the site.

3.0 Planning Assessment

3.1 Commercial Zone

The site is zoned Commercial in accordance with the Scheme.

3.2 Categorisation of Use

Pursuant to clause 8.2.1 the proposed use and development is categorised into the following use classes:

1. The residential apartments which will be located above ground level are categorised as 'Residential' which the Scheme defines as follows:

   "*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 and single or multiple dwellings.*"

   Specifically, the residential apartments fit within the multiple dwelling sub-use class.

2. Approval is sought for the three ground floor level tenancies to be used interchangeably for the dual uses of 'Food Services' and 'General Retail and Hire' which the Scheme defines as follows:

   Food Services

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

   It is envisaged that the tenancies would be used within the parameters of café or restaurant sub-use class.

   General Retail and Hire

   "*use of land for selling goods or services or hiring goods. Examples include an adult sex product shop, amusement parlour, beauty salon, betting agency, commercial art gallery, departments store, hairdresser, market, primary produce sales, shop, shop front dry cleaner, supermarket and video shop*."

It is envisaged that the tenancies could be used within the parameters of all sub-use classes.

3.3 Purpose Statements

The following section lists the purpose statements of the Commercial zone with a response provided detailing how the proposed use and development is consistent with each statement.

23.1.1.1 To provide for large floor area retailing and service industries.

Response

Whilst the provision of large floor area retailing, and service industries is not proposed, the subject site is not currently used for large floor retailing and service industries. Furthermore, the subject site is surrounded by residential uses which may conflict with the suite of uses that are permitted within the Commercial zone Accordingly, the proposed use and development will not convert established Commercial land used for large floor area retailing activities.

23.1.1.2 To provide for development that requires high levels of vehicle access and car parking for customers.

Response

Provision for car parking has been made for each residential apartment and the retail tenancies. It is observed that there is a shortfall in car parking spaces however it is expected that this will be off-set by the provision of communal electric vehicles, ample bicycle storage spaces and the high walkability of the site.

23.1.1.3 To provide for a diversity of generally non-residential uses reflecting the transition between the Central Business Zone and Inner Residential areas.

Response

The proposed residential apartment and retail complex will assist with the transition between the Central Business zone and Inner Residential through the provision of above ground floor residential use and retail tenancies at the ground floor.

23.1.1.4 To allow for uses such as car yards, warehouse and showrooms in the areas of high traffic volume and high passing visibility.

Response

No car yards, warehouses or show rooms are proposed.

23.1.1.5 To allow good quality building stock to be used for less land extensive central service uses such as offices and specialist wholesaling uses.

Response

The proposed development represents brown-field development at a density that maximises the site. The proposed building has been designed to be an attractive and appealing building to encourage use of the ground floor tenancies and to be an aesthetic feature within the cityscape.

23.1.1.6 To allow for service industry uses such as motor repairs which provide a valuable service to users of the central area.

Response

No service industry uses are proposed.

23.1.1.7 To provide for residential use primarily above ground floor level.

Response

The proposed building has been designed to accommodate all residential use components (with the exception of access) above the ground floor level.

3.4 Use Standards

23.3.1 Hours of Operation	
Objective **To ensure that hours of operation do not have unreasonable impact on residential amenity on land within a residential zone.**	
Acceptable Solutions	**Performance Criteria**
A1 Hours of operation of a use within 50 m of a residential zone must be within: (a) 6.00 am to 10.00 pm Mondays to Saturdays inclusive; (b) 7.00 am to 9.00 pm Sundays and Public Holidays; except for office and administrative tasks.	**P1** Hours of operation of a use within 50 m of a residential zone must not have an unreasonable impact upon the residential amenity of land in a residential zone through commercial vehicle movements, noise or other emissions that are unreasonable in their timing, duration or extent.

Response

It is envisaged that the general retail and hire, and food services components of the ground floor tenancies will operate between the specified hours which can be ratified through the provision of a condition. Accordingly, the acceptable solution can be met.

23.3.2 Noise	
Objective **To ensure that noise emissions do not cause environmental harm and do not have unreasonable impact on residential amenity on land within a residential zone.**	
Acceptable Solutions	**Performance Criteria**
A1 Noise emissions measured at the boundary of a residential zone, must not exceed the following: (a) 55dB(A) (LAeq) between the hours of 7.00 am to 7.00 pm; (b) 5dB(A) above the background (LA90) level or 40dB(A) (LAeq), whichever is the lower, between the hours of 7.00 pm to 7.00 am;	**P1** Noise emissions measured at the boundary of a residential zone must not cause environmental harm within the residential zone.

(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.	

Response

It is expected that the noise emissions generated by the general retail and hire, and food services components of the ground floor tenancies will not exceed the specified dB(A) (LAeq) levels at the boundary of the nearest residential zone which is located approximately 17m to the south-west of the subject site beyond Harrington Street.

Factors that will ensure any noise emissions will not exceed the specified levels include the nature of the uses which will primarily occur within the building and the presence of significant background noise levels attributed to traffic movement along Harrington Street which is a high traffic volume street. Accordingly, it is expected that the acceptable solution can be met.

23.3.3 External Lighting	
Objective **To ensure that external lighting does not have unreasonable impact on residential amenity on land within a residential zone.**	
Acceptable Solutions	**Performance Criteria**
A1 External lighting within 50 m of a residential zone must comply with all of the following: (a) be turned off between 11:00 pm and 6:00 am, except for security lighting; (b) security lighting must be baffled to ensure they do not cause emission of light outside the zone.	**P1** External lighting within 50 m of a residential zone must not adversely affect the amenity of adjoining residential areas, 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

No external lighting of the building is proposed with the exception of providing illumination to the main entrance to the residential apartment and underneath the awnings which will extend over the pedestrian footpaths along Harrington Street and Patrick Street which will assist with passive surveillance and visibility purposes. The lighting will be restricted to the entrance alcove and beneath the awning which will ensure light emissions will be contained within the zone boundary. Accordingly, the acceptable solution can be met.

23.3.4 Commercial Vehicle Movements	
Objective **To ensure that commercial vehicle movements not have unreasonable impact on residential amenity on land within a residential zone.**	
Acceptable Solutions	**Performance Criteria**
A1 Commercial vehicle movements, (including loading and unloading and garbage removal) to or from a site within 50 m of a residential zone, must be within the hours of: (a) 6.00am to 10.00pm Mondays to Saturdays inclusive; (b) 7.00am to 9.00pm Sundays and Public Holidays.	**P1** Commercial vehicle movements, (including loading and unloading and garbage removal) to or from a site within 50 m of a residential zone 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

It is envisaged that commercial vehicles associated with the general retail and hire, and food services components of the ground floor tenancies will operate between the specified hours which can be ratified through the provision of a condition. Accordingly, the acceptable solution can be met.

23.3.5 Outdoor Work Areas	
Objective **To ensure that use of outdoor work areas does not have unreasonable impact on residential amenity on land within a residential zone.**	
Acceptable Solutions	**Performance Criteria**
A1 Outdoor work areas and noise-emitting services such as air conditioning equipment, pumps and ventilations fans must not be located within 50m of a residential zone.	**P1** Outdoor work areas and noise-emitting services such as air conditioning equipment, pumps and ventilations fans located within 50 m of a residential zone must be accompanied by effective acoustic screening in the intervening space.

Response

No outdoor work areas are proposed. However, plant and equipment will be located within 50m of the nearest residential zoned land which is located approximately 17m to the south-west beyond Harrington Street. Therefore, assessment against the corresponding performance criteria is required.

Performance Criteria Assessment

It is expected that all plant and equipment including air-conditioning, ventilation and extraction will be located within the ground floor level or at the roof top where actual and perceived noise emissions will be provided with effective acoustic screening by the building, distance and other specific acoustic treatments which will be required to protect the amenity of the residential apartments.

It is therefore submitted that the location and position of noise-emitting plant and equipment will comply with the performance criteria.

Use standards 23.3.6 through to 23.3.9 do not apply to the proposed use and development on the basis that the uses in which each standard regulates are not proposed which include:

- ***Adult Entertainment Venues;***
- ***Take-away Food Shops;***
- ***Hotel Industries; and***
- ***Manufacturing and Processing Uses.***

3.5 Development Standards

23.4.1 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 a residential zone.**	
Acceptable Solutions	**Performance Criteria**
A1 Building height must be no more than: (a) 11.5m high and a maximum of 3 storeys; or (b) 15m high and a maximum of 4 storeys, if the development provides at least 50% of the floor space above ground level for residential use.	**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

The building has been designed to have a maximum of 4 storeys and a height below 15m. Section plans have been provided which illustrates the building relative to the maximum 15m building height. Acceptable solution A1 (c) is therefore met.

Acceptable Solutions	Performance Criteria
A2	**P2**
Building height within 10 m of a residential zone must be no more than 8.5 m.	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

The proposed building will be setback approximately 17m from the nearest residential zoned land (Inner Residential) which is situated to the south-west beyond Harrington Street road reserve. Therefore, the provision is not applicable to the assessment.

23.4.2 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.**	
Acceptable Solutions	**Performance Criteria**
A1	**P1**
Building setback from frontage must be parallel to the frontage and must be no less than: 0m from the frontage.	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 adequate opportunity for parking.

Response

The proposed building will be constructed to and parallel with the Harrington Street and Patrick Street frontages. Therefore, the acceptable solution is met.

Acceptable Solutions	Performance Criteria
A2	**P2**

Building setback from a residential zone must be no less than: (a) 5m; (b) half the height of the wall; whichever is the greater.	Building setback from a 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; (d) industrial activity.

Response

The wall of the proposed building that will be located to the nearest residential zoned land (Inner Residential) which is situated to the south-west beyond Harrington Street road reserve will have a maximum height of approximately 15m. The wall will be setback approximately 17m from the residential zoned land which is greater than half the height of the wall (~7.2m). Therefore, sub-clause (b) is met.

23.4.3 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.**	
Acceptable Solutions	**Performance Criteria**
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;	**P1** Building design must enhance the streetscape by satisfying all of the following: (a) provide the main access to the building in a way that is visible from the street or other public space boundary; (b) provide windows in the front façade in a way that enhances the streetscape and provides for passive surveillance of public spaces; (c) treat very large expanses of blank wall in the front façade and facing other public space boundaries with architectural detail or public art so as to contribute positively to the streetscape and public space; (d) ensure the visual impact of mechanical plant and miscellaneous equipment, such as heat pumps, air conditioning units, switchboards, hot water units or similar, is limited when viewed from the street; (e) ensure roof-top service infrastructure, including service plants and lift structures, is screened so as to have limited visual impact;

(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.	(f) only provide shutters where essential for the security of the premises and other alternatives for ensuring security are not feasible; (g) be consistent with any Desired Future Character Statements provided for the area.

Response

In response to the acceptable solution, the following is observed:

a) *the main pedestrian entrance to the residential apartments and retail tenancies will be from Harrington Street and will be clearly visible from the road and footpath;*

b) *the Harrington Street ground level façade will have glazing to approximately 19% and the Patrick Street ground level façade will have glazing to approximately 48%;*

c) *the Harrington street ground level façade will have a total expanse of blank wall equal to approximately 20% of the length of the façade. The Patrick Street ground level façade contain a single expanse of blank wall approximately 30% of the total facade;*

d) *all mechanical plant and miscellaneous will be located between the basement and ground floor level car parking areas and rooftop structures which will ensure the items are screened from public view;*

e) *the lift structure and service plant and equipment have been designed to be incorporated into the design of the roof;*

f) *awnings have been proposed to extend over the public footpath located along Harrington Street and Patrick Street;*

g) *no security shutters over windows or doors have been proposed to the Harrington Street and Patrick Street facades.*

The proposed building is unable to comply with sub-clause (b). Assessment against the corresponding performance criteria is therefore required.

Performance Criteria Assessment

The Harrington Street ground level façade will include sufficient levels of glazing that will correspond with the retail tenancies. The level of glazing, modulation and materiality of the Harrington Street façade will ensure the building contributes positively to the streetscape.

Acceptable Solutions	Performance Criteria
A2 Walls of a building on land adjoining a residential zone must comply with all of the following: (a) be coloured using colours with a light reflectance value not greater than 40 percent; (b) if within 50 m of a residential zone, must not have openings in walls facing the residential zone, unless the line of sight to the building is blocked by another building.	**P2** No performance criteria.

Response

The subject site does not adjoin a residential zone. Therefore, the provision is not applicable to the assessment.

23.4.4 Passive Surveillance	
Objective **To ensure that building design provides for the safety of the public.**	
Acceptable Solutions	**Performance Criteria**
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 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.	**P1** Building design must provide for passive surveillance of public spaces by satisfying all of the following: (a) provide the main entrance or entrances to a building so that they are clearly visible from nearby buildings and public spaces; (b) locate windows to adequately overlook the street and adjoining public spaces; (c) incorporate shop front windows and doors for ground floor shops and offices, so that pedestrians can see into the building and vice versa; (d) locate external lighting to illuminate any entrapment spaces around the building site; (e) provide external lighting to illuminate car parking areas and pathways; (f) design and locate public access to provide high visibility for users and provide clear sight lines between the entrance and adjacent properties and public spaces; (g) provide for sight lines to other buildings and public spaces.

Response

In response to the acceptable solution, the following is observed:

- *a) the main pedestrian entrance to the residential apartments and retail tenancies will be from Harrington Street and will be clearly visible from the road and footpath;*
- *b) the Harrington Street ground level façade will have glazing to approximately 19% and the Patrick Street ground level façade will have glazing to approximately 48%;*
- *c) the Harrington street ground level façade will have a total expanse of blank wall equal to approximately 20% of the length of the façade. The Patrick Street ground level façade contain a single expanse of blank wall approximately 30% of the total facade;*
- *d) no concealed alcoves or enclosures will be created near public spaces due to the building being built to the frontage of Harrington Street and Patrick Street;*
- *e) the car parking areas will be located within the building where internal lighting will be provided;*
- *f) discreet lighting will be provided within the recessed residential entrances and the entrances to the retail tenancies.*

The proposed building is unable to comply with sub-clause (b). Assessment against the corresponding performance criteria is therefore required.

Performance Criteria Assessment

The extent of glazing proposed on the Harrington Street and Patrick Street frontages will ensure adequate passive surveillance is achieved between retail tenancies and adjacent footpaths.

23.4.5 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.**	
Acceptable Solutions	**Performance Criteria**
A1 Landscaping along the frontage of a site is not required if all of the following apply:	**P1** Landscaping must be provided to satisfy all of the following: (a) enhance the appearance of the development;

(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.	(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

The proposed building will be built to the frontage of Harrington Street and Patrick Street the facades of which will extend the width of each corresponding frontage (except for vehicular access ways). Therefore, sub-clause (a) is met.

Acceptable Solutions	Performance Criteria
A2 Along a boundary with a residential zone landscaping must be provided for a depth no less than: 2m.	**P2** Along a boundary with a residential zone landscaping or a building design solution must be provided to avoid unreasonable adverse impact on the visual amenity of adjoining land in a residential zone, having regard to the characteristics of the site and the characteristics of the adjoining residentially-zones land.

Response

The subject site does not adjoin a residential zone. Therefore, the provision is not applicable to the assessment.

23.4.6 Outdoor Storage Areas	
Objective **To ensure that outdoor storage areas for non-residential use do not detract from the appearance of the site or the locality.**	
Acceptable Solutions	**Performance Criteria**
A1 Outdoor storage areas for non-residential uses must comply with all of the following: (a) be located behind the building line; (b) all goods and materials stored must be screened from public view; (c) not encroach upon car parking areas, driveways or landscaped areas.	**P1** Outdoor storage areas for non-residential uses must satisfy all of the following: (a) be located, treated or screened to avoid unreasonable adverse impact on the visual amenity of the locality; (b) not encroach upon car parking areas, driveways or landscaped areas.

Response

No outdoor storage areas are proposed. Therefore, this provision is not applicable to the assessment.

23.4.7 Fencing	
Objective **To ensure that fencing does not detract from the appearance of the site or the locality and provides for passive surveillance.**	
Acceptable Solutions	**Performance Criteria**
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 10 m of the frontage; (b) fences along a frontage must be at least 50% transparent above a height of 1.2 m; (c) height of fences along a common boundary with land in a residential zone must be no more than 2.1 m and must not contain barbed wire.	**P1** Fencing must contribute positively to the streetscape and not have an unreasonable adverse impact upon the amenity of land in a residential zone which lies opposite or shares a common boundary with a site, having regard to all of the following: (a) the height of the fence; (b) the degree of transparency of the fence; (c) the location and extent of the fence; (d) the design of the fence; (e) the fence materials and construction; (f) the nature of the use; (g) the characteristics of the site, the streetscape and the locality, including fences; (h) any Desired Future Character Statements provided for the area.

Response

No security fencing is proposed. Therefore, the provision is not applicable to the assessment.

3.6 Development Standards - Subdivision

23.5.1 Subdivision	
Objective **To provide for lots with appropriate area, dimensions, services, roads and access to public open space to accommodate development consistent with the Zone Purpose and any relevant Local Area Objectives or Desired Future Character Statements.**	
Acceptable Solutions	**Performance Criteria**
A1 The size of each lot must be no less than: 360m^2 except if for public open space, a riparian reserve or utilities.	**P1** The size of each lot must be sufficient to accommodate development consistent with the Zone Purpose, having regard to any Local Area Objectives or Desired Future Character Statements.

Response

The subdivision will result in a single lot which will have an area of approximately 1,705m^2 in area. Therefore, the acceptable solution is met.

Acceptable Solutions	Performance Criteria
A2	**P2**
The design of each lot must provide a minimum building area that is rectangular in shape and complies with all of the following; (a) clear of the frontage, side and rear boundary setbacks; (b) clear of easements; (c) clear of title restrictions that would limit or restrict the development of a commercial building; (d) has an average slope of no more than 1 in 10; (e) is a minimum of 10 m x 10 m in size.	The design of each lot must contain a building area able to satisfy all of the following: (a) be reasonably capable of accommodating use and development consistent with Zone Purpose, having regard to any Local Area Objectives or Desired Future Character Statements; (b) provides for sufficient useable area on the lot for on-site parking and manoeuvring, unless adequate arrangements are made for suitable alternative solutions to future likely demand generated by the development potential of the lot; (c) minimises the need for earth works, retaining walls, and cut & fill associated with future development.

Response

The proposed lot will be able to comprise a rectangular building envelope which:

a) *will comply with the required frontage, side and rear boundary setbacks;*

b) *will be clear of identified easements;*

c) *will be clear of title restrictions that would limit the development of a commercial building;*

d) *will have a gradient of approximately 8.5% (if located within the south-eastern section);*

e) *will have a minimum area of 10m by 10m.*

Acceptable Solutions	Performance Criteria
A3	**P3**
The frontage for each lot must be no less than: 10m	The frontage of each lot must be sufficient to accommodate development consistent with the Zone Purpose, having regard to any Local Area Objectives or Desired Future Character Statements.

Response

The proposed lot will have a frontage along Harrington Street of approximately 57m and a frontage along Patrick Street of approximately 26m. Therefore, he acceptable solution is met.

Acceptable Solutions	Performance Criteria
A4	**P4**
No Acceptable Solution.	The arrangement of roads within a subdivision must satisfy all of the following: (a) the subdivision will not compromise appropriate and reasonable future subdivision of the entirety of the parent lot; (b) accords with any relevant road network plan adopted by the Planning Authority; (c) facilitates the subdivision of neighbouring land with subdivision potential through the provision of connector roads, where appropriate, to the common boundary; (d) provides for acceptable levels of access, safety, convenience and legibility through a consistent road function hierarchy.

Response

There is no acceptable solution. Therefore, assessment against the corresponding performance criteria is required.

Performance Criteria Assessment

The proposed subdivision (consolidation) will not change the arrangement or location of Harrington Street or Patrick Street, or create any new roads. Accordingly, the provision is not considered applicable to the assessment pursuant to clause 7.5.2 (b) of the Scheme.

Acceptable Solutions	Performance Criteria
A5	**P5**
Each lot must be connected to services adequate to support the likely future use and development of the land.	No Performance Criteria.

Response

The subject site is located within an area that is fully serviced by reticulated water, sewerage and stormwater infrastructure. Accordingly, the proposed lot will be capable of connecting to the necessary services required to support the proposed development.

Acceptable Solutions	**Performance Criteria**
A6 No Acceptable Solution.	**P6** Public Open Space must be provided as land or cash in lieu, in accordance with the relevant Council policy.

Response

There is no acceptable solution. Therefore, assessment against the corresponding performance criteria is required.

Performance Criteria Assessment

The proposed subdivision will consolidate six existing titles with no additional lots being created. As such, the proposed subdivision will not increase the demand for public open space. Accordingly, a cash-in-lieu contribution of Public Open Space is not considered necessary.

3.7 Potentially Contaminated Land Code

The land is identified as being potentially contaminated. Accordingly, assessment against the Code is required.

E2.5 Use Standards	
Objective **To ensure that potentially contaminated land is suitable for the intended use.**	
Acceptable Solutions	**Performance Criteria**
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 subdivision does not adversely impact on health or the environment and is suitable for its 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

Advice from the Director within the meaning of the Scheme has not been obtained. Therefore, assessment against the corresponding performance criteria is required.

Performance Criteria

In this instance, an environmental site assessment was prepared by Geo Environmental Solutions which concluded the following:

- *A risk to potential receptors has not been identified during or after development;*
- *All samples collected at the site are below threshold concentrations for assessment risk to human health;*
- *No particular health and safety issues are identified which may originate from onsite contamination activities;*
- *Other advice provided within the recommendations section of this report, there are no specific remediation and protection measures required to be implemented before excavation commences;*
- *As a result of proposed site excavation, there is a very low human health risk to future users of the site and;*
- *GES advise that during site excavation works for site redevelopment, there is a low risk that site contamination will present an environmental risk.*

Accordingly, performance criteria (P1) (b) is satisfied.

A copy of the environmental site assessment is contained with ***Appendix D****.*

E2.6.1 Subdivision	
Objective **To ensure that subdivision of potentially contaminated land does not adversely impact on human health or the environment and is suitable for its intended use.**	
Acceptable Solutions	**Performance Criteria**
A1 For subdivision of land the Director, or a person approved by the Director for the purpose of this Code: (c) certifies that the land is suitable for the intended use; or (d) 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** Subdivision does not adversely impact on health and the environment and is suitable for its intended use, having regard to: (d) an environmental site assessment that demonstrates there is no evidence the land is contaminated; or (e) an environmental site assessment that demonstrates that the level of contamination does not present a risk to human health or the environment; or (f) 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

Refer to assessment against Standard E2.5.

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.**	
Acceptable Solutions	**Performance Criteria**
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

Advice from the Director within the meaning of the Scheme has not been obtained. Therefore, assessment against the corresponding performance criteria is required.

Performance Criteria

In this instance, an environmental site assessment was prepared by Geo Environmental Solutions which concluded the following:

- *A risk to potential receptors has not been identified during or after development;*
- *All samples collected at the site are below threshold concentrations for assessment risk to human health;*
- *No particular health and safety issues are identified which may originate from onsite contamination activities;*
- *Other advice provided within the recommendations section of this report, there are no specific remediation and protection measures required to be implemented before excavation commences;*
- *As a result of proposed site excavation, there is a very low human health risk to future users of the site and;*
- *GES advise that during site excavation works for site redevelopment, there is a low risk that site contamination will present an environmental risk.*

Accordingly, performance criteria (P1) (b) is satisfied.

3.8 Road and Railway Assets Code

This code applies to the proposed use and development on the basis that it will intensify the use of the existing site access.

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.**	
Acceptable Solutions	**Performance Criteria**
A1 The annual average daily traffic (AADT) of vehicle movements, to and from a site, onto a category 1 or category 2 road, in an area subject to a speed limit of more than 60km/h, must not increase by more than 10% or 10 vehicle movements per day, whichever is the greater.	**P1** Any increase in vehicle traffic to a category 1 or category 2 road in an area subject to a speed limit of more than 60km/h must be safe and minimise any adverse 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 of the road; (d) the speed limit and traffic flow of the road;

	(e) any alternative access to a road; (f) the need for the use; (g) any traffic impact assessment; and (h) any written advice received from the road authority.

Response

The subject property does not have direct access to a category 1 or 2 road. Therefore, the provision is not applicable to the assessment.

Acceptable Solutions	Performance Criteria
A2	**P2**
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 more than 60km/h, must not increase by more than 10% or 10 vehicle movements per day, whichever is the greater.	Any increase in vehicle traffic at an existing access or junction in an area subject to a speed limit of more than 60km/h 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

Patrick Street is subject to a speed limit of 60km/h or less. Therefore, this provision is not applicable to the assessment.

Acceptable Solutions	Performance Criteria
A3	**P3**

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.	Any increase in vehicle traffic at an existing access or junction in an area subject to a speed limit of more than 60km/h 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

It has been determined that the proposed storage use will increase vehicle movements to and from the site by more than 20%. Therefore, assessment against the corresponding performance criteria is required.

Performance Criteria Assessment

A Traffic Impact Assessment (TIA) was prepared for the proposed development. The TIA determined that the proposed increase in vehicle movements from the site as a result of the proposed development will not unreasonably impact the efficiency and safety of Harrington Street or Patrick Street. Specific details with regard to the nature of the use, vehicle movements, nature and efficiency of accesses and the nature of the roads are contained within the TIA.

E5.5.2 Existing Level Crossings	
Objective **To ensure that the safety and the efficiency of the rail network is not reduced by access across part of the rail network.**	
Acceptable Solutions	**Performance Criteria**
A1 Where use has access across part of a rail network, the annual average daily traffic (AADT)	**P1** Any increase in vehicle traffic at an existing access across part of a rail network, must be

at an existing level crossing must not be increased by greater than 10% or 10 vehicle movements per day, whichever is the greater.	safe and not unreasonably impact on the efficiency of the rail network, 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

The subject site does not require direct access over a rail network. Therefore, the provision is not applicable to the assessment.

<table>
<tr><th colspan="2">E5.6.1 Development Adjacent to Roads and Railways</th></tr>
<tr><td colspan="2">Objective
To ensure that development adjacent to category 1 or category 2 roads or the rail network:
(a) ensures the safe and efficient operation of roads and the rail network;
(b) allows for future road and rail widening, realignment and upgrading; and
(c) is located to minimise adverse effects of noise, vibration, light and air emissions from roads and the rail network.</td></tr>
<tr><th>Acceptable Solutions</th><th>Performance Criteria</th></tr>
<tr><td>A1.1
Except as provided in A1.2, the following development must be located at least 50m from the rail network, or a category 1 road or category 2 road, in an area subject to a speed limit of more than 60km/h:
(a) new buildings;
(b) other road or earth works; and
(c) building envelopes on new lots.
A1.2</td><td>P1
The location of development, from the rail network, or a category 1 road or category 2 road in an area subject to a speed limit of more than 60km/h, must be safe and not unreasonably impact on the efficiency of the road or amenity of sensitive uses, having regard to:
(a) the proposed setback;
(b) the existing setback of buildings on the site;
(c) the frequency of use of the rail network;</td></tr>
</table>

Buildings, may be: (a) located within a row of existing buildings and setback no closer than the immediately adjacent building; or (b) an extension which extends no closer than: (i) the existing building; or (ii) an immediately adjacent building.	(d) the speed limit and traffic volume of the road; (e) any noise, vibration, light and air emissions from the rail network or road; (f) the nature of the road; (g) the nature of the development; (h) the need for the development; (i) any traffic impact assessment; (j) any recommendations from a suitably qualified person for mitigation of noise, if for a habitable building for a sensitive use; and (k) any written advice received from the rail or road authority.

Response

The subject site is located greater than 50m from a category 1 or 2 road and a rail network. Therefore, the provision is not applicable to the assessment.

E5.6.2 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.**	
Acceptable Solutions	**Performance Criteria**
A1 No new access or junction to roads in an area subject to a speed limit of more than 60km/h.	**P1** For roads in an area subject to a speed limit of more than 60km/h, 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; (e) the need for the access or junction; (f) any traffic impact assessment; and

	(g) any written advice received from the road authority.

Response

Both Harrington Street and Patrick Street are subject to a speed limit of 60km/h or less. Therefore, this provision is not applicable to the assessment.

Acceptable Solutions	Performance Criteria
A2	**P2**
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.	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

One access providing both entry and exit will be provided for Patrick Street. Therefore, the acceptable solution is met.

E5.6.3 New Level Crossings	
Objective **To ensure that the safety and the efficiency of the rail network is not reduced by access across part of the rail network.**	
Acceptable Solutions	**Performance Criteria**
A1	**P1**
No acceptable solution.	Level crossings must be safe and not unreasonably impact on the efficiency of the rail network, having regard to: (a) the nature and frequency of the traffic generated by the use; (b) the frequency of use of the rail network;

	(c) the location of the level crossing; (d) any alternative access; (e) the need for the level crossing; (f) any traffic impact assessment; (g) any measures to prevent access to the rail network; and (h) any written advice received from the rail authority.

Response

No level crossings are proposed. Therefore, the provision is not applicable to the assessment.

E5.6.4 Site Distances at Accesses, Junctions and Level Crossings	
Objective **To ensure that the safety and the efficiency of the rail network is not reduced by access across part of the rail network.**	
Acceptable Solutions	**Performance Criteria**
A1 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.	**P1** The design, layout and location of an access, junction or rail level crossing must provide adequate sight distances to ensure the safe movement of vehicles, having regard to: (a) the nature and frequency of the traffic generated by the use; (b) the frequency of use of the road or rail network; (c) any alternative access; (d) the need for the access, junction or level crossing; (e) any traffic impact assessment; (f) any measures to improve or maintain sight distance; and (g) any written advice received from the road or rail authority.

Response

The TIA determined that the sight distances for the Patrick Street access will comply with Safe Intersection Sight Distance shown in Table E5.1 of the Code. Therefore, sub-clause (a) is met.

3.9 Car Parking and Sustainable Transport Code

This code applies to all use and development.

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.** **(c) there is enough car parking to meet the reasonable needs of all users of a use or development, taking into account:** **(i) the level of parking available on or outside of the land;** **(ii) the impact on the demand for and supply of car parking associated with approved but uncompleted uses and developments and the future occupation of vacant premises; and** **(iii) the access afforded by other modes of transport.** **(d) where car parking cannot be provided for onsite, a cash contribution toward the development of public parking facilities may be required.**	
Acceptable Solutions	**Performance Criteria**
A1 The number of on-site car parking spaces must be: (a) no less 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;

Response

It has been determined that the proposed development will result in a short fall of car parking spaces. Therefore, assessment against the corresponding performance criteria is required.

Performance Criteria Assessment

The TIA addresses the performance criteria for the short fall in carparking spaces in which a variation is being sought. Overall, it is considered that the short fall in car parking spaces can be sufficiently offset by:

- *the provision of ample secure bicycle parking spaces which is expected encourage cycling as a mode of transport;*

- *the proximity to very high frequency public transport which operates along Elizabeth Street and is located within 300m of the development site; and*

- *the high walkability level of the site due to its proximity to the Hobart CBD, North Hobart commercial and retail strip and other key community facilities and services.*

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.**	
Acceptable Solutions	**Performance Criteria**
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

Provision can be made for accessible parking spaces to be sited and designed in accordance with the relevant provisions of the Building Code of Australia. It is noted that there is sufficient space within the car parking area to locate required accessible parking spaces within proximity to key access points, including the lift well.

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.**	
Acceptable Solutions	**Performance Criteria**
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,	**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;

provided the existing number of motorcycle parking spaces is not reduced.	(c) the availability and likely use of other modes of transport; (d) the availability and suitability of alternative arrangements for motorcycle parking provision.

Response

No designated motorcycle parking spaces are proposed. Therefore, assessment against the corresponding performance criteria is required.

Performance Criteria Assessment

The demand for motorcycle parking is largely unknown, however it is becoming a more popular mode of inner city transport (particularly scooters). It is considered that the spaces will be sufficient to accommodate the demand generated by either the retail or food services use. Further short-term motorcycle parking can be accommodated within the on-street restricted parking area which operates within the immediate vicinity of the site. Given the location of the site, it is expected that other modes of transport including public, walking and cycling will be used more frequently.

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.**	
Acceptable Solutions	**Performance Criteria**
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

Table E6.2 requires 6 bicycle parking spaces to be provided. In this instance, 13 bicycle parking spaces will be provided which significantly exceeds the requirements of Table E6.2. Therefore, the acceptable solution is met.

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.

Acceptable Solutions	Performance Criteria
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

A singular vehicle access point will be provided for at the Patrick Street frontage. Therefore, the acceptable solution is met.

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.

Acceptable Solutions	Performance Criteria
A1	**P1**
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.	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.

Response

The TIA has determined that the accesses comply with the requirements of AS/NZS 2890.1:2004 Parking Facilities Part 1: Off-street car parking. Therefore, sub-clause (a) is met.

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.

Acceptable Solutions	Performance Criteria
A1	**P1**
Vehicular passing areas must:	Vehicular passing areas must be provided in sufficient number, dimension and siting so that

(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.	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

The access and internal laneways of the car parking areas will be dual lane which will allow for vehicular passing. Therefore, the acceptable solution is met.

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.**	
Acceptable Solutions	**Performance Criteria**
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.	**P1** On-site turning may not be required if access is safe, efficient and convenient, having regard to all of the following: (a) avoidance of conflicts between users including vehicles, cyclists, dwelling occupants 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; (e) suitability of the location of the access point and the traffic volumes on the road.

Response

The ability for vehicles to enter and exit the site in a forward direction has been provided. Therefore, the acceptable solution is met.

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.**	
Acceptable Solutions	**Performance Criteria**
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

The TIA has determined that the layout of the car parking spaces, access aisle and circulation areas comply with AS/NZS 2890.1:2004 Parking Facilities Part 1: Off-street car parking.

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.**	
Acceptable Solutions	**Performance Criteria**
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; provided that the standard of paving and drainage complies with the adopted standards of the Council.	**P1** Parking spaces and vehicle circulation roadways must not unreasonably detract from the amenity of users, adjoining occupiers or the quality of the environment through dust or mud generation or sediment transport, having regard to all of the following: (a) the suitability of the surface treatment; (b) the characteristics of the use or development; (c) measures to mitigate mud or dust generation or sediment transport.

Response

The proposed car parking areas will be concrete and drained to an approved public stormwater system. Therefore, the acceptable solution is met.

E6.7.7 Lighting of Parking Area	
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.**	
Acceptable Solutions	**Performance Criteria**
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.	**P1** Parking and vehicle circulation roadways and pedestrian paths used outside daylight hours must be provided with lighting to a standard which satisfies all of the following: (a) enables easy and efficient use of the area; (b) minimises potential for conflicts involving pedestrians, cyclists and vehicles; (c) reduces opportunities for crime or anti-social behaviour by supporting passive surveillance and clear sight lines and treating the risk from concealment or entrapment points; (d) prevents unreasonable impact on the amenity of adjoining users through light overspill; (e) is appropriate to the hours of operation of the use.

Response

The car parking areas will be located within the building and will be internally lit. Therefore, the acceptable solution can be met.

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.	
Acceptable Solutions	**Performance Criteria**
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.	**P1** Landscaping of parking and circulation areas accommodating more than 5 cars must satisfy all of the following: (a) relieve the visual impact on the streetscape of large expanses of hard surfaces; (b) soften the boundary of car parking areas to reduce the amenity impact on neighbouring properties and the streetscape; (c) reduce opportunities for crime or anti-social behaviour by maintaining passive surveillance opportunities from nearby public spaces and buildings.

Response

The car parking areas will not be landscaped. Therefore, assessment against the corresponding performance criteria is required.

Performance Criteria Assessment

In this instance, the car parking areas will be located within the building and will not be visible from public spaces. Accordingly, the provision is not considered applicable to the proposed development pursuant to clause 7.5.2 (b) of the Scheme on the basis that the standard deals with a matter that will not be affected by the proposed development.

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.**	
Acceptable Solutions	**Performance Criteria**
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.	**P1** The design of motorcycle parking areas must provide safe, obvious and easy access for motorcyclists having regard to all of the following: (a) providing clear sightlines from the building or the public road to provide adequate passive surveillance of the parking facility and the route from the parking facility to the building;

	(b) avoiding creation of concealment points to minimise the risk.

Response

No motorcycle parking spaces are proposed.

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.**	
Acceptable Solutions	**Performance Criteria**
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.	**P1** The design of bicycle parking facilities must provide safe, obvious and easy access for cyclists, having regard to all of the following: (a) minimising the distance from the street to the bicycle parking area; (b) providing clear sightlines from the building or the public road to provide adequate passive surveillance of the parking facility and the route from the parking facility to the building; (c) avoiding creation of concealment points to minimise the risk.

Response

The area set aside for bicycle parking spaces can be fitted out in accordance with Table E6.2 of the Code. The bicycle parking areas will be located within 30m of the main entrance (including pedestrian entrance) to each parking level. Therefore, the acceptable solution is met.

Acceptable Solutions	**Performance Criteria**
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.	**P2** The design of bicycle parking spaces must be sufficient to conveniently, efficiently and safely serve users without conflicting with vehicular or pedestrian movements or the safety of building occupants.

Response

The area set aside for bicycle parking spaces can be designed to comply with 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. Therefore, the acceptable solution can be met.

E6.7.11 Bicycle End of Trip Facilities	
Objective **To ensure that cyclists are provided with adequate end of trip facilities.**	
Acceptable Solutions	**Performance Criteria**
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; (d) opportunity for sharing bicycle facilities by multiple users.

Response

No end of trip facilities for cyclists (change room and shower facility) are proposed to be provided. Therefore, assessment against the corresponding performance criteria is required.

Performance Criteria Assessment

It is observed that 5 employee cycle parking spaces are required, with the additional 3 spaces required for visitors. It is expected that toilet facilities required by food service facilities will be sufficient to provide for the reasonable needs of cyclist for changing and amenity purposes should they be required.

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.**	
Acceptable Solutions	**Performance Criteria**
A1 Parking spaces and vehicle turning areas, including garages or covered parking areas in	**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 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.	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) 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; 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

The subject site is not located within the listed zones. Therefore, the provision is not applicable to the assessment.

E6.7.13 Facilities for Commercial Vehicles	
Objective **To ensure that facilities for commercial vehicles are provided on site, as appropriate.**	
Acceptable Solutions	**Performance Criteria**
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.	**P1** Commercial vehicle arrangements for loading, unloading or manoeuvring must not compromise the safety and convenience of vehicular traffic, cyclists, pedestrians and other road users.

Response

Commercial vehicle facilities for loading and unloading of goods is not proposed to be located on-site. Therefore, assessment against the corresponding performance criteria is required.

Performance Criteria Assessment

It is proposed that the proposed uses will be serviced on the street. The TIA identifies that there is a 19m length of 15-minute parking on the Harrington Street frontage which operates between 8am and 6pm Monday to Friday and 8am to 12pm on Saturday. The TIA recommends that a 10m length of this kerbside space be dedicated to service vehicle to cater for refuse collection and other services.

E6.7.14 Access to a Road	
Objective **To ensure that access to the road network is provided appropriately.**	
Acceptable Solutions	**Performance Criteria**
A1 Access to a road must be in accordance with the requirements of the road authority.	**P1** No performance criteria.

Response

It is considered that Patrick Street access will be in accordance with the requirements of the road authority by virtue of being assessed through the development application process.

3.10 Stormwater Management Code

This code applies to all development requiring management of stormwater.

E7.7.1 Stormwater Drainage and Disposal	
Objective **To ensure that stormwater quality and quantity is managed appropriately.**	
Acceptable Solutions	**Performance Criteria**
A1 Stormwater from new impervious surfaces must be disposed of by gravity to public stormwater infrastructure.	**P1** Stormwater from new impervious surfaces must be managed by any of the following: (a) disposed of on-site with soakage devices having regard to the suitability of the site, the system design and water sensitive urban design principles; (b) collected for re-use on the site; (c) disposed of to public stormwater infrastructure via a pump system which is designed, maintained and managed to minimise the risk of failure to the satisfaction of the Council.

Response

The proposed development is capable of connecting into the public stormwater system via an existing connection point. Therefore, the acceptable solution is met.

Acceptable Solutions	**Performance Criteria**
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 m^2; (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

Th standard is not applicable to the proposed development on the following basis:

- *a) no new impervious surfaces will be created;*
- *b) new car parking areas will be provided however they will be located within the existing building which will not increase level of impervious surfaces on the site; and*
- *c) the proposed subdivision will consolidate six lots into 1 and will not create any additional lots.*

Acceptable Solutions	Performance Criteria
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.	**P3** No performance criteria.

Response

The proposed development will connect into the existing public stormwater system. No new stormwater systems are proposed to be installed.

Acceptable Solutions	Performance Criteria
A4 A major stormwater drainage system must be designed to accommodate a storm with an ARI of 100 years.	**P4** No performance criteria.

Response

The proposed development will connect into the existing public stormwater system. No new on-site stormwater disposal systems are proposed to be installed.

3.11 Historic Heritage Code

This code applies to the proposed development on the basis that the site is identified as a place of archaeological potential.

A Statement of Historic Archaeological potential (SoHAP) has been prepared by Praxis Environment which addresses the relevant provisions of the Code. A copy of the SoHAP is contained within ***Appendix E****.*

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LAUNCESTON TAS 7250

25th February 2018

Dear George

Further to our discussions and previous correspondence (your ref. 17.275), I provide the current document as a *preliminary statement of historic archaeological potential* (SoHAP) for 209-215 Harrington Street, Hobart. This does not negate the need to formulate a more detailed SoHAP (as per my response to your brief dated 15/2/18) however is intended for use by the planning authority in consideration of the current application for development at that site which is imminently due for determination.

The table below details the archaeological management process as will need to be applied to any proposed development of the subject site:

Methodology for formulation of the statement of archaeological potential		
	If 'no'	**If 'yes'**
1. Archaeological potential. Are you likely to find something if you dig here? (i.e. a Statement of Archaeological Potential).	Further action may not be required, although a contingency plan may be required for unexpected finds.	The significance of the archaeological potential should be investigated.
2. Significance. Could anything you find here greatly contribute to our understanding of the site or related significant theme?	Further action may not be required.	The likely integrity of the archaeological remains should be investigated.
3. Integrity. Are any archaeological remains likely to be intact?	Further action may not be required, although a contingency plan is required for unexpected integrity.	The likelihood of significant archaeological remains is confirmed.
4. Impact Will proposed works impact upon the significant archaeological remains? i.e. an Archaeological Impact Assessment.	Further action may not be required, although a contingency plan may be required for unexpected impacts.	An Archaeological Method Statement will be required to detail how impact will be managed/mitigated.

The subject site is included in Table E.13.4 (Places of Archaeological Potential), as defined by Figure E.13.4.1 of the scheme, therefore Clause E.13.10.1 of the scheme applies:

	Acceptable Solution	**Performance Criteria**
E.13.10.1 – Building and Works other than Demolition	*A1. Building and works do not involve excavation or ground disturbance.*	*P1. Buildings, works and demolition must not unnecessarily impact on archaeological resources at places of archaeological potential, having regard to:* *a) the nature of the archaeological evidence, either known or predicted;* *b) measures proposed to investigate the archaeological evidence to confirm predictive statements of potential;* *c) strategies to avoid, minimise and/or control impacts arising from building, works and demolition;* *d) where it is demonstrated there is no prudent and feasible alternative to impacts arising from building, works and demolition, measures proposed to realise both the research potential in the archaeological evidence and a meaningful public benefit from any archaeological investigation;* *(a) measures proposed to preserve significant archaeological evidence ‘in situ’.*
E.13.10.2 – Subdivision	*A1. Subdivision provides for building restriction envelopes on titles over land defined as the Place of Archaeological Potential in Table E13.4.*	*P1. Subdivision must not impact on archaeological resources at Places of Archaeological Potential through demonstrating either of the following:* *(a) that no archaeological evidence exists on the land;* *(b) that there is no significant impact upon archaeological potential.*

Accordingly, the site requires such a detailed SoHAP in order to guide any future development. In the absence of such, I provide the following brief pictorial site background as a means of understanding the historical background of the site as per Step (1) of the methodology table and to very broadly understand the possible archaeological potential of the site. Note that this does not include:

- An assessment of disturbance history between, and after, the known historical phases which may have impacted the archaeological resource.
- Detailed historical assessment of building function, persons associated (etc.).

- Consideration of whether any of the possible archaeological remains are significant and/or contribute to relevant historical/archaeological research frameworks.

All of the above would need to form part of an expanded and more comprehensive SoHAP.

Similarly, this document does not consider the current application and possible archaeological impact, not does it propose any management strategies to protect, conserve, investigate or interpret any significant remains – which would be required in an archaeological impact and method statement.

It is expected that the planning authority, in any approval, would require the above to be completed prior to the commencement of works. This would likely include:

- An expanded *SoHAP* which would include a more comprehensive site history, consideration of disturbance events, consideration of the significance of any remains within various thematic, regional and temporal research frameworks – culminating in a detailed *archaeological zoning plan* for the site.
- Consideration of the likely impact of the proposed development via an *archaeological method statement* which would also need to consider the feasibility of avoiding impact and preserving any significant archaeological remains.
- Formulation of an *archaeological method statement* which would detail how any archaeological remains which cannot be feasibly preserved are to be managed in order to mitigate that impact.
- Detail of any public benefit initiatives arising from the archaeology of the site (such as interpretation etc.).

Ahead of the above, the following is a brief pictorial overview of the site development history, which gives an indication of historical development of the site (note that in all images the *approximate* subject site is outlined or depicted in red, and unless otherwise noted, Harington Street is to the bottom of the image Figures 1 & 2 depict the subject site:

Figure 1 – The subject site, 209-215 Harrington Street, Hobart. www.thelist.tas.gov.au

Figure 2 – The subject site, 209-215 Harrington Street, Hobart. www.thelist.tas.gov.au

Figure 3 depicts the subject site in c1832, which shows a masonry building (pink) on the corner of Harrington and Patrick Street and a timber building (grey) facing Harrington Street. The subject site at that time comprised of parts of three titles. Further research through grants records, titles (etc.) are likely to ascertain owners of these buildings and may allude to their use, although these were *probably* domestic. Whilst this map is known to be reasonably accurate in the approximate location and size of buildings, the precise rate of error is unclear (based on actual archaeological observations that have ground-truthed this map.

Figures 4 and 5 are from the c1839 Frankland Survey and the c1841 census map (which was largely based on Frankland's survey with some additions). These show a similar configuration of buildings as per the c1832 survey, however they do show what is probably an adjacent building being within the subject site (shown as outside the site on the earlier survey). The accuracy of both these surveys is not high and can be only relied upon for approximate locations of buildings, so it is unclear whether that third building was within the subject site.

Sprent's c1845 survey (Figure 6) shows the similar configuration of masonry building on the corner and timber building on Harrington Street as per the c1832 survey, with each having a timber addition (or another building) near/against them, as well as a masonry building partly within the subject site further up Harrington Street. This survey is known to have a very high level of accuracy. Again, the precise nature/function of these buildings is unknown ahead of further research, but probably domestic.

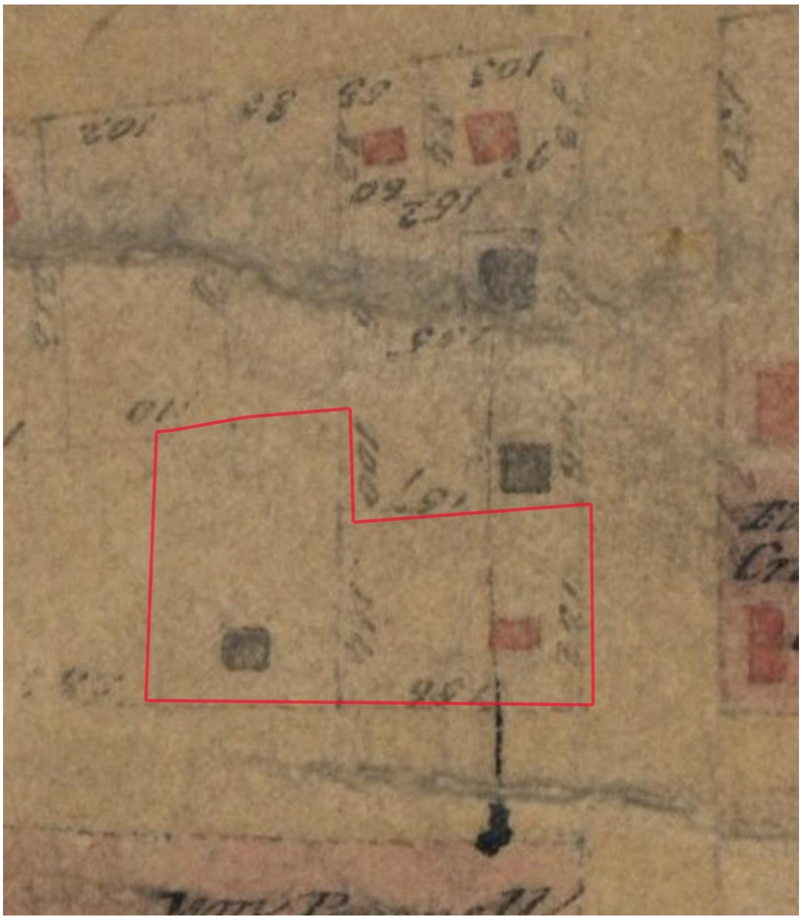


Figure 3 - c1832 – DPIPWE Hobart 5.

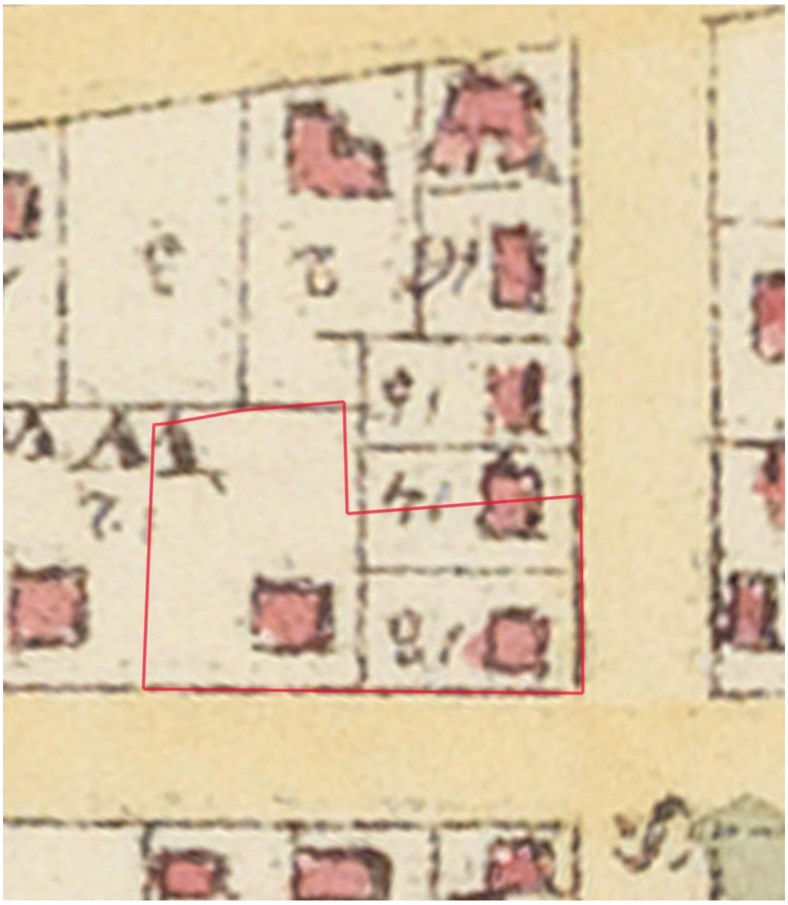


Figure 4 - c1839 Frankland survey (Tasmanian Archive and Heritage Office, PH-30-1-693-1).

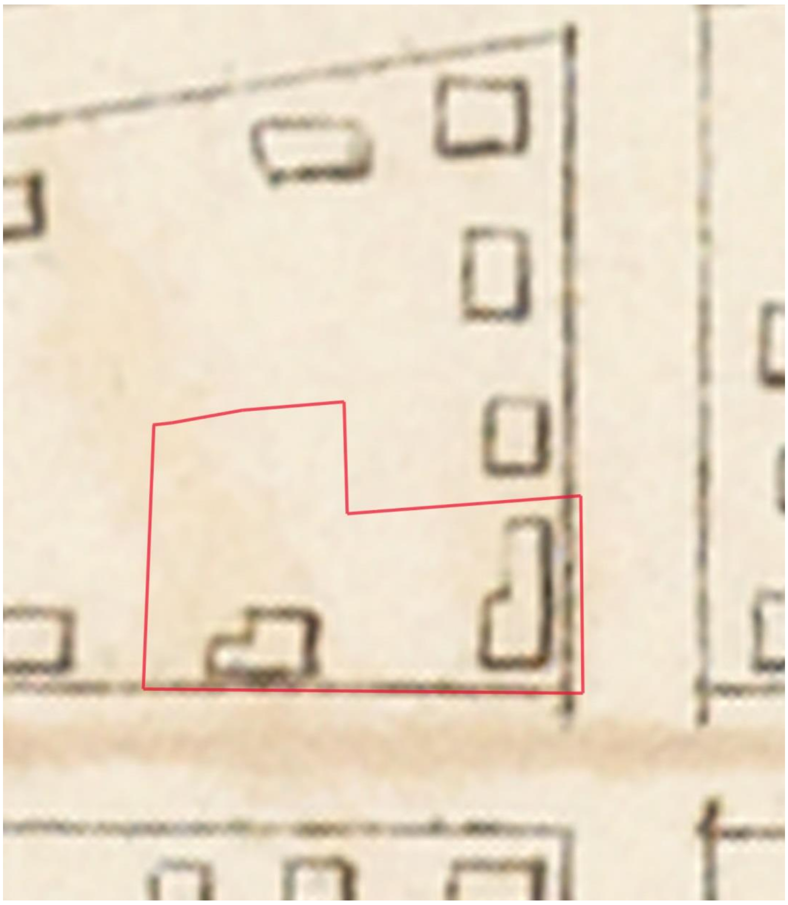


Figure 5 - c1841 Census map of Hobart.

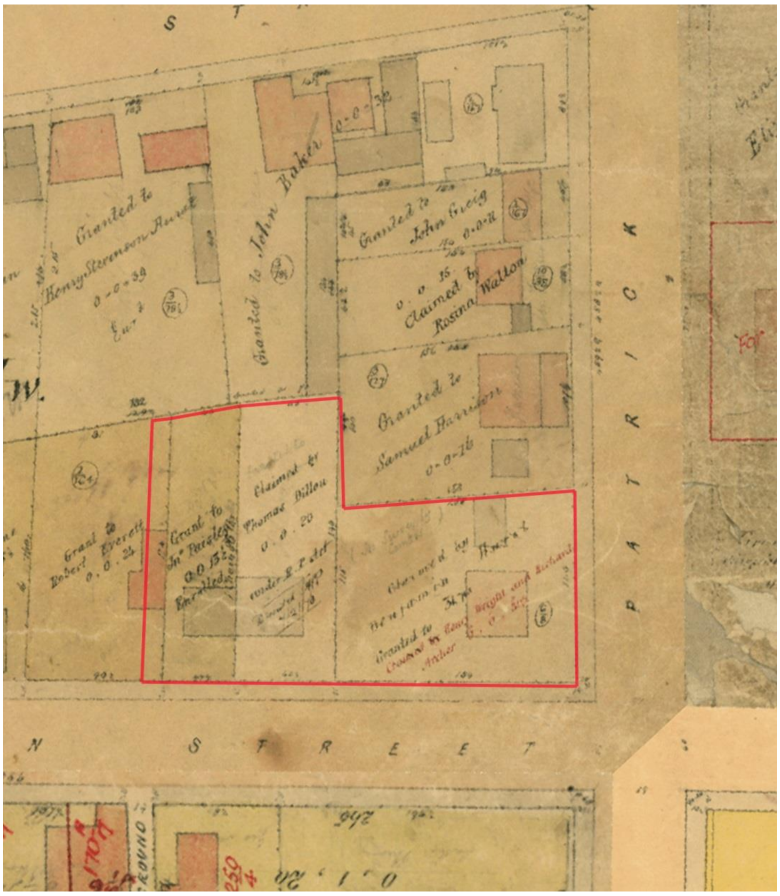


Figure 6 - Sprent's c1846 map survey of Hobart (www.thelist.tas.gov.au).

Photographs from the later nineteenth-century show that arrangement similar to that as depicted on the Sprent survey, with two main buildings fronting Patrick Street two facing Harrington Street, however by the 1880s a cottage with a steeply-pitched roof and veranda onto the street was added to the Harrington Street frontage on the site of an earlier shed in that location (see difference between Figures 6 and 7). Figure 8 shows in more detail the two building facing Patrick Street (the corner of Patrick/Harrington denoted by the red line).

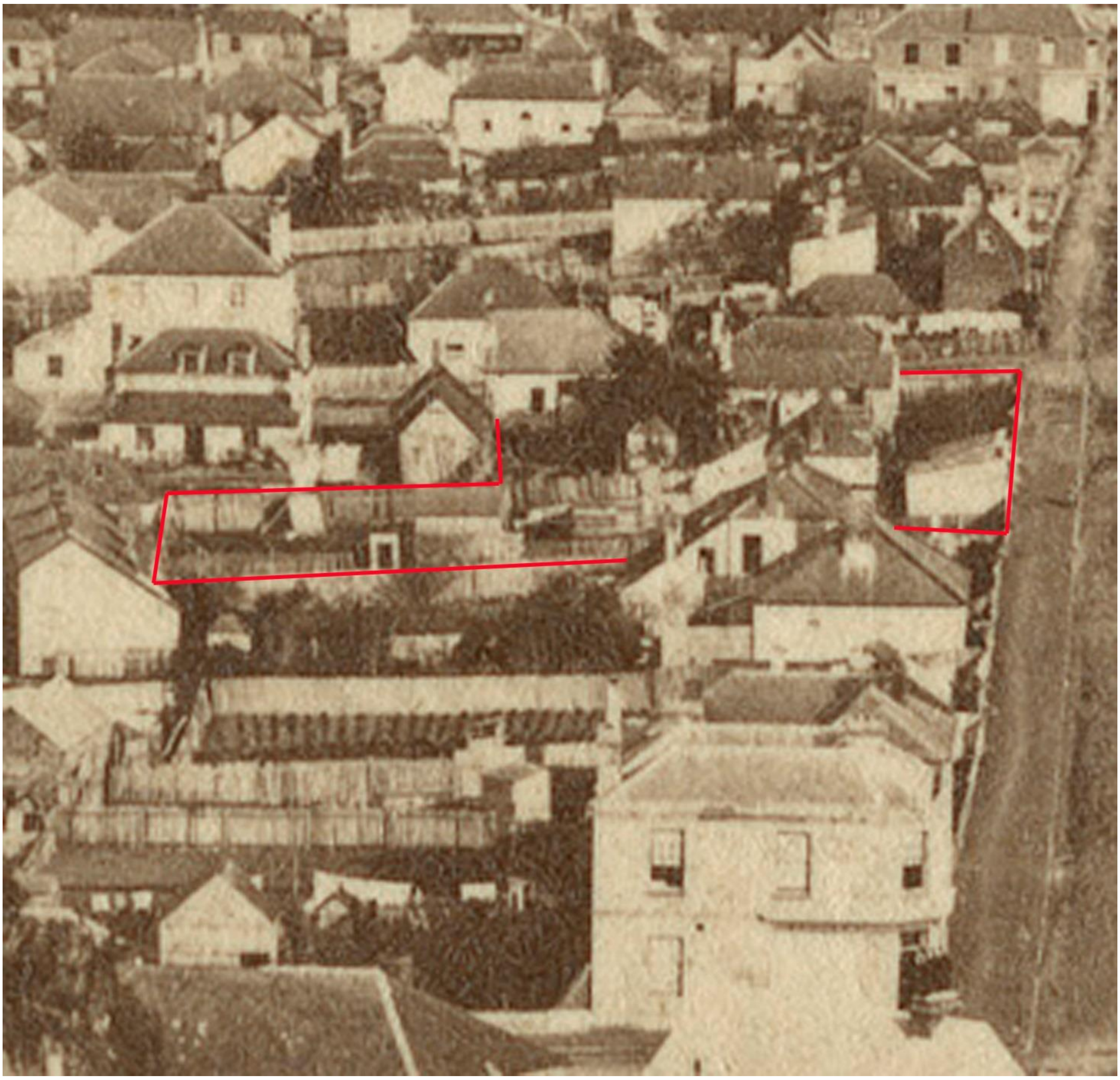


Figure 6 - Part of an 1865 stereoscope photograph across Hobart. State Library of Tasmania LPIC147-3-124.

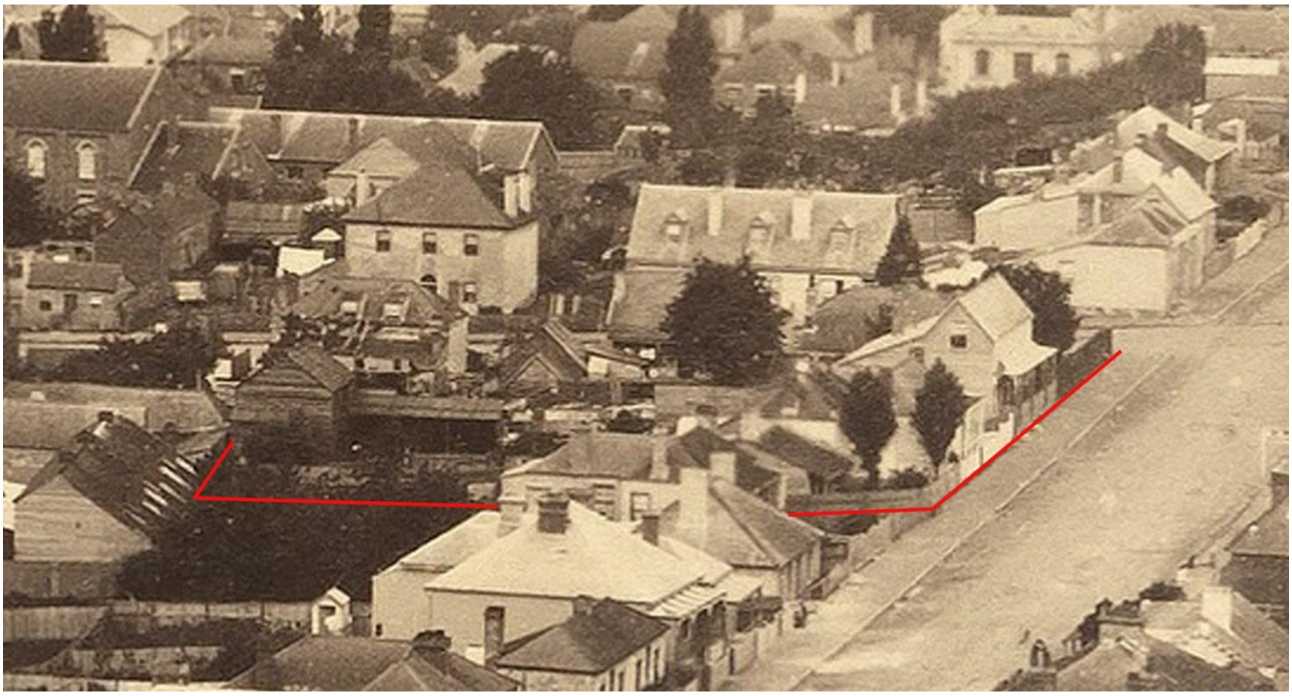


Figure 7 - Excerpt from a c1880s panorama of Hobart. Tasmanian Archive and Heritage Office NS2906-1-3.

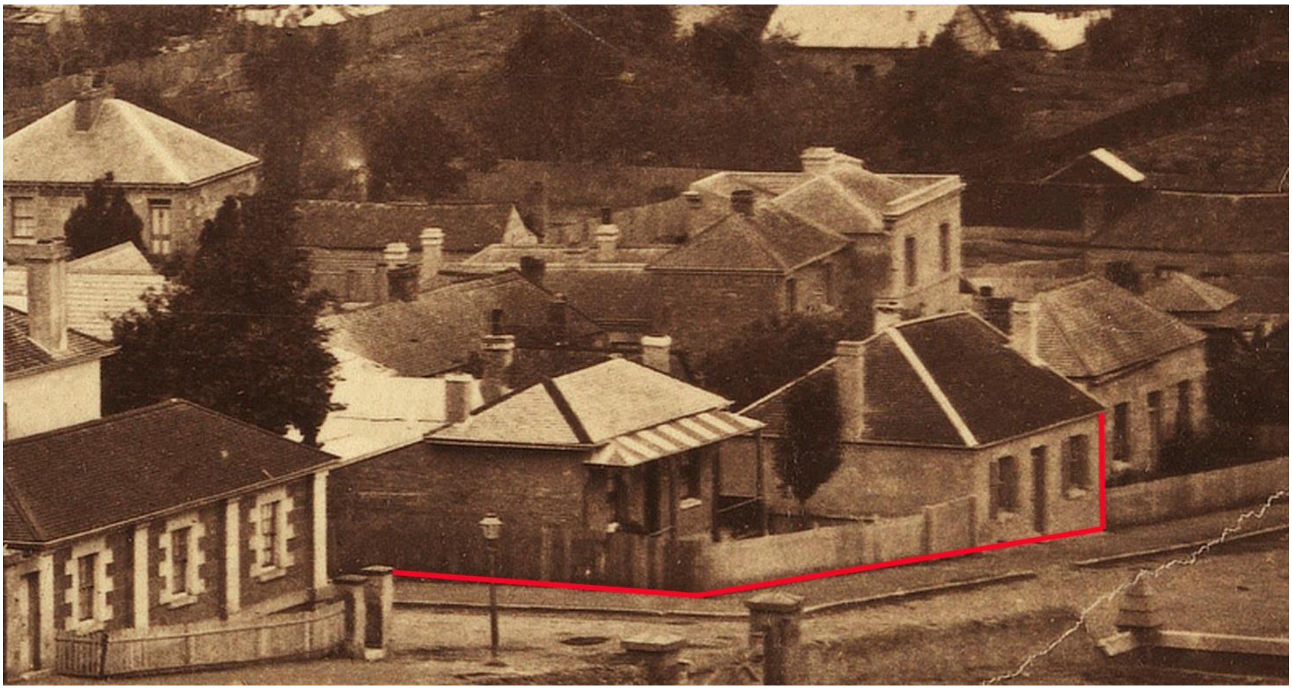


Figure 8 - Excerpt from a c1880s panorama of Hobart. Tasmanian Archive and Heritage Office PH6-1-64.

The 1890s photograph in Figure 8 depicts a similar configuration, essentially with three houses facing Harrington Street and two facing Patrick Street within the subject site. Those facing Patrick Street are small double-fronted cottages as best depicted on Figure 8, those facing Harrington Street are the two earlier conjoined houses (one much smaller and set back from the street) as well as the steeply pitched-roof cottage as seen in Figure 7. The 1908 Metropolitan Drainage Board survey shows again that similar arrangement, however by that time it appears that the pre-c1880 cottage (steep roof and veranda) fronting Harrington Street had been replaced by three narrow terrace houses (marked on Figure 10 as 209-213 Harrington Street). That survey also shows a series of outbuildings, some depicted in earlier photographs (sheds and privies).

Figure 9 - Excerpt from a c1890 panorama of Hobart. Tasmanian Archive and Heritage Office NS1013-1-522.

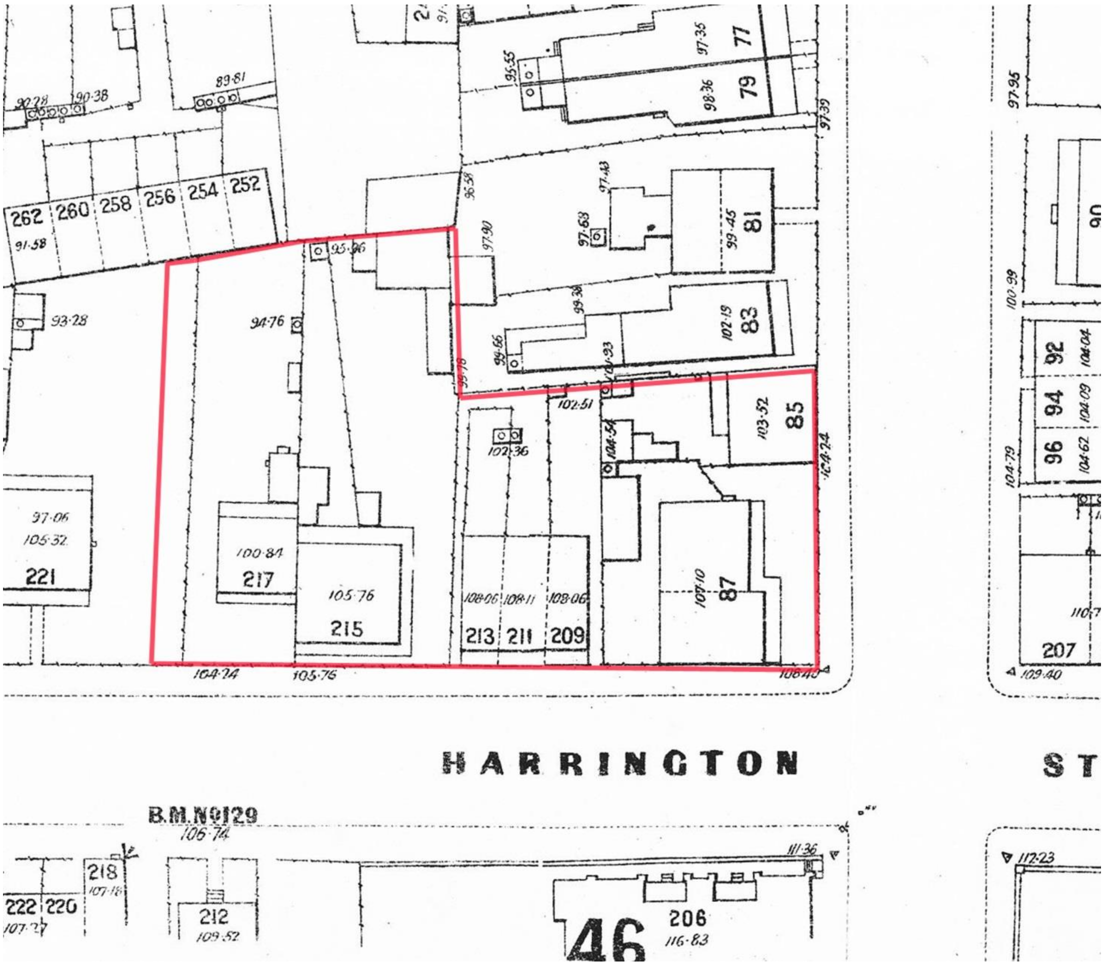


Figure 10 - c1908 Metropolitan Drainage Board plan of Hobart (Hobart Map 16 - State Library of Tasmania TL.MAP 881.11).

Figure 11, from the 1946 aerial run of Hobart shows the same arrangement of buildings as per the 1908 MDB survey.

Figure 11 – 1946 aerial photograph of Hobart. DPIPWE Hobart 1946 Run 5 10892.

Figure 12 depicts the overlay footprints of pre-1846 surveys of Hobart showing the earliest locations of development fronting Patrick Street and further up Harrington Street. Figure 13, drawn from the 1908 MDB survey, shows those similar building footprints, indicating that the earlier buildings had largely survived until then, but with some infill on the Harrington Street frontage as well as outbuildings which were either built in the last half of the nineteenth-century, or omitted from those earlier surveys. Figure 14 is an overlay of all known site development up to 1946 which shows that (in the absence of disturbance) would result in expected remains of those buildings and their occupation to be present mostly on the street frontages, with only the remains of outbuildings and ancillary structures further rearward.

Figure 12 - Overlay footprints of all known pre-1846 development as per the above surveys/maps (adapted from www.thelist.tas.gov.au.

Figure 13 - Overlay footprint of pre-1908 development (likely to include some pre-1846 development).

Figure 14 - Overlay footprint of pre-1946 development (likely to include some pre-1846 development – 1908 buildings outlined in orange).

Preliminary archaeological observations

As per the limitations above, it would appear that the main areas of archaeological potential are those fronting each street, with a large area at the rear of the site that *probably* has a lower archaeological potential (although may have remains of features such as wells, cesspits, drains, rubbish pits etc).

Although a comprehensive site history has not been undertaken, the pictorial analysis included here suggests that all buildings were *probably* domestic – however further research is required to ascertain whether there was any commercial/trade or other activity undertaken on the sites. Further research would be needed to possibly link the sites to prominent persons, or to at least indicate the 'status' of the inhabitants which would be required to pose an archaeological research design and ascertain the potential of these sites to yield information that may be of archaeological value.

Whilst site observations have not been undertaken, and no research has been undertaken thus far on the demolition of those earlier buildings and the construction of the current buildings (and any intermediate generations of buildings – therefore an adequate knowledge of disturbance is not able to influence archaeological judgments at this stage.

At this preliminary stage, I recommend:

- That this document accompanies the current development application to inform the planning authority that at least parts of the site are likely to have some archaeological potential.
- That a more detailed and rigorous SoHAP be formulated if the current proposal is approved.
- If that SoHAP confirms the preliminary findings here, then an archaeological impact assessment is to be formulated for the proposed development. This will need to consider the possibility of conserving archaeological remains, or if this is not prudent/feasible then the formulation of an archaeological method statement to mitigate impact and to yield archaeological potential and provide a public benefit (e.g. through publication and/or interpretation).
- All of the above is expected to form a condition(s) of any approval and be approved by council officers prior to implementation (if necessary) ahead of the commencement of construction (as further refined by any archaeological method statement.

Please contact me if you have any further queries or require any clarification.

Regards

Brad Williams BA. (Hons.) Archaeology, MA Cultural Heritage Management. G.Dip Environmental Planning.

Director – Praxis Environment

GES

GEO-ENVIRONMENTAL

SOLUTIONS

ENVIRONMENTAL SITE ASSESSMENT
209-215 HARRINGTON STREET, HOBART
SEPTEMBER 2018

1 EXECUTIVE SUMMARY

This report presents the findings of an Environmental Site Assessment (ESA) undertaken by Geo-Environmental Solutions Pty. Ltd. (GES) at the 209 to 215 Harrington Street, Hobart - hereby referred to as 'The Site'. GES was commissioned by Chau Nominees Pty Ltd to conduct the site assessment.

The requirement for an environmental site assessment has been triggered by the interim planning scheme (IPS) contaminated site overlay.

The site was previously owned by City Cabs Co-Operative Society Ltd. and formerly operated as a taxi call center, parking and re-fueling depot from approximately 1970 until 2006. It is understood that all petroleum- related infrastructure was removed from the site in 2006. A triple interceptor pit remains on the site which is believed to have been associated with a car wash at the site.

Previous environmental investigations, conducted by SEMF Pty Ltd (SEMF) and Coffey Environments (Coffey) in 2007 historically identified a dissolved phase petroleum hydrocarbon plume in the groundwater beneath the eastern corner of the site. The plume has not been delineated to the north-east, east and south-east.

The following is proposed at the site:

- It is proposed that the site changes from commercial to commercial/residential land use and will change from the existing car park and commercial offices to a large development which will encompass all existing titles comprising:
    - Basement carpark;
    - Ground floor commercial offices and car parking; and
    - First to third floor residential apartments;
- There will be site demolition and excavation works which will involve:
    - Removal of the existing building structures;
    - Excavation of the entire site to approximately 29 m AHD;
    - Construction of a basement and ground floor car park with multi-level apartments.

The scope of works of this ESA was to:

- Identify areas of concern and contaminants of concern through a desktop assessment;
- Collect groundwater from existing groundwater monitoring wells at the site and sample for contaminates of concern to assess potential onsite and potential offsite impact;
- Detail specific onsite human health risk and environmental impacts which may source from any contaminated groundwater;
- Drill nine (9) soil bores at the site to identify potential human health risk to onsite receptors from potential contamination impacted soil;
- Assess all risks with respect to proposed future land use which includes site demolition, soil excavation and commercial building development;
- Assess potential impact to surrounding offsite receptors; and
- Develop a conceptual site model (CSM) for the site and offsite if applicable to assess specific potential ecosystem and human health receptors.

The following contaminants have been identified based on the current and historical site investigations:

- PAH compounds in soil (including benzo(a)pyrene) and various heavy metals sourcing from the interceptor trap;
- Petroleum hydrocarbons in soil sourcing from former underground storage tanks;
- Hydrocarbon impact historically identified in the aquifer at the site has not been detected in this assessment; and
- Although not all hydrocarbon impacted wells could be sampled, no further vapour intrusion assessment is required given the basement mixing environment and carpark ventilation requirements;

Based on an assessment of soil, groundwater and soil petroleum hydrocarbon vapour at the site, a human health risk has not been identified to the either of the following receptors:

- Site development workers;
- Future site users;
- Future site trench workers

Management measures need to be put in place to manage offsite sediment transport from stormwater and vehicle trafficking.

The offsite migration of hydrocarbon impacted groundwater has not been assessed in this report.

Provided the recommendations herein are implemented, the following conclusions can be made:

- A risk to potential receptors has not been identified during and after development.
- All samples collected at the site are below threshold concentrations for assessing risk to human health;
- No particular health and safety issues are identified which may originate from onsite contamination activities;
- Other than advice provided within the recommendations section of this report, there are no specific remediation and protection measures required to be implemented before excavation commences;
- As a result of proposed site excavation, there is a very low human health risk to future users of the site; and
- GES advise that during site excavation works for site redevelopment, there is a low risk that site contamination will present an environmental risk.

A soil and water management plan is required to reduce the spread of onsite soils and water. Water should be collected and tested before it is discharged to the stormwater system.

Level 2 and 3 materials proposed to be excavated will require management where identified in fill and natural soils in the western corner of the site and near the former interceptor trap.

An excavation management plan is recommended to minimize the risk of contaminating clean Level 1 soil at the site which is proposed to be excavated. Additional soil sampling prior to excavation works is optional to further classify proposed material for disposal at a licensed landfill.

In summary, if recommendations herein are implemented, based on the adopted land used class, there is a low risk that residual contamination at the site will present a risk to human health or the environment.

Table of Contents

Figures

Tables

2 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
COA	Certificate of Analysis
COC	Chain of Custody
COPC	Chemical 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
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	National Environmental Protection Measure
NHMRC	National Health and Medical Research Council
NRMMC	Natural Resource Management Ministerial Council
NL	Non Limiting
NRMMC	Natural Resource Management Ministerial Council

PAH	Poly-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

3 INTRODUCTION

3.1 General

This report presents the findings of an Environmental Site Assessment (ESA) undertaken by Geo-Environmental Solutions Pty. Ltd. (GES) at the 209 to 215 Harrington Street, Hobart - hereby referred to as ‘The Site’. The site location is presented in Figure 1.

GES was commissioned by Chau Nominees Pty Ltd to conduct the site assessment.

This ESA has been prepared by a suitably qualified and experience practitioner in accordance with procedures and practices detailed in National Environmental Protection Measure (NEPM; 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.

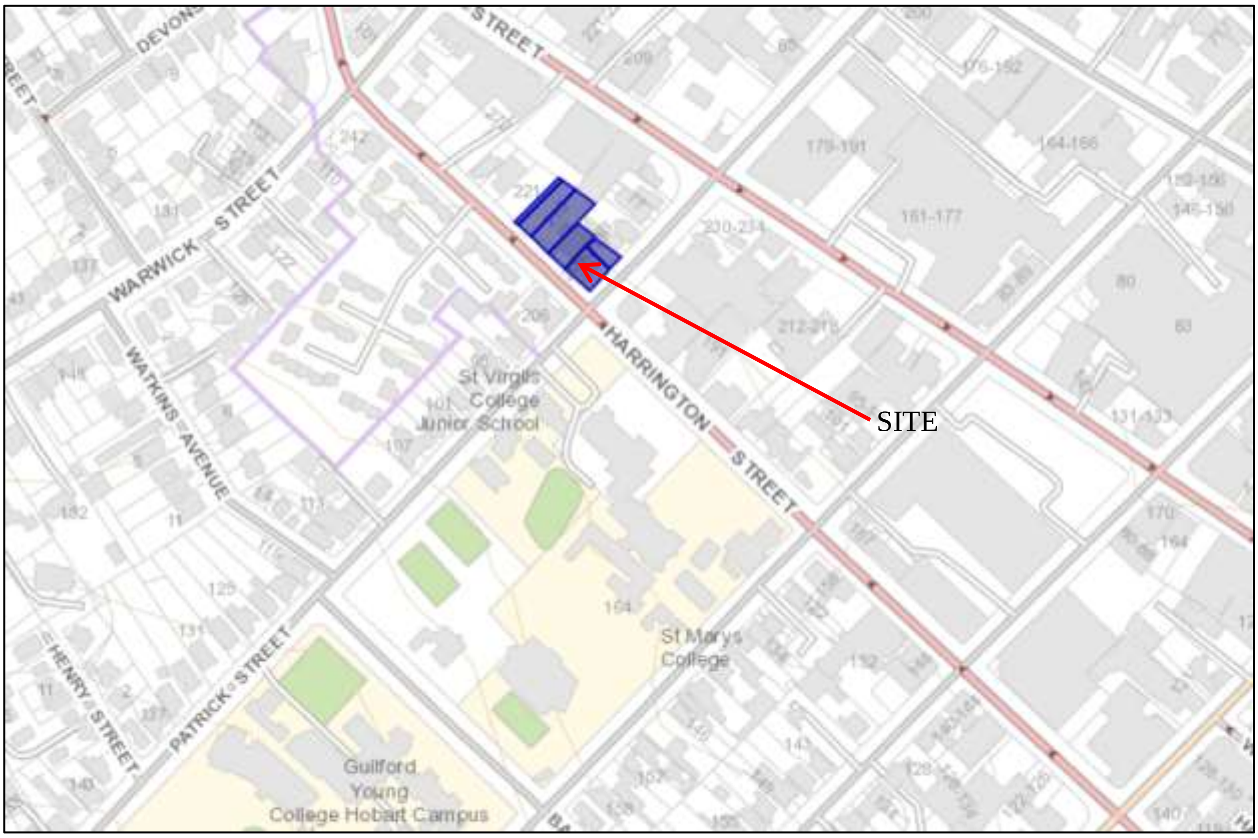


Figure 1 Site Location

3.2 Background

The site was previously owned by City Cabs Co-Operative Society Ltd. and formerly operated as a taxi call center, parking and re-fueling depot from approximately 1970 until 2006. It is understood that all petroleum- related infrastructure was removed from the site in 2006. A triple interceptor pit remains on the site which is believed to have been associated with a car wash at the site. Prior to its operation as the cab depot, the site use is unknown.

Previous environmental investigations, conducted by SEMF Pty Ltd (SEMF) and Coffey Environments (Coffey) in 2007 historically identified a dissolved phase petroleum hydrocarbon plume in the groundwater beneath the eastern corner of the site. The plume has not been delineated to the north-east, east and south-east.

Residual soil impact at concentrations were identified above the former Underground Storage Tank (UST) in the eastern corner of the site at a minimum depth of 1 .4metres below ground surface (mgbs).

3.3 Site Layout

A schematic of the existing site layout is presented in Figure 2, Plate 1 & Plate 2.

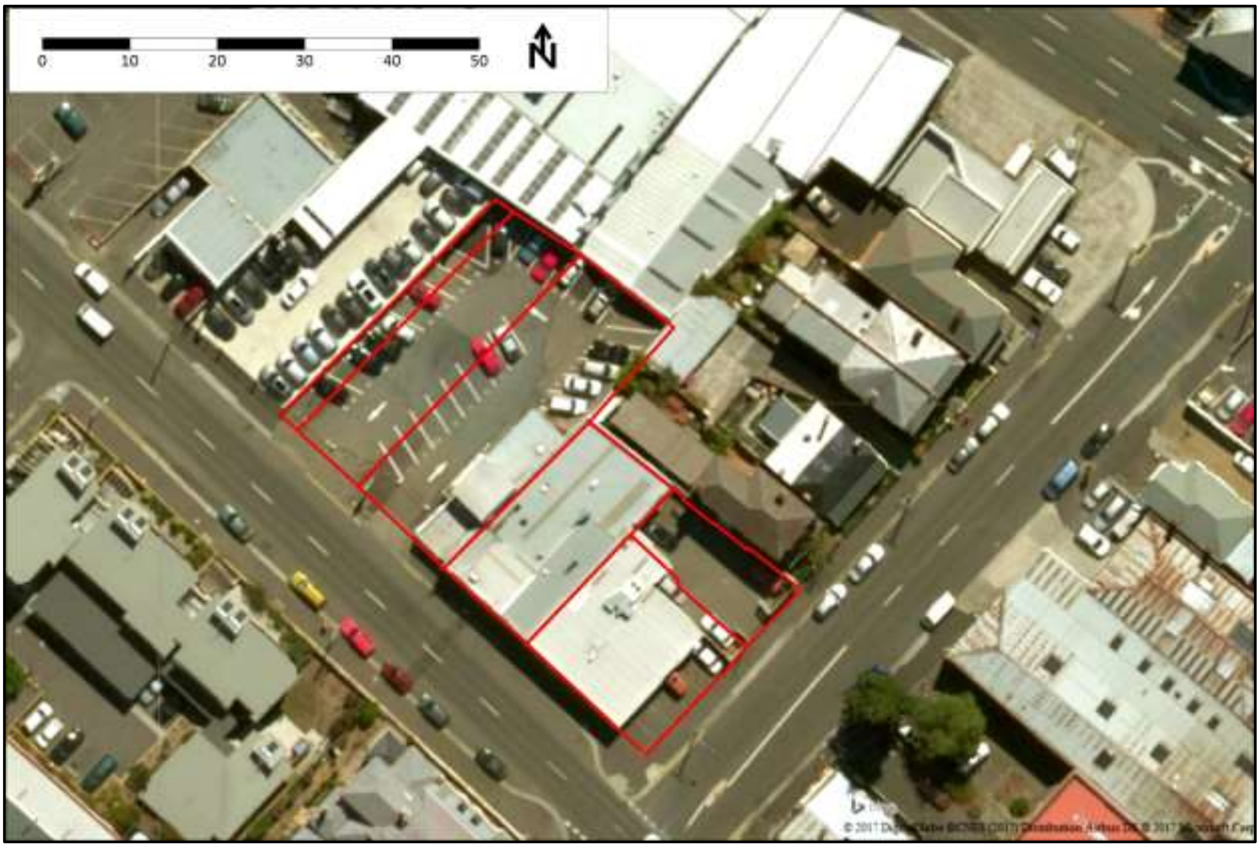


Figure 2 Existing Site Layout

Plate 1 Aerial View of The Site

Plate 2 Aerial View of The Site

3.4 Site Details

Site details are presented in Table 1.

Table 1 Site Details

SITE LOCATION: 209-215 Harrington Street, Hobart
INVESTIGATION AREA 209-215 Harrington Street only. Limits approximately defined by borehole extent
SITE ELEVATION & GRADIENT 28 to 32.5 m AHD with an average 15% gradient in local area to the north-east
SITE SURFACING The surface of the site is bitumen paved and with building slabs
TITLE REFERENCES The investigation area includes the following title references: CT 52394/1 (shared ROW with 221 Harrington St) CT52395/1 CT232390/1 CT203787/1 CT247958/1 CT197488/1
SITE OWNER CHAU NOMINEES PTY LTD
PREVIOUS LANDUSE Unknown
SITE SURROUNDING LAND ZONING Hobart Interim Planning Scheme 2015 23.0 Commercial (north) 11.0 Inner Residential (south)
SITE LAND USE - Commercial: Private Car Parking (825 m^2) Jackson Security offices (436 m^2) Industry Link Culinary School (220 m^2) Office car parking (260 m^2)
PROPOSED LAND USE Basement car park, commercial & carp park on the ground floor and residential units above ground floor
SURROUNDING LAND USE: NW – Car Yard & Printing Supplies Shop; SW – Residential; SE – Restaurant & Toy Shop; E – Vehicle Servicing Workshop; NE – Residential; N – Jacksons Motor Car Company

3.5 Investigation Objectives

The objective of this ESA was to:

- Determine the suitability of the site for the intended use;
- Review any historical contaminated site assessment reports or documents which may indicate previous land use which may have had involved contaminating activities
- Assess the following at the site:
    - Chemicals of Potential Concern (COPC's);
    - Areas of Environmental Concern (AEC); and
    - Human and Environmental health risk.
- Conduct an invasive investigation in areas where site development is proposed;
- Conduct groundwater monitoring to assess potential risk to site users;
- Determine the potential for offsite impact from site contamination, and implications for offsite ecosystem receptors;
- Assess any environmental site assessment data gaps;
- Provide recommendations on what measures may need to be put in place to address any potential data gaps and to further assess contamination remediation and/or management (if required).

3.6 Scope of Works

The scope of works of this ESA was to:

- Identify areas of concern and contaminants of concern through a desktop assessment;
- Collect groundwater from existing groundwater monitoring wells at the site and sample for contaminates of concern to assess potential onsite and potential offsite impact;
- Detail specific onsite human health risk and environmental impacts which may source from any contaminated groundwater;
- Drill nine (9) soil bores at the site to identify potential human health risk to onsite receptors from potential contamination impacted soil;
- Assess all risks with respect to proposed future land use which includes site demolition, soil excavation and commercial building development;
- Assess potential impact to surrounding offsite receptors; and
- Develop a conceptual site model (CSM) for the site and offsite if applicable to assess specific potential ecosystem and human health receptors.

4 PLANNING

4.1 Proposed Site Development Works

The following is proposed at the site:

- It is proposed that the site changes from commercial to commercial/residential land use and will change from the existing car park and commercial offices to a large development which will encompass all existing titles comprising:
    - Ground floor carpark and commercial (retail) offices; and
    - First to third floor residential apartments;
- There will be site demolition and site preparation work (Figure 3) which will involve:
    - Removal of the existing building structures;
    - Site filling below 32.1 m AHD within the proposed car parking areas;
    - Minor excavation and fill works to 32.7 m AHD within the two retail/lobby/stairwell/lift areas of the site; and
    - Construction of multi-level apartments.

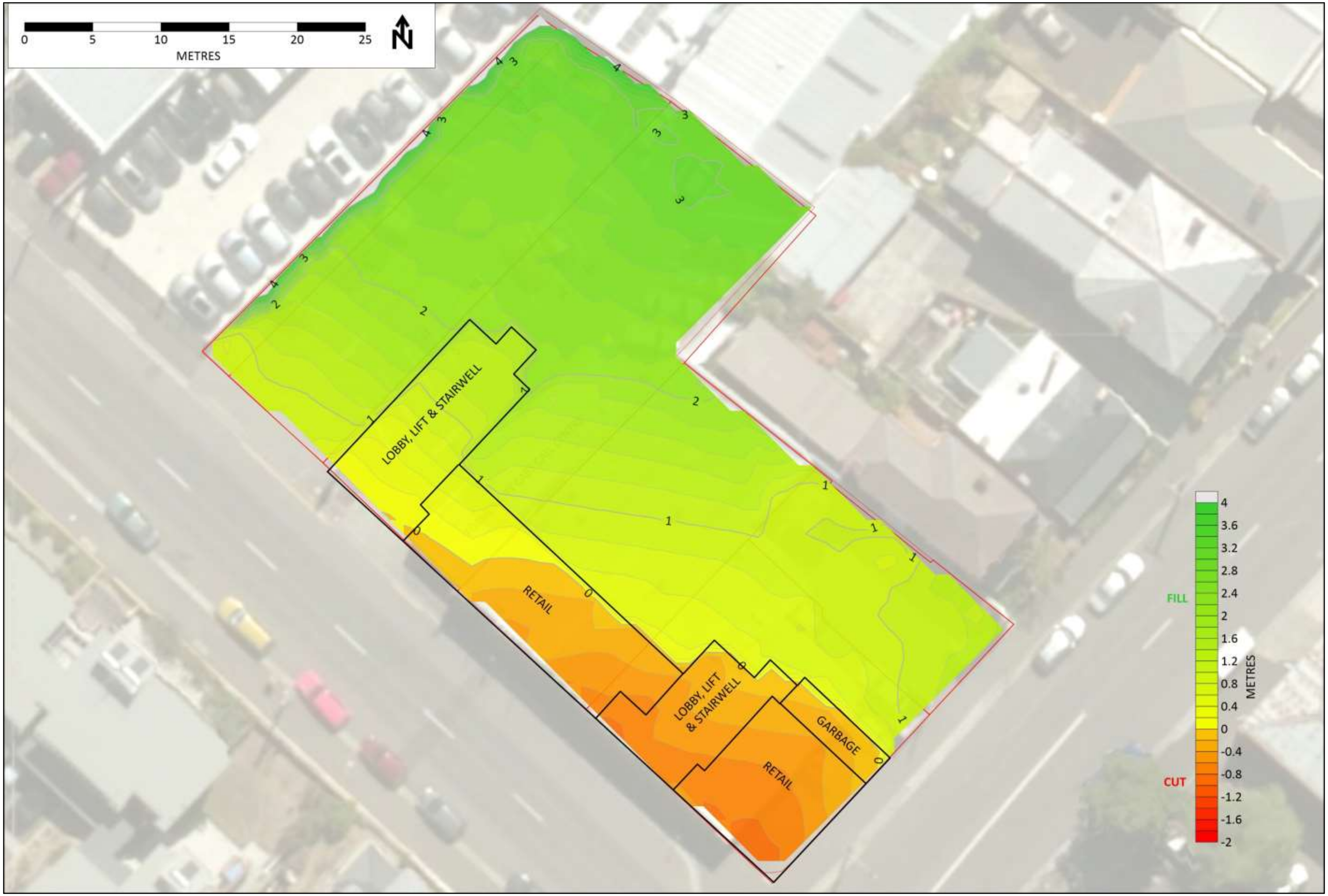


Figure 3 Proposed Site Development Ground Floor Layout with Proposed Excavation and Filling Relative to Current (2013 Mt Wellington LIDAR) Level

The risk assessment herein depends on likely soil, groundwater or vapour exposure pathways based on:

- Present site conditions;
- Proposed development site layout and building construction; and
- Site earthworks.

4.2 Assessment Trigger

The need for this assessment has been triggered by the following:

- The site falls within the Hobart City Council contaminated site overlay and need to be assessed in accordance with the following interim planning scheme code:
    - *E2.5 Use Standards (change of use from commercial to partial residential)*
    - *E2.6.2 Excavation*.
- Given that there is proposed ***excavation works*** at the site, there are no acceptable solutions to proposed works, and therefore E2.6.2 P1 performance criteria are to be addressed
- Given that there is a proposed ***change of use*** at the site *the authority director, or a person approved by the director for this code is required to:*
    - a) certify 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.

4.3 Performance Criteria

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.

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.

5 DESKTOP STUDY

5.1 Site Walkover

A site walkover was completed by GES staff. Attention was paid mainly to the accessible paved areas of the site, and notice was taken of any spill locations or areas at the site that might present a source of potential contamination (Appendix 2).

5.1.1 Surface Coverings

The surface condition of bitumen across the site was generally good but may not reflect the previous site condition when it was operating as a City Cabs.

5.1.2 Signs of Contamination

No oily stains could be identified around the former City Cabs site. There was some staining around the waste bins in the small yard fronting on Patrick street.

5.2 MRT Geology Mapping

The geology of the site has been mapped on a 1:25,000 scale by Mineral Resources Tasmania (Figure 4) and is inferred to be underlain with:

- Tertiary age, poorly-consolidated interbedded claystone, sandstone and pebble conglomerate (Tse);

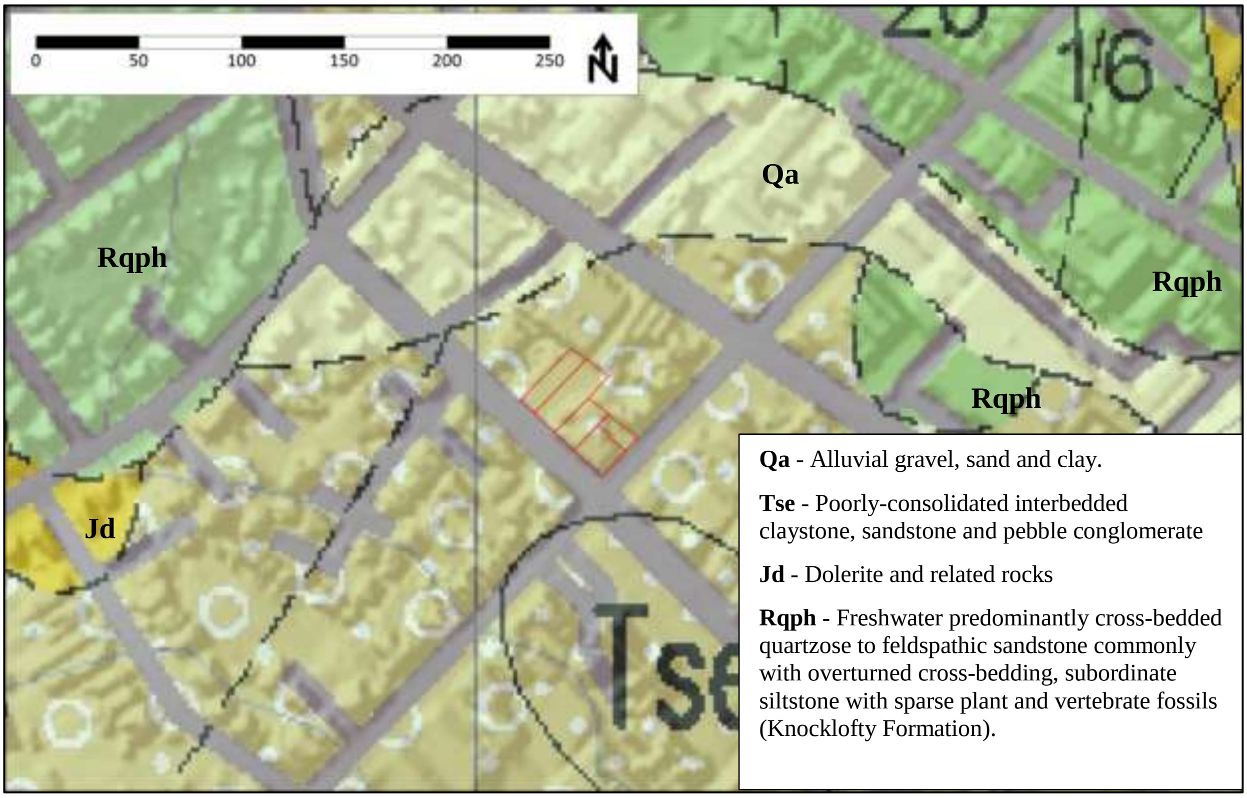


Figure 4 Mineral Resources Tasmania 1:25000 Scale Mapping (The LIST).

5.3 Site Topography, Drainage & Hydrogeology

The site ranges in elevation from 28 to 32.5 m AHD and has an average gradient of 15% to the north-east in local area. Some of the contours in the area are confused by cut and fill, with a likely fill of 1 m in the northern corner of the former City Cabs site and likely deep cuts of up to 2 m on the neighboring site to the northwest. There are surface water spoon drains and/or grates around the northern perimeter of the former City Cabs site and the western perimeter of the yard.

On a local scale, groundwater is inferred to be migrating to the northeast towards Jacksons Motor Company site within a perched aquifer and then to the east based on broad scale topographic trends (Figure 5).

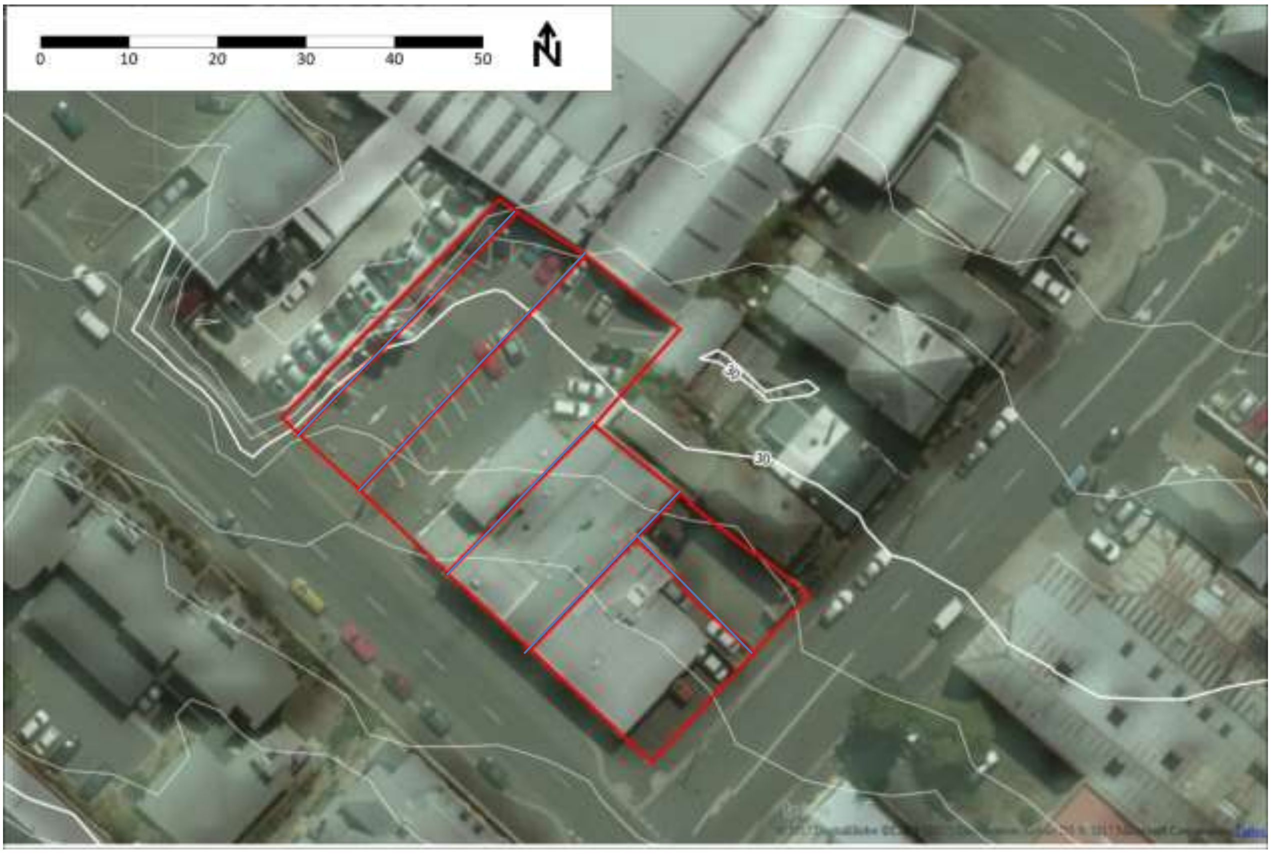


Figure 5 Surface Topography

5.4 Historical Aerial Photography Interpretation

Historical aerial photographs of the site were collated from the Department of Primary Industries, Parks, Water and Environment (DPIPWE).

Table 2 presents a summary of alterations to the site between photo events and the individual aerial photos are presented in Plate 3 & Plate 10.

Table 2 Historical Aerial Photograph Review

Photo	52394/1	52395/1	232390/1	203787/1	24/79/58/1	197488/1
1957 Plate 3	Car wreckers.	Car wreckers.	Large historical residence. Large backyard with a couple of smaller sheds.	Large historical residence with many trees in the backyard.	Large residences with a small yard on the norther portion of the lot and a couple of conjoined outbuildings.	Small residence fronting on Patrick Street.
1958 Plate 4	As above	As above	As above	As above	As above	As above
1969 Plate 5	As above	As above	As above	The site building has been demolished and replaced with a shed covering the entire site except for three off-street carparks.	Possible car park off Harrington Street alongside the northern boundary (on the northern side of the residence).	Backyard looks to be paved. Residence remaining.
1973 Plate 6	As above	As above	The site appears to have been infilled and is possibly used as a commercial space with a small shed built on the southern boundary.	As above	A shed has been built in place of the carpark. The existing house and outbuilding have been retained.	As above with cars in the backyard and side lane.
1977 Plate 7	As above	As above	Very uniform looking cars present on the site may be taxi's.	The off-street carparks have been made under cover with a tall pitched roof as apparent in present day.	As above	Residence has been demolished. Used as a car parking/storage yard.
1989 Plate 8	Taxi car park, refueling & call center.	Taxi car park, refueling & call center. Pavement removed above UST	The taxi call center has been expanded to double the size with a smaller second level. A canopy has been placed over the bowsers.	As above	As above	Car parking
2007 Plate 9	Taxi car park, refueling & call center	Taxi car park, refueling & call center	As above	As above	All site buildings have been demolished and replaced with the existing Jacksons Security building.	As above
2016 Plate 10	Carpark	Carpark	The canopy has been deconditioned but the call center remains. The site has been converted into a carpark.	As above	As above	As above

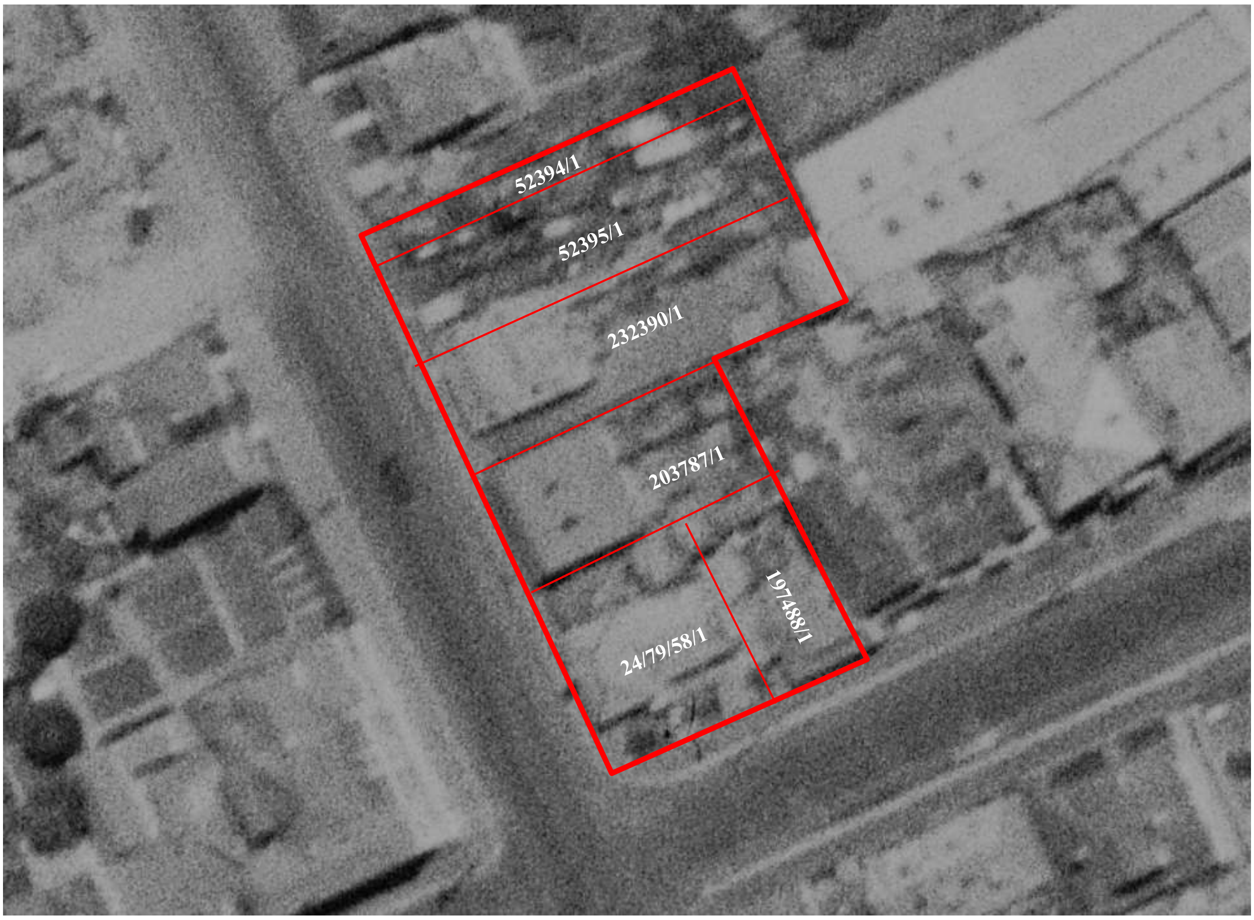


Plate 3 Historical Aerial Photograph, The Site 1957

Plate 4 Historical Aerial Photograph, The Site 1958

Plate 5 Historical Aerial Photograph, The Site 1969

Plate 6 Historical Aerial Photograph 1973

Plate 7 Historical Aerial Photograph 1977

Plate 8 The Site Aerial Photograph 1989

Plate 9 The Site Aerial Photograph 2007

Plate 10 The Site Aerial Photograph 2016

5.5 Previous Site Investigations

The following environmental site assessments are known to have been conducted at the site:

- Connelly Environmental 2006 Analysis of validation samples: City Cabs: 215 Harrington Street, Hobart 7001. Letter report, dated 18 April 2006.
- SEMF 2006 City Cabs, 215-217 Harrington Street, Hobart, Environmental Site Assessment Report. Dated December 2006.
- SEMF 2007a BSG Electrical Pty. Ltd., 215-217 Harrington Street, Hobart, stage 2 Environmental Site Assessment Report. Dated August 2007.
- SEMF 2007b Heath Risk Assessment, City Cabs, 215-217 Harrington Street, Hobart. Dated 14 August 2007.
- Coffey Environments 2007. Health Risk Assessment. Former City Cabs Site 215-217 Harrington Street, Hobart, Tasmania. Prepared for BSH Electrical Pty Ltd 213 Harrington Street Hobart, Tasmania 7000, 31 October 2007.

The following reports, which contain information pertaining to the historical and current site conditions including soil and groundwater data, were reviewed for this assessment:

- SEMF 2007 Heath Risk Assessment, City Cabs, 215-217 Harrington Street, Hobart. Dated 14 August 2007.
- Coffey Environments 2007. Health Risk Assessment. Former City Cabs Site 215-217 Harrington Street, Hobart, Tasmania. Prepared for BSH Electrical Pty Ltd 213 Harrington Street Hobart, Tasmania 7000, 31 October 2007.

5.5.1 Site Infrastructure Summary

Coffey 2007 report details that all site underground petroleum storage system (UPSS) infrastructure which was historically present at the site has been decommissioned. A total of three underground storage tanks and four bowsers have been removed from the site. It is presumed that associated pipework has also been removed. There was no sign of the triple interceptor trap on the northern corner of the site.

5.5.2 SEMF 2007

The following can be concluded from the Health Risk Assessment at 215-217 Harrington Street:

- Given the proposed basement carpark and limited opportunity for access to impacted soil, the HIL D investigation limits apply. Of the 16 soil samples collected from 6 soil bores (Figure??) all heavy metal concentrations were below HIL D investigation limits for assessing commercial/industrial sites. NEPM 2013 HIL threshold for commercial sites are noted to have either increased or remain the same in the case of lead;
- There was minor occurrence of TPH C_6-C_9 type compounds detected in BH4-3.0 and BH5-2.9 which exceeded historical investigation limits, but are identified to be below NEPM 2013 F1 threshold investigation limits for assessing vapour intrusion risk on commercial/industrial sites for all soil types and depths;
- Benzene, toluene, xylene and ethylbenzene concentrations were below NEPM 2013 HSL D threshold limits for assessing vaporing intrusion risk for all soil types and depths,
- Based on the substances identified on site, their concentrations, and the isolated pockets in which they occur, SEMF concluded that the human health risk was very low, as such, acceptable.

5.5.3 Coffey Environments 2007

The following can be concluded from the Health Risk Assessment at 215-217 Harrington Street:

- The purpose of the Coffey HRA was to assess the potential health risks to on- and off-site populations associated with petroleum hydrocarbon impact identified in soil and groundwater based on non-sensitive commercial/industrial use of the site, and residential and commercial land uses of properties located hydraulically down-gradient;
- Coffey did not assess impacts from contaminants other than petroleum hydrocarbons or risks to off-site ecological receptors;
- Coffey identified soil and groundwater impact is associated with the storage of petroleum-based products at the site;

- Benzene, toluene and ethylbenzene concentrations (consistent with unleaded fuel) were highest in CC3, followed by CC5 and CC6. CC3 is adjacent to the former petroleum bowsers, and CC5 is downgradient (to the north) of the same bowsers;
- TRH C_{10} to C_{36} concentrations (consistent with diesel type fuel) are highest in CC5, followed by CC3, CC6 and CC2.
- Based on the distribution of the diesel contamination plume, it is apparent that groundwater may be migrating to the northeast (if the diesel leak is originated from the bowsers) or the east to north-east if the diesel leak originated from the diesel UST T2. This contrasts with Coffey inferred east to south easterly groundwater flow;
- Concentrations of contaminants in soil samples only exceeded both the DTAE (2006) Further Investigation Thresholds and the NEPM HIL F guideline for commercial industrial land use at one location;
- Coffey conducted a quantitative risk assessment and concluded that COPC concentrations identified in soil and groundwater, were not considered to present an unacceptable health risk to on-site and off-site commercial and maintenance workers and off-site residential occupants, based on the future non-sensitive commercial land use and commercial and residential properties hydraulically down-gradient of the site;
- Coffey noted that the triple interceptor pit was not investigated and potential hydrocarbon impact beneath this area is not known and is therefore considered to be a limitation of their assessment. Coffey concluded that if impact is detected in this area during redevelopment of the site, then an additional assessment of the potential health risks may be required;

5.6 Groundwater

5.6.1 Potential Up-Gradient Contamination Sources

There are no known potential contaminated sites upgradient of the site other than a service station on the corner of Hill Street and Patrick Street approximately 500 m to the southwest. Contouring indicates that groundwater from this service station is likely to divert to the east of the site. There are only residential dwellings and school hydraulically upgradient of the site.

5.6.2 Downgradient Ecosystem Receptors

It is inferred that groundwater at the site locally diverts to the northeast before intersecting the bottom of the valley 100 m to the north and following the Quaternary alluvial sediments along the former rivulet alignment towards the Derwent River marine ecosystem environmental setting. The total length of the course is anticipated to be approximately 800 m.

5.6.3 Water Bore Users

Mineral Resources Tasmania Registered water bores are presented in Appendix 3. The nearest registered groundwater bore to the site (bore ID 2864) is located approximately 2.5 km to the north of the site in a Jurassic dolerite fractured rock aquifer. The groundwater within that bore 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 groundwater in this bore is not expected to be entirely representative of the groundwater at the site. The Tertiary deposits around Hobart are typically quite salty, and similar or higher TDS values are expected.

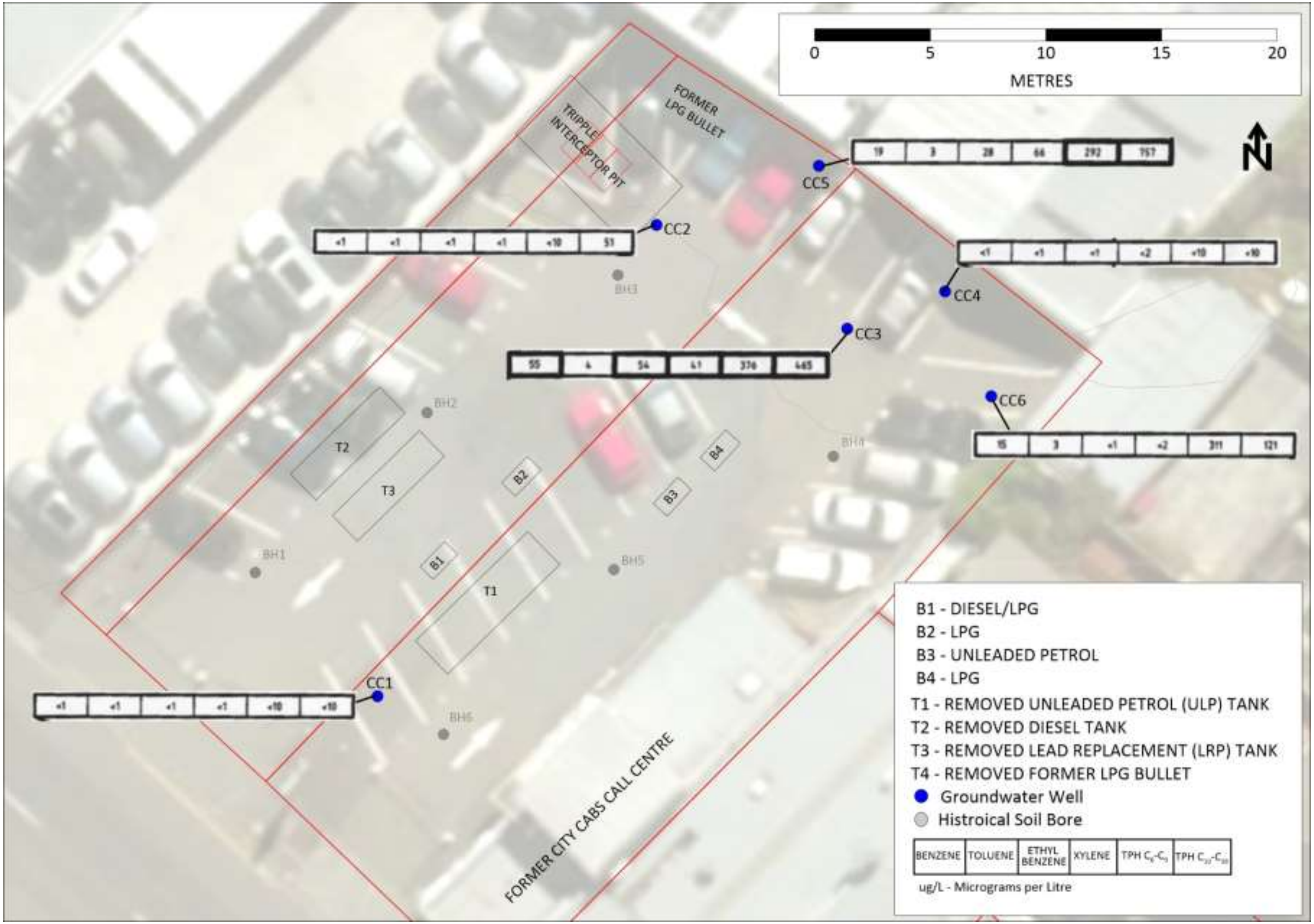


Figure 6 Summary of Historical Investigation Points, Known Site Infrastructure Associated with Petroleum Storage and Use & Historical Analytical Results

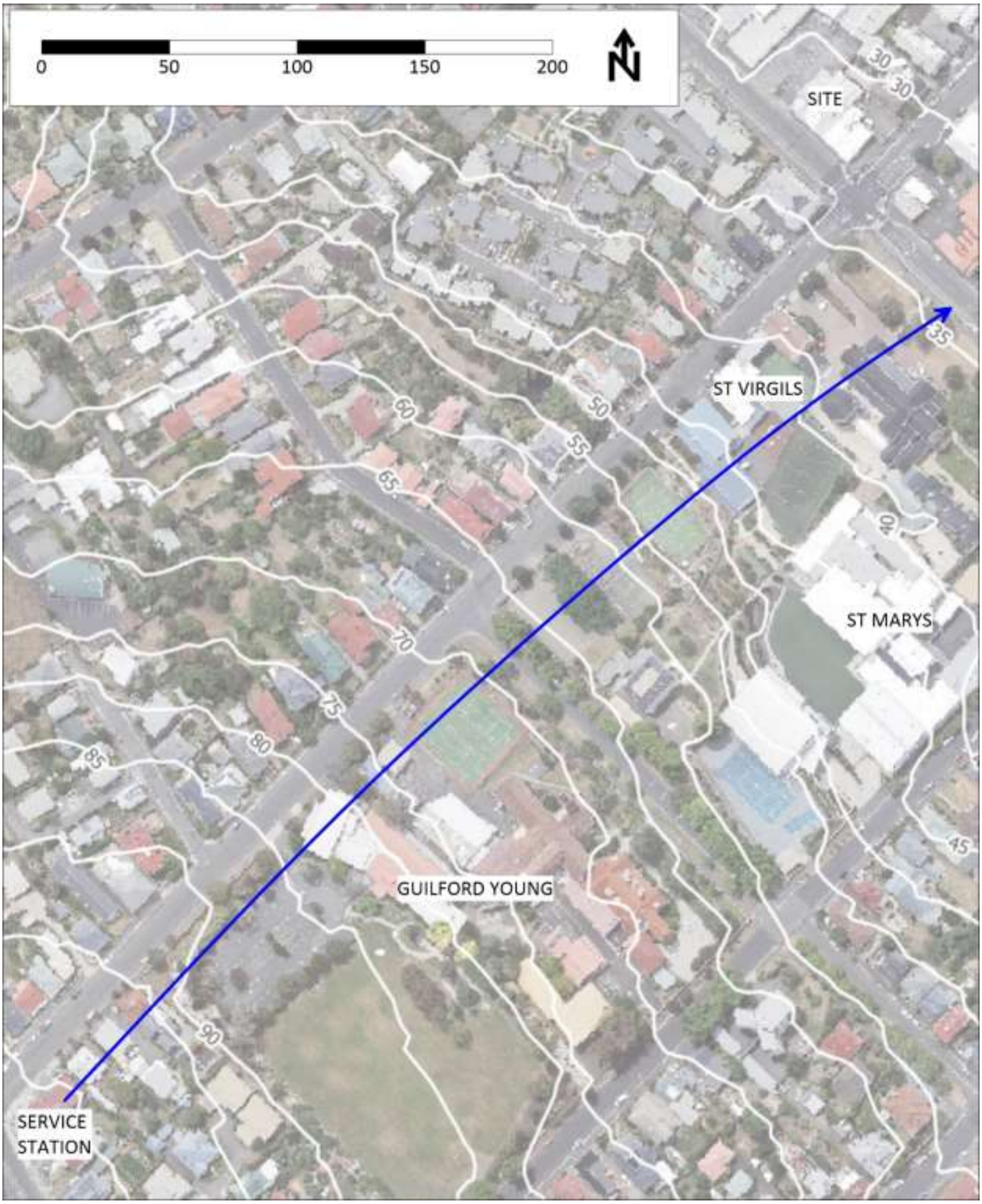


Figure 7 Potential Upgradient Contaminating Activities

Figure 8 Regional Topography with Inferred Groundwater Flow Direction

5.7 Potential Contamination Issues

5.7.1 Areas of Potential Concern

The following areas of potential concern have been identified:

- Before 1957 to between 1977 and 1989, lots 52395/1 & 52394/1 have been used as a car storage yard and probably a car wrecker. It is not apparent if the site was paved during this period but may have been a source of hydrocarbon spills;
- Between 1967 and 1973, fill material was disposed onto the northern side of lot 232390/1;
- Lots 52395/1, 52394/1 &232390/1 may have been used as a taxi can center since 1973 and certainly between 1977 and 2007, with the installation UPSS infrastructure on the site;
- It is no clear how much soil been removed from around the UPSS infrastructure. This soil at the historical locations has not been identified at a risk to human health or environment;
- GES are not aware of any groundwater contour diagram which has been historically produced for the site. Assumptions were made that the impacted wells CC3 and CC5 are either hydraulically or topographically downgradient (to the northeast) of the UPSS infrastructure. This needs to be clarified with revised gauging to ensure groundwater monitoring wells have been appropriately placed;
- Although Coffey identified that groundwater concentrations did not exceed modelled threshold limits for assessing vapour intrusion, this is based on the previous development proposal (details of which are not available) which may not reflect proposed change of use for this development. A revised vapour intrusion assessment is therefore required to determine how changed site conditions (deep excavations and basement carpark) will affect vapour intrusion risk to future site users;
- Groundwater ecological risk was not assessed by Coffey;
- The proposed development will involve excavation and disposal of soil which may be impacted. The soil needs to be reassessed against NEPM 2013 criteria for assessing ecological and human health risk and compared against IB150 for determining disposal fate; and
- Data gaps in the historical assessment include the interceptor trap. GES are not aware of any formalized UPSS decommissioning validation reporting.

5.7.2 Contaminants of Potential Concern

Contamination from the site source from underground fuel storage and dispensing infrastructure. COPC include the following:

- Total Petroleum/Recoverable Hydrocarbons (TPH/TRH) from various sources;
- Mono Aromatic hydrocarbons: Benzene, Toluene, Ethylbenzene, Xylene (BTEX) sourcing from leaded fuel stored and dispensed at the site;
- Polycyclic Aromatic Hydrocarbons (PAH) potentially in the fill and sourcing from the historical vehicle wreckers;
- Lead from unleaded fuel, batteries stored in the car yard part of the site; and
- General heavy metals which may be present within the fill material.

6 FIELD INVESTIGATION PROCEDURES

6.1 Works Summary

Site investigation works comprised of soil bore drilling which is summarised in Table 3 and Figure 9.

Table 3 Summary of Site Investigation Work Dates

Hole ID	**SB# Drill & Sample**	**Locate Existing Wells**	**MW# Gauge**	**MW# Purge & Sample**
BH01-BH09	31/10/17		-	-
CC1, CC2, CC4*	-		25/9/17	25/9/17
CC6	26/9/17		-	-
CC1, CC2, CC6	-		16/11/17	-

SB Soil Bore; CC – Monitoring Well

* CC3 & CC5 could not be located or were badly damaged and inaccessible

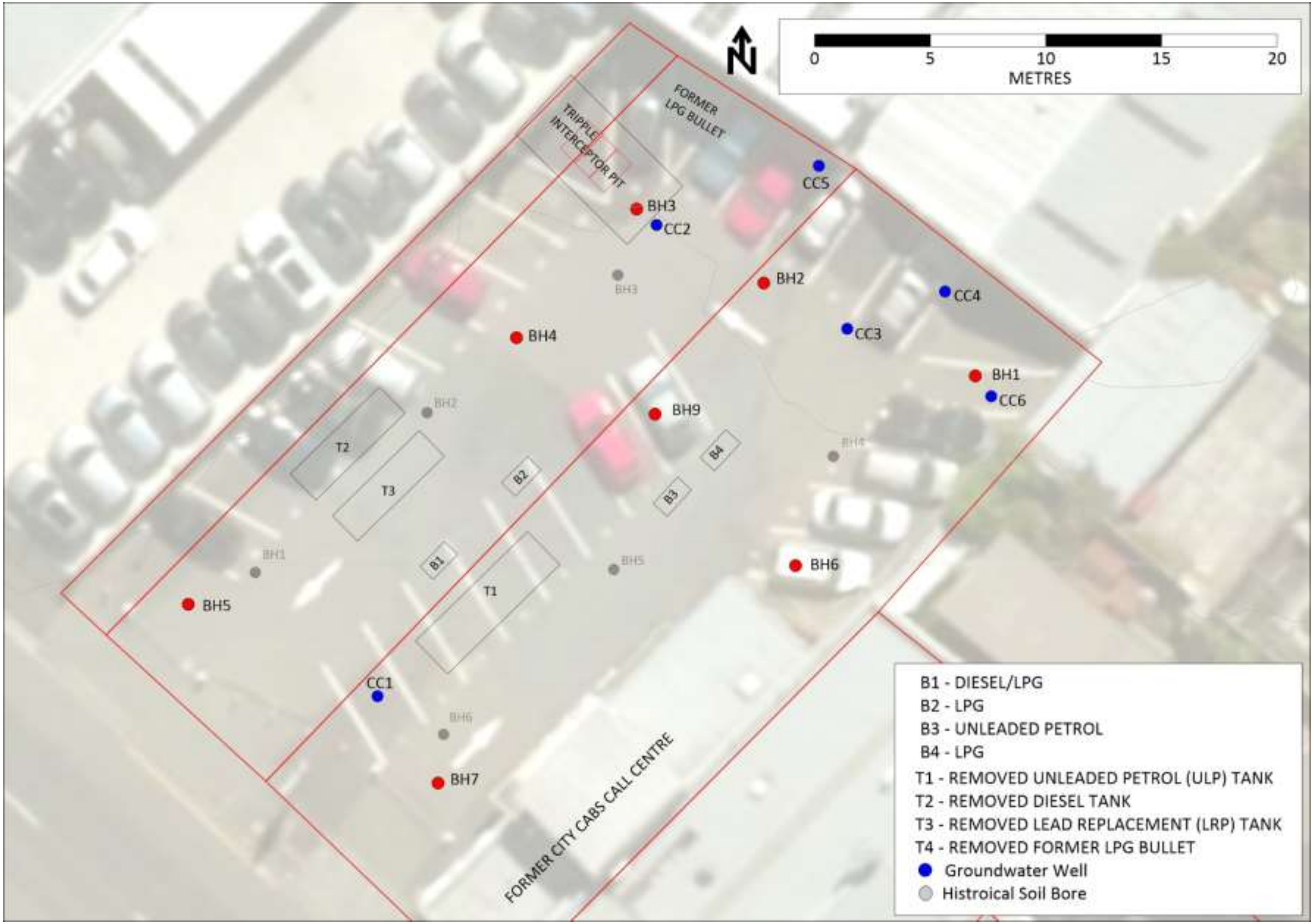


Figure 9 Test Pit (TH1 the TH3) and Borehole (BH1 to BH3) Investigation Areas

6.2 Soil Investigation

6.2.1 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 and concrete at each drilling location as required.

A total of nine (9) 65 mm diameter soil bores were drilled for assessing site geology and sampling for contamination impact. The bores were drilled by GES using a hand auger and or the industry recognized Geoprobe direct push drilling systems. 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.

6.2.2 Soil Sampling

Soil bore soil sampling was conducted per the National Environmental Protection Measure (NEPM 2013) and AS4482 sampling guidelines. Table 4 presents a summary of the soil assessment methodology adopted at the site.

Table 4 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 grab sampling; • Hollow stem auger until refusal depth and split spoon sampling; • Percussion drilling in rock and grab samples were collected from air blasted cuttings
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 (R213) was used to decontaminate reusable sampling equipment.
Soil Screening	In accordance with AS4482.2. Individual soil samples were collected from the core tray 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. Equipment calibration certificates are presented in Appendix 4
Laboratory Soil Sample Collection	In accordance with AS4482.2. All samples were collected using disposable nitrile gloves. All samples were selected for laboratory analysis. A minimum number of samples were carefully selected which would provide sufficient information to delineate 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.

6.2.3 Soil Analysis

Primary and QC samples were submitted to Analytical Laboratory Services (ALS) for analysis. Of the 31 primary samples collected, all 31 were selected for analysis. Chain of Custody (COC) documentation was completed and is provided in Appendix 5. Table 5 presents a summary of the laboratory analyses undertaken.

Table 5 Overview of Soil Analysis and Quality Control

Analytes	Primary Soil Samples	Triplicates	Rinse Blank[b]	Field Blank[c]
TPH/TRH	31	1	1	-
BTEX	31	1	1	-
PAH*	31	1	1	-

Sampling Quality Control Standards (AS4482):
a – One (1) in twenty (20) intra laboratory split (duplicate) samples
b - Single rinse sample per piece of equipment per day
c - Single trip blank per esky

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 (for chromium);
- 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.

6.3 Groundwater Assessment

6.3.1 Monitoring Well Establishment

A total of six groundwater wells were historically installed at the site. All wells were inspected for suitability for used in this contaminated site assessment. Only four of the wells were usable for the purposes of this investigation:

- CC5 could not be located and is suspected to be buried beneath a concrete plinth/slab, and
- CC3 could be located but was badly damaged and could not be used to access groundwater.

6.3.2 Monitoring Well Development and Slug Testing

All groundwater monitoring wells are presumed to have been historically developed. Slug testing for hydraulic conductivity was not part of the scope of this investigation.

6.3.3 Monitoring Well Gauging and Sampling

Table 6 summarises the procedures for monitoring well gauging and sampling.

Table 6 Summary of Monitoring Well Gauging and Sampling Procedures

Activity	**Procedure Details**
Surveying	All wells and bores were located to within 0.5 m horizontal on The LIST plan. 2013 Mt Wellington & Derwent River LIDAR survey were used in this investigation to approximate top of casing elevations to an estimated 0.1 m vertical accuracy.
Groundwater Gauging	All groundwater wells were gauged for standing water levels (SWL) from top of casing (TOC) and the presence of Phase Separated Hydrocarbons (PSH) using a Solinst water/oil/air Interface Probe (IP).
Groundwater Extraction Method	Groundwater was extracted from the well using one of the following: • Geoprobe peristaltic pump in cases where the well is shallower than 7 m; or a • Waterra valve in cases where the well is deeper than 7 m.
Groundwater Purging	To ensure a representative groundwater sample could be collected, groundwater was purged three (3) times the volume of the well (6 x water column) or 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 at each 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.

6.3.4 Groundwater Analysis

Primary and QC samples (excluding triplicates) were submitted to Analytical Laboratory Services (ALS) for analysis. Table 7 presents a summary of the sample analysis including the QC sampling based on AS5667.1 and AS5667.11.

Table 7 Overview of Groundwater Analysis and Quality Control

Analytes	**Primary Groundwater Samples**	**Duplicates**[a]	**Triplicate**[b]	**Rinse Blank**[c]	**Field Blank**[d]
TPH/TRH	4	1	-	1	-
BTEX	4	1	-	1	-
Lead	4	1	-	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 rinse sample per piece of equipment per day
d - Single field blank per day.

6.4 Soil Vapor Assessment

No soil vapour sampling was conducted. Soil and groundwater petroleum hydrocarbon concentrations are used to infer soil vapour risks.

7 QUALITY CONTROL

7.1 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 (MDL). 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

Acceptable RPD is less than 30%. Therefore if RPD >30% difference, a review into the cause should be conducted of both laboratories and of the appropriateness of the methods being used.

Field QA/QC procedures and compliance are summarised in Table 8

Table 8 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
Field instruments calibrated	Yes	Certificates can be Provided
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 (COC) 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 samples collected (1:20)	Yes	Secondary duplicate (split) samples will be sent to a secondary Laboratory that is NATA accredited. Either a second ALS Laboratory or Eurofins Environmental Testing Australia – MGT. Mixing of the duplicate and split sample will be sampled in accordance of NEPM Schedule B, Section 5.3
Required numbers of field and rinse blank samples collected	Rinse only	One rinse blank was collected. As one rinsate is required per day of sampling.
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.

7.2 Laboratory

Laboratory QA/QC procedures and compliance are summarised in Table 9 & Table 10.

Table 9 Laboratory QA/QC Procedures and Compliance for Soil

QA/QC Requirement	Compliance	Comments
All analyses NATA accredited	Yes	
Appropriate analytical methods used, in accordance with Schedule B(3) of the NEPM	Yes	
Acceptable laboratory limits of reporting (LORs) adopted.	Yes	
Method blanks: zero to <Practical Quantitation Limit (PQL)	Yes	
Laboratory control samples: 70% to 130% recovery for soil; or 80% to 120% recovery for waters;	Yes	
Duplicate samples outliers:<30% to 50% RPD.	No	EM1715132 outlier for lead
Matrix spikes: 70% to 130% recovery for organics or 80%-120% recovery for inorganics	No	EM1715132 outliers for lead and manganese
Surrogates: 70% to 130% recovery	Yes	
Analysis holding time outliers	Yes	
Frequency of Quality Control Sample	No	EM1715132 PAH, Phenols, TRH laboratory duplicates EM1715132 PAH/phenol matrix spike

Table 10 Laboratory QA/QC Procedures and Compliance for Groundwater

QA/QC Requirement	Compliance	Comments
All analyses NATA accredited	Yes	
Appropriate analytical methods used, in accordance with Schedule B(3) of the NEPM	Yes	
Acceptable laboratory limits of reporting (LORs) adopted.	Yes	
Method Blanks: zero to <Practical Quantitation Limit (PQL)	Yes	
Duplicate Samples:<30% to 50% RPD.	Yes	
Laboratory Control Samples: 70% to 130% recovery for soil; or 80% to 120% recovery for waters;	Yes	
Matrix spikes: 70% to 130% recovery for organics or 80%-120% recovery for inorganics	Yes	
Surrogates: 70% to 130% recovery	Yes	
Analysis holding time outliers	Yes	
Quality Control Sample Frequency Outliers	Yes	

7.3 Quality Assurance and Quality Control Outputs

All field and Laboratory Quality Assurance and Quality Control (QA/QC) details are presented in Appendix 6.

8 FIELD INVESTIGATION FINDINGS

8.1 Soil Bores

8.1.1 Geological Interpretation

The geology of the site is summarised in Table 11 and soil bore logs are presented in Appendix 7.

The outside areas of the site (BH01 to BH09) are paved with approximately 100 mm of bitumen. No boreholes have been drilled within the existing building footprint. Existing building footprints are not determined to be areas of potential concern considering historical site use primarily as residential dwellings. Fill material comprises primarily of GRAVEL and SAND. The fill is up to 1.6 m thick but averages 1.0 m and displays no pattern of distribution across the site as expected from the historical aerials.

The natural sediments comprise of mixed silty and sandy CLAY material.

Table 11 Stratigraphy at the Site (depths indicate base of horizon)

Investigation Holes	Fill Composition	Fill Base (m)	Natural Soil Composition	Natural Soil Base Top of Rock (m)	Rock Composition	Hole Depth (m)
BH01	BITUMEN CLAY/GRAVEL	0.9	Sandy CLAY	3+	NA	3+
BH02	BITUMEN Clayey GRAVEL	1.0	Sandy Silty CLAY	3+	NA	3+
BH03	BITUMEN Clayey GRAVEL/SAND	1.2	Clayey SAND Sandy Silty CLAY	3+	NA	3+
BH04	BITUMEN Sandy GRAVEL Gravelly CLAY	1.3	Clayey SAND Sandy Silty CLAY	3+	NA	3+
BH05	BITUMEN Clayey SAND	1.1	Clayey SAND Sandy Silty CLAY	4+	NA	4+
BH06	BITUMEN Clayey SAND	0.45	Sandy CLAY	2.5+	NA	2.5+
BH07	BITUMEN Clayey SAND	0.7	Sandy CLAY	2.8+	NA	2.8+
BH08	BITUMEN Sandy GRAVEL	1.0	Sandy CLAY	3.5+	NA	3.5+
BH09	BITUMEN GRAVEL/SAND	1.6	Sandy CLAY	3+	NA	3+

8.1.2 Grain & Depth 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) relative to the proposed finished floor level.

When assessing petroleum vapour intrusion screening levels, site development works have the potential to affect vapour intrusion risks. The following inclusions are developed into the petroleum hydrocarbon vapour intrusion model with respect to grain class averages overlying the sample:

- Where the proposed finished floor levels are below the pre-development levels and where soil is proposed to be excavated from the site, the excavated material is excluded from the grain class averages for determining threshold PVI HSL limits;
- Where the proposed finished floor levels are above the pre-development surface levels and site infilling is proposed, the fill material will be assigned a GW (well weathered gravel) coding which will be added to (extend) the overall vapour intrusion depth;
- An allowance will be made for a slab on ground. The slab will be conservatively assigned CLAY type material properties. Slab thickness may be locally adjusted (applied to the development plans) to attenuate vapour intrusion risks;
- An allowance is made for developments which have a crawl space. In this scenario, the soil sample depth corresponds with the vapour intrusion depth, and a crawl space attenuation factor may be applied if the proposal is deemed to allow for crawl space ventilation, and the crawl space is not venting into the building;
- Where garden beds or unpaved areas are proposed near the borehole, biodegradation attention factor is applied.

The corresponding depth class from which the sample is collected is also adjusted and revised based on the proposed development finished floor levels. Where the fields are left blank, a class is not assigned given the sample was collected from within the proposed excavation. Pavement is assigned a clay class by default.

Table 13 provides a summary of the grain class averages for material overlying the sample (excluding the excavated materials).

8.1.3 Soil Contamination Observations

No PID screening was conducted at the site. There were no obvious signs of hydrocarbon impacted soil.

8.2 Groundwater

8.2.1 Aquifer Interpretation

The migration of contamination downhill of the site rather in line with the hydraulic gradient is best explained by the presence of a perched aquifer within the fill and above the natural clay material.

8.2.2 Groundwater Gauging

Two separate gauging events were conducted. Groundwater wells were re-gauged as groundwater from the initial gauging was inferred to be spurious and directed into the hillside. The wells were identified to be pressurized and the caps were left off for 24 hours prior to the second gauging event.

Field results from the groundwater gauging are presented in Appendix 8. Groundwater depths for the gauging event are presented in Table 12. PSH was not detected (gauged) in any of the monitoring wells. Groundwater levels have been contoured in Figure 10.

Table 12 Summary of Groundwater Gauging Results

Monitoring Well	CC1	CC2	CC6
Well Depth (m)	9.53	9.49	6.39
Top of Casing (TOC) Height (m AHD)	31.389	30.048	29.830
Groundwater Gauging Date	16/11/17	16/11/17	16/11/17
Groundwater Depth from TOC (m)	4.857	3.505	3.400
PSH Thickness (mm)	0	0	0
Corrected Groundwater Elevation (m AHD)*	26.532	26.543	26.430

Table 13 Summary of Grain & Depth Class Based on USCS Classification

Sample	Excavation - Red Fill (Aded as GW) - Green (metres)		Soil Grain Class Averaging Above Soil Sample																		Attenuation			Petroleum Vapour Intrusion HSL Grain Class*	SAMPLE USCS
		Revised Depth From (m)	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 SLAB (CH)	Crawl Space	Biodegradation		
BH01 1.5-1.6	2.2	3.8	2.2			0.9									0.6					NA	0.1	1.0	1.0	SAND	CH
BH01 2.5-2.6	2.2	4.8	2.2			0.9									0.8		1			NA	0.1	1.0	1.0	SAND	CI
BH01 2.7-2.8	2.2	5.0	2.2			0.9									0.8		1			NA	0.1	1.0	1.0	SAND	CI
BH02 0.7-0.8	2.2	3.0	2.2			0.7														NA	0.1	1.0	1.0	SAND	GC
BH02 1.5-1.6	2.2	3.8	2.2			1.0									0.5					NA	0.1	1.0	1.0	SAND	CH
BH02 2.5-2.6	2.2	4.8	2.2			1.0									1.5					NA	0.1	1.0	1.0	SAND	CH
BH02 2.7-2.8	2.2	5.0	2.2			1.0									1.7					NA	0.1	1.0	1.0	SAND	CH
BH03 0.5-0.6	2.0	2.6	2.0			0.3				0.2										NA	0.1	1.0	1.0	SAND	GC
BH03 1.5-1.6	2.0	3.6	2.0			0.8				0.7										NA	0.1	1.0	1.0	SAND	SC
BH03 2.5-2.6	2.0	4.6	2.0			0.8				0.8					0.9					NA	0.1	1.0	1.0	SAND	CH
BH03 2.7-2.8	2.0	4.8	2.0			0.8				0.8					1.1					NA	0.1	1.0	1.0	SAND	CH
BH04 0.5-0.6	1.7	2.3	1.7			0.5														NA	0.1	1.0	1.0	SAND	GC
BH04 1.5-1.6	1.7	3.3	2.1			0.6				0.1					0.1		0			NA	0.1	1.0	1.0	SAND	CH
BH04 2.5-2.6	1.7	4.3	2.1			0.6				0.1					1.1		0			NA	0.1	1.0	1.0	SAND	CH
BH04 2.9-3.0	1.7	4.7	2.1			0.6				0.1					1.5		0			NA	0.1	1.0	1.0	SAND	CH
BH05 0.5-0.6	0.5	1.1	0.5							0.5										NA	0.1	1.0	1.0	SAND	SC
BH05 1.5-1.6	0.5	2.1	0.5							1.3					0.2					NA	0.1	1.0	1.0	SAND	CH
BH05 2.5-2.6	0.5	3.1	0.5							1.3					1.2					NA	0.1	1.0	1.0	SAND	CH
BH05 3.6-3.7	0.5	4.2	0.5							1.3					2.3					NA	0.1	1.0	1.0	CLAY	CH
BH06 0.5-0.6	1.7	2.3	1.7							0.4					0.1					NA	0.1	1.0	1.0	SAND	CH
BH06 1.5-1.6	1.7	3.3	1.7							0.4					0.8		0			NA	0.1	1.0	1.0	SAND	CI
BH06 2.4-2.5	1.7	4.2	1.7							0.4					0.8		1			NA	0.1	1.0	1.0	SAND	CI
BH07 0.5-0.6	1.1	1.6	1.1				0.2			0.2										NA	0.1	1.0	1.0	SAND	SW
BH07 1.5-1.6	1.1	2.6	1.1				0.4			0.2					0.8					NA	0.1	1.0	1.0	SAND	CH
BH07 2.5-2.6	1.1	3.6	1.1				0.4			0.2					1.8					NA	0.1	1.0	1.0	CLAY	CH
BH08 1.5-1.6	0.1	1.7	1.1												0.5					NA	0.1	1.0	1.0	SAND	CH
BH08 3.4-3.5	0.1	3.6	1.1												2.4					NA	0.1	1.0	1.0	CLAY	CH
BH09 0.5-0.6	1.7	2.3	2.0				0.2													NA	0.1	1.0	1.0	SAND	SW
BH09 1.5-1.6	1.7	3.3	2.0				0.4								0.8					NA	0.1	1.0	1.0	SAND	CH
BH09 2.5-2.6	1.7	4.3	2.0				0.4								1.3		1			NA	0.1	1.0	1.0	SAND	CI
BH09 2.9-3.0	1.7	4.7	2.0				0.4								1.3		1			NA	0.1	1.0	1.0	SAND	CI

8.2.3 Hydraulic Gradient and Flow Direction

The groundwater flow direction is inferred to be to the east and the hydraulic gradient is determined to be approximately 0.7% Table 14. Given the very shallow gradient and the coarse approach to obtaining the casing elevations, the findings are not considered reliable.

Table 14 Summary of Inferred Site Groundwater Flow Directions and Rates

Details	Result
Groundwater flow direction from the site	Site
Hydraulic Gradient Calculations Upgradient Groundwater Elevation Downgradient Groundwater Elevation Distance Between Upgradient and Downgradient Points Hydraulic Gradient	26.53 m AHD contour 26.46 m AHD contour 10 m 0.7 %

8.2.4 Groundwater Physiochemistry

All purge volumes were attained or the wells were pumped dry before collecting a representative sample for physiochemical analysis and laboratory analysis. Physiochemical parameters were collected whilst purging and a representative value for the aquifer is presented in Table 15.

Table 15 Summary of Stabilised Groundwater Properties

Parameter	Range	Average	Comment
Temp (°C)	13.9 (CC4) to 16.2 (CC1)	15.1	Typical temperature for groundwater within southern Tasmania
pH	7.15 (CC6) to 7.38 (CC1)	7.3	Indicates neutral pH conditions for groundwater
Redox (mV)	10.5 (CC4) to 186 (CC1)	77.8	Indicates mildly oxidising REDOX conditions for groundwater
EC (µs/cm)	1474 (CC6) to 4360 (CC1)	2518.8	Indicates mildly brakish conditions for groundwater

8.2.5 PSH & Groundwater Contamination Observations

PSH was not gauged in any wells at the site.

The following observations can be made during groundwater sampling activities:

- PID read 125 ppm when wall CC4 was opened and 567 ppm when CC6 was opened;

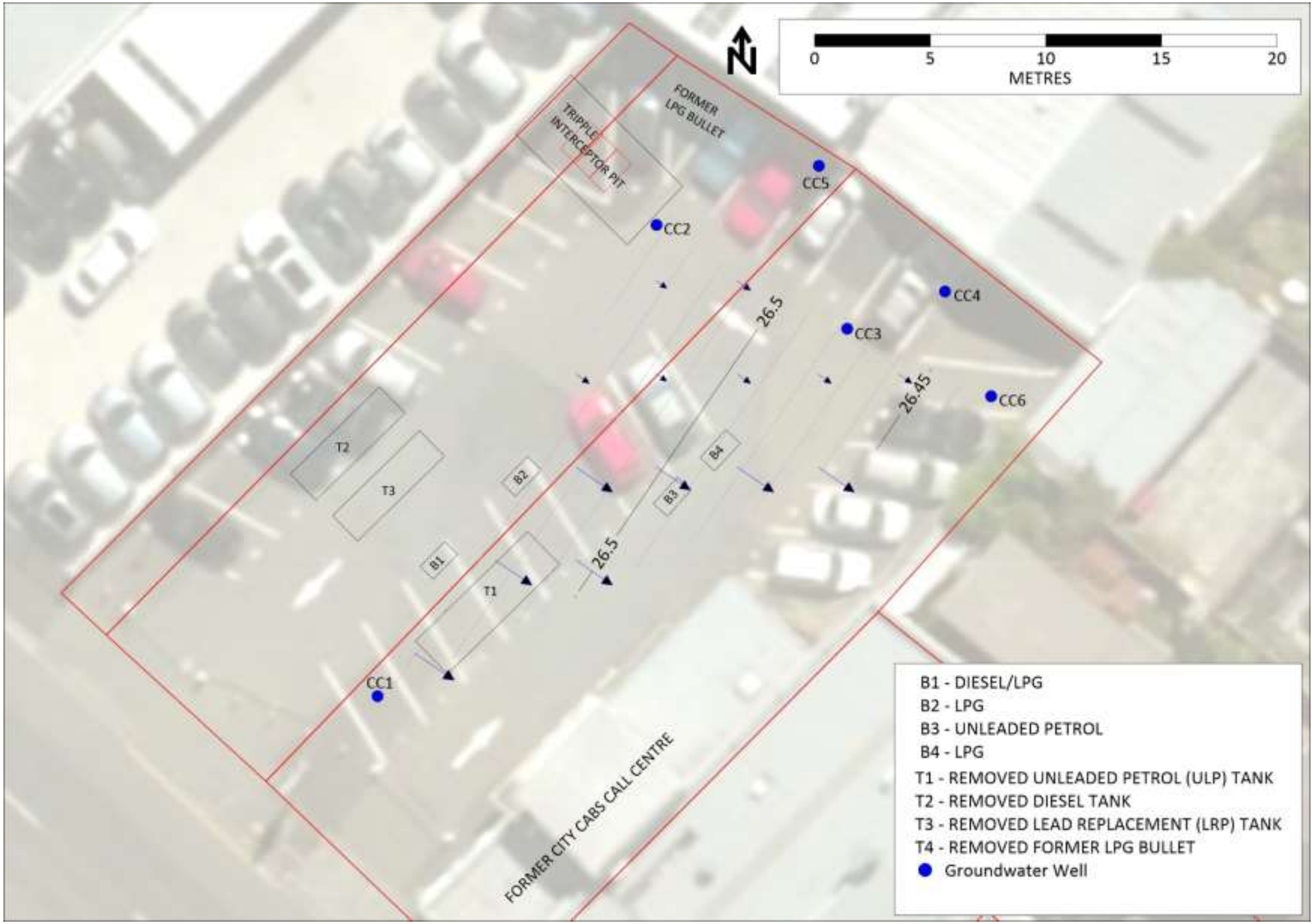


Figure 10 Inferred Shallow Gravel Aquifer Confined Within the Alluvial Deposits. Aquifer Lithology Indicated Alongside Boreholes

9 SOIL ECOLOGICAL IMPACT ASSESSMENT

9.1 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.

9.2 NEPM (2013) Guidelines

The following ecological investigation guidelines are to be addressed in order to assess acceptable levels of risk to terrestrial ecosystems:

- NEPM (2013) Ecological Investigation Levels (EIL's) – have been developed for selected metal and organic substances. EIL's 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 2013);
- NEPM (2013) Ecological Screening Levels (ESL's) – 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 (NEPM 2013).

Soil analytical results are compared against Ecological Screening Levels (ESL's) and Ecological Investigation Levels (EIL's) limits presented in Table 16.

Table 16 Summary of Soil Contaminates Considered as part of this investigation, based on NEPM (2013) ASC

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

9.3 Guidelines

9.3.1 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 below.

9.3.2 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 (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 17.

Table 17 Adopted Land Use Scenario For the Various Soil Bores

Land Use Scenario	**Applicable Soil Bores**
Areas of Ecological Significance	
Urban Residential & Public Open Space	
Commercial & Industrial	*All soil bores*

9.4 Findings

9.4.1 Ecological Screening Levels

Laboratory analytical results are presented in Appendix 9.

Given the exceedances are below the proposed finished floor level and there is a proposal for pavement coverings at the site, there is overall reduced risk that existing hydrocarbons will leach into the receiving environment.

Given the exceedances are below the proposed excavation depth and there is a proposal for pavement coverings at the site, there is a low risk that hydrocarbons will leach into the receiving environment.

Table 18 compares soil analytical results for residual samples (non-excavated soil which is to remain at the site) against relevant NEPM ESL's. Concentrations which exceeded laboratory levels of reporting (LOR) are highlighted in bold, ESL exceedances are highlighted with a colored cell, and samples within the proposed excavation zone are marked with an X.

The following exceedances were noted:

- Benzo(a)pyrene exceeds ESL guideline limits for commercial sites in BH3 at 1.5 m which is below the proposed excavation depth of 0.6 m at this location;
- Benzo(a)pyrene exceeds ESL guideline limits for commercial sites in BH5 at 0.5 m which comprises fill material which is proposed to be excavated at this location;
- F2 type compounds exceeds ESL guideline limits for commercial sites in BH9 at 2.5 m which is well below the proposed excavation depth of 0.9 m at this location

Given the exceedances are below the proposed excavation depth and there is a proposal for pavement coverings at the site, there is a low risk that hydrocarbons will leach into the receiving environment.

Table 18 Summary of Soil Analytical Results Compared with ESL's

NEPM Ecological Screening Levels for Soil				BTEX				PAH	TRH			
Bold - Indicates LOR Exceedances X - Indicates Sample Within Proposed Excavation Zone 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
BH01 1.5-1.6	31/10/17	F	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH01 2.5-2.6	31/10/17	F	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH01 2.7-2.8	31/10/17	F	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH02 0.7-0.8	31/10/17	C	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH02 1.5-1.6	31/10/17	F	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH02 2.5-2.6	31/10/17	F	COM/IND	<0.2	<0.5	**1**	**1.4**	<0.5	**16**	<50	<100	<100
BH02 2.7-2.8	31/10/17	F	COM/IND	<0.2	<0.5	**3.1**	**4.6**	<0.5	**74**	**120**	<100	<100
BH03 0.5-0.6	31/10/17	C	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH03 1.5-1.6	31/10/17	C	COM/IND	<0.2	<0.5	<0.5	<0.5	**4.2****	<10	<50	**350**	<100
BH03 2.5-2.6	31/10/17	F	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH03 2.7-2.8	31/10/17	F	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH04 0.5-0.6	31/10/17	C	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	**280**	**100**
BH04 1.5-1.6	31/10/17	F	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH04 2.5-2.6	31/10/17	F	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH04 2.9-3.0	31/10/17	F	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	**160**	**120**	<100
BH05 0.5-0.6	31/10/17	C	COM/IND	<0.2	<0.5	<0.5	<0.5	**12.6****	<10	<50	**820**	**220**
BH05 1.5-1.6	31/10/17	F	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH05 2.5-2.6	31/10/17	F	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH05 3.6-3.7	31/10/17	F	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH06 0.5-0.6	31/10/17	F	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH06 1.5-1.6	31/10/17	F	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH06 2.4-2.5	31/10/17	F	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH07 0.5-0.6	31/10/17	C	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH07 1.5-1.6	31/10/17	F	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH07 2.5-2.6	31/10/17	F	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH08 1.5-1.6	31/10/17	F	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH08 3.4-3.5	31/10/17	F	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH09 0.5-0.6	31/10/17	C	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH09 1.5-1.6	31/10/17	F	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH09 2.5-2.6	31/10/17	F	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	**230**	**170**	<100
BH09 2.9-3.0	31/10/17	F	COM/IND	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100

9.4.2 Ecological Investigation Levels

Table 19 compares soil analytical results for residual samples (non-excavated soil which is to remain at the site) against relevant ecological investigation limits (EIL's). Concentrations which exceeded laboratory LOR are indicated in bold, EIL exceedances are highlighted with a colored cell, and samples within the proposed excavation zone are marked with an X.

No EIL exceedances were detected based on the limited samples collected at the site.

Table 19 Soil Analytical Results Compared Against Ecological Investigation Levels

NEPM Ecological Investigation Levels for Soil

Bold - Indicates LOR Exceedances
X - Indicates Sample Within Proposed Excavation Zone

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	DDT	Naphthalene
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
BH01 1.5-1.6	31/10/17	COM/IND	45	6 (3)	F	22	22	12	32	16	12	<5		<1
BH01 2.5-2.6	31/10/17	COM/IND	35	6 (3)	F	17	17	19	54	14	8	<5		<1
BH01 2.7-2.8	31/10/17	COM/IND	35	6 (3)	F	23	23	30	77	14	13	<5		<1
BH02 0.7-0.8	31/10/17	COM/IND	20	6 (3)	C	56	56	24	83	15	875	11		<1
BH02 1.5-1.6	31/10/17	COM/IND	45	6 (3)	F	21	21	16	28	15	22	<5		<1
BH02 2.5-2.6	31/10/17	COM/IND	45	6 (3)	F	18	18	12	37	14	13	<5		<1
BH02 2.7-2.8	31/10/17	COM/IND	45	6 (3)	F	24	24	16	66	11	15	<5		2
BH03 0.5-0.6	31/10/17	COM/IND	20	6 (3)	C	58	58	25	87	12	15	<5		<1
BH03 1.5-1.6	31/10/17	COM/IND	20	6 (3)	C	124	124	17	610	25	558	7		<1
BH03 2.5-2.6	31/10/17	COM/IND	45	6 (3)	F	39	39	33	37	25	11	<5		<1
BH03 2.7-2.8	31/10/17	COM/IND	45	6 (3)	F	45	45	27	42	28	9	<5		<1
BH04 0.5-0.6	31/10/17	COM/IND	20	6 (3)	C	66	66	21	226	17	216	<5		<1
BH04 1.5-1.6	31/10/17	COM/IND	45	6 (3)	F	30	30	14	34	20	12	<5		<1
BH04 2.5-2.6	31/10/17	COM/IND	45	6 (3)	F	36	36	26	38	22	9	<5		<1
BH04 2.9-3.0	31/10/17	COM/IND	45	6 (3)	F	33	33	26	52	19	11	<5		<1
BH05 0.5-0.6	31/10/17	COM/IND	20	6 (3)	C	83	83	18	219	16	452	<5		<1
BH05 1.5-1.6	31/10/17	COM/IND	45	6 (3)	F	36	36	19	32	28	10	<5		<1
BH05 2.5-2.6	31/10/17	COM/IND	45	6 (3)	F	41	41	26	34	29	8	<5		<1
BH05 3.6-3.7	31/10/17	COM/IND	45	6 (3)	F	43	43	27	48	24	10	<5		<1
BH06 0.5-0.6	31/10/17	COM/IND	45	6 (3)	F	21	21	18	31	16	10	<5		<1
BH06 1.5-1.6	31/10/17	COM/IND	35	6 (3)	F	40	40	28	56	13	10	<5		<1
BH06 2.4-2.5	31/10/17	COM/IND	35	6 (3)	F	37	37	25	73	13	12	<5		<1
BH07 0.5-0.6	31/10/17	COM/IND	10	6 (3)	C	<5	<5	<2	<5	4	<5	<5		<1
BH07 1.5-1.6	31/10/17	COM/IND	45	6 (3)	F	26	26	19	39	17	10	<5		<1
BH07 2.5-2.6	31/10/17	COM/IND	45	6 (3)	F	55	55	13	58	12	10	<5		<1
BH08 1.5-1.6	31/10/17	COM/IND	45	6 (3)	F	27	27	18	23	17	10	<5		<1
BH08 3.4-3.5	31/10/17	COM/IND	45	6 (3)	F	36	36	15	54	12	13	<5		<1
BH09 0.5-0.6	31/10/17	COM/IND	10	6 (3)	C	<5	<5	<2	13	4	<5	<5		<1
BH09 1.5-1.6	31/10/17	COM/IND	45	6 (3)	F	37	37	11	115	12	120	<5		<1
BH09 2.5-2.6	31/10/17	COM/IND	35	6 (3)	F	24	24	20	76	17	11	<5		<1
BH09 2.9-3.0	31/10/17	COM/IND	35	6 (3)	F	41	41	25	61	15	12	<5		<1

10 GROUNDWATER ECOLOGICAL ASSESSMENT

10.1 Hydrocarbon Plume Overview

Groundwater COC and analytical results are presented in Appendix 5 & 9.

Petroleum hydrocarbons were detected in all wells at the site with the exception for CC1 which is located on the western side of the site. Low concentration TPH C_6-C_{10} are identified above laboratory limits of reporting (LOR). The hydrocarbons are located on the northern side of the site and are expected to source from unleaded fuel.

Table 10 presents a summary of the laboratory analytical results, and indicates where hydrocarbons were detected in groundwater they do not comprise a significant portion (ie. >20%) of the effective solubility in the product (CRC CARE 2013) and are therefore not inferred to comprise of LNAPL.

10.2 Ecological Risk

Groundwater does not exceed threshold limits for freshwater ecosystem protection (Table 20), and therefore the groundwater at the site does not present a risk to downgradient ecological receptors.

Table 20 Summary of Vadose Zone Lithology based on USCS System

Investigation Levels		Benzene	Toluene	Ethyl-benzene	Xylene			BTEX	Napthalene	TPH Carbon Chain Fractions		TRH Carbon Chain Fractions							
Indicates >Laboratory LOR Indicates Likley LNAPL					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
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**																		
25/09/2017	CC1	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	<20	<20	<20	<100	<100	<100	<100	<100
25/09/2017	CC2	<1	<2	<2	<2	<2	<2	<1	<5	40	<50	20	20	20	<100	<100	<100	<100	<100
25/09/2017	CC4	<1	<2	<2	<2	<2	<2	<1	<5	130	<50	120	120	120	<100	<100	<100	<100	<100
26/09/2017	CC6	<1	<2	<2	<2	<2	<2	<1	<5	160	<50	150	150	150	<100	<100	<100	<100	<100

Table 21 PAH Concentrations in Groundwater Compared Against NEPM 2013 Threshold Limits for Fresh Water Ecosystems and Drinking Water

AWQG (2000) **Fresh Water (95% Trigger)**		Benzene	Toluene	Ethyl-benzene	Xylene			BTEX	Napthalene	TRH Carbon Chain Fractions							Metal
					M, P	O	Total	Total		6 - 10	F1	>10 - 16	>16 - 34	>34 - 40	>10 - 40	F2	Pb
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				350			16								0.0034
Date Collected	**Water Sample ID**																
25/09/2017	CC1	<1	<2	<2	<2	<2	<2	<1	<5	<20	<20	<100	<100	<100	<100	<100	<0.001
25/09/2017	CC2	<1	<2	<2	<2	<2	<2	<1	<5	20	20	<100	<100	<100	<100	<100	<0.001
25/09/2017	CC4	<1	<2	<2	<2	<2	<2	<1	<5	120	120	<100	<100	<100	<100	<100	<0.001
26/09/2017	CC6	<1	<2	<2	<2	<2	<2	<1	<5	150	150	<100	<100	<100	<100	<100	<0.001

11 SOIL HUMAN HEALTH DIRECT CONTACT ASSESSMENT

11.1 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 eg. swimming pools, lift shafts etc. (up to 3 m BGS); basement carparks; and deep foundations.

11.1.1 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.

11.1.2 Adopted Land Use Classification

The adopted land use class is presented in Table 22.

Land use class is based on the opportunity for soil access as per NEPM 2013 guidelines. A land use class D has been applied to all soil samples. There will be minimal opportunity to access to soil due to the presence of the pavement surfaces.

Table 22 Summary of Land Use Setting and Density for Determining Exposure Risk

Property	Land Use Class	Land Use Density	Paved Area	Sensitive Land Use
The Site	D	High	<100%	No

Table 23 summarises the areas of the site in which the soil analytical results are expected to be relevant as well as the applicable land use class for defining the threshold limits.

Table 23 Summary of Land Use Class Adopted for Defining Soil Analysis Threshold Limits

Soil Bores	Relevant Receptors	Adopted Land Use Class
All soil bores	The site – commercial workers	D

11.1.3 Health Investigation & Screening Levels

The main exposure pathways and methods for assessing short term heath risk from contaminated soils are presented in Table 24. Vapour inhalation risk is addressed in Section 13 of this report.

Table 24 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 – Indoor (PVI)	Petroleum Hydrocarbons	HSL's (addressed in PVI sections)	NEPM (2013)
Vapour Inhalation – Trench (PVI)			CRC CARE (Friebel & Nadebaum, 2011)
Dermal Contact		HSL's	
Dust Inhalation	Metals PAH's Organochlorides Phenols Herbicides Other Pesticides	Health Investigation Levels (HIL's)	NEPM (2013)
Soil Ingestion			

PVI – Petroleum Vapour Intrusion

11.2 Findings

11.2.1 Dermal Contact - Petroleum Hydrocarbons

Laboratory analytical results are presented in Appendix 9.

Table 25 presents soil hydrocarbon analytical results compared against CRC CARE (Friebel & Nadebaum, 2011) HSL guidelines for assessing dermal contact risk. Concentrations which exceeded laboratory LOR are highlighted in bold, HSL exceedances are highlighted with a colored cell indicating the highest HSL land used class which is exceeded, and samples within the proposed excavation zone are marked with an X.

The dermal contact risk is acceptable in selected sample locations per guidelines for intrusive maintenance workers, HSL D guidelines.

11.2.2 Dust Inhalation & Soil Ingestion

Combined dust inhalation and soil ingestion risk is assessed through the application of NEPM (2013) HIL's for exposure to soil contaminants.

Laboratory analytical results are presented in Appendix 9. Soil analytical results are compared against the HIL's presented in Table 26. Concentrations which exceeded laboratory LOR are highlighted in bold, HIL exceedances are highlighted with a colored cell indicating the highest HIL land used class which is exceeded and samples within the proposed excavation zone are marked with an X.

There are no HIL exceedance based on Commercial Setting D for assessing exposure risk to future land users with limited access to impacted soil (commercial and residential) and commercial workers involved with the site development works.

Table 25 Soil Analytical Results Compared Against CRC CARE (Friebel & Nadebaum, 2011) Guidelines for Dermal Contact

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 C Recreational		120	18000	5300	15000	1900	5100	3800	5300	7400
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									
31/10/2017	BH01 1.5-1.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2017	BH01 2.5-2.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2017	BH01 2.7-2.8	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2017	BH02 0.7-0.8	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2017	BH02 1.5-1.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2017	BH02 2.5-2.6	<0.2	<0.5	**1**	**1.4**	<1	**18**	<50	<100	<100
31/10/2017	BH02 2.7-2.8	<0.2	<0.5	**3.1**	**4.6**	**2**	**81**	**120**	<100	<100
31/10/2017	BH03 0.5-0.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2017	BH03 1.5-1.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**350**	<100
31/10/2017	BH03 2.5-2.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2017	BH03 2.7-2.8	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2017	BH04 0.5-0.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**280**	**100**
31/10/2017	BH04 1.5-1.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2017	BH04 2.5-2.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2017	BH04 2.9-3.0	<0.2	<0.5	<0.5	<0.5	<1	<10	**160**	**120**	<100
31/10/2017	BH05 0.5-0.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	**820**	**220**
31/10/2017	BH05 1.5-1.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2017	BH05 2.5-2.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2017	BH05 3.6-3.7	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2017	BH06 0.5-0.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2017	BH06 1.5-1.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2017	BH06 2.4-2.5	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2017	BH07 0.5-0.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2017	BH07 1.5-1.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2017	BH07 2.5-2.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2017	BH08 1.5-1.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2017	BH08 3.4-3.5	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2017	BH09 0.5-0.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2017	BH09 1.5-1.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
31/10/2017	BH09 2.5-2.6	<0.2	<0.5	<0.5	<0.5	<1	<10	**230**	**170**	<100
31/10/2017	BH09 2.9-3.0	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100

Table 26 Soil Analytical Results Compared Against NEPM (2013) Health Investigation Limit Guidelines

Bold - Indicates LOR Exceedance in Non Metalic Compounds		EA055: Moi	EG005T: Total Metals by ICP-AES														EG035T: Total Recover
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
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
LOR		1	5	10	1	50	1	2	2	5	5	5	2	5	5	5	0.1
HIL A Low Density Residential			100		60	4500	20		100	6000	300	3800	400	200		7400	40
HIL B High Density Residential			500		90	40000	150		600	30000	1200	14000	1200	1400		60000	120
HIL C Recreational			300		90	20000	90		300	17000	600	19000	1200	700		30000	80
HIL D Comercial/Industrial			3000		500	3E+05	900		4000	2E+05	1500	60000	6000	10000		400000	730
Sample date:	Sample ID																
31/10/2017	BH01 1.5-1.6	22	<5	90	<1	<50	<1	16	16	22	12	456	12	<5	66	32	<0.1
31/10/2017	BH01 2.5-2.6	16	<5	10	<1	<50	<1	14	21	17	8	133	19	<5	46	54	<0.1
31/10/2017	BH01 2.7-2.8	13	<5	10	<1	<50	<1	14	29	23	13	227	30	<5	56	77	<0.1
31/10/2017	BH02 0.7-0.8	19	11	120	<1	<50	<1	15	23	56	875	446	24	<5	73	83	0.8
31/10/2017	BH02 1.5-1.6	16	<5	90	<1	<50	<1	15	17	21	22	108	16	<5	75	28	0.1
31/10/2017	BH02 2.5-2.6	23	<5	70	<1	<50	<1	14	11	18	13	95	12	<5	48	37	<0.1
31/10/2017	BH02 2.7-2.8	16	<5	20	<1	<50	<1	11	12	24	15	84	16	<5	25	66	<0.1
31/10/2017	BH03 0.5-0.6	18	<5	100	1	<50	<1	12	20	58	15	613	25	<5	79	87	<0.1
31/10/2017	BH03 1.5-1.6	27	7	310	<1	<50	<1	25	13	124	558	422	17	<5	42	610	4.2
31/10/2017	BH03 2.5-2.6	22	<5	70	<1	<50	<1	25	26	39	11	347	33	<5	78	37	<0.1
31/10/2017	BH03 2.7-2.8	20	<5	60	<1	<50	<1	28	23	45	9	296	27	<5	84	42	<0.1
31/10/2017	BH04 0.5-0.6	20	<5	130	<1	<50	<1	17	23	66	216	229	21	<5	91	226	0.5
31/10/2017	BH04 1.5-1.6	26	<5	60	<1	<50	<1	20	18	30	12	179	14	<5	78	34	<0.1
31/10/2017	BH04 2.5-2.6	20	<5	100	<1	<50	<1	22	17	36	9	245	26	<5	76	38	<0.1
31/10/2017	BH04 2.9-3.0	18	<5	60	<1	<50	<1	19	27	33	11	142	26	<5	63	52	<0.1
31/10/2017	BH05 0.5-0.6	17	<5	220	<1	<50	<1	16	15	83	452	474	18	<5	52	219	1.1
31/10/2017	BH05 1.5-1.6	26	<5	50	<1	<50	<1	28	20	36	10	144	19	<5	86	32	<0.1
31/10/2017	BH05 2.5-2.6	18	<5	230	<1	<50	<1	29	20	41	8	1060	26	<5	83	34	<0.1
31/10/2017	BH05 3.6-3.7	18	<5	100	<1	<50	<1	24	25	43	10	694	27	<5	82	48	<0.1
31/10/2017	BH06 0.5-0.6	20	<5	90	<1	<50	<1	16	19	21	10	85	18	<5	60	31	<0.1
31/10/2017	BH06 1.5-1.6	18	<5	10	<1	<50	<1	13	26	40	10	196	28	<5	66	56	<0.1
31/10/2017	BH06 2.4-2.5	16	<5	10	<1	<50	<1	13	25	37	12	213	25	<5	70	73	<0.1
31/10/2017	BH07 0.5-0.6	4.9	<5	<10	<1	<50	<1	4	<2	<5	<5	19	<2	<5	8	<5	<0.1
31/10/2017	BH07 1.5-1.6	23	<5	60	<1	<50	<1	17	18	26	10	79	19	<5	63	39	<0.1
31/10/2017	BH07 2.5-2.6	23	<5	20	<1	<50	<1	12	8	55	10	83	13	<5	58	58	0.2
31/10/2017	BH08 1.5-1.6	21	<5	160	<1	<50	<1	17	16	27	10	117	18	<5	78	23	<0.1
31/10/2017	BH08 3.4-3.5	20	<5	20	<1	<50	<1	12	13	36	13	210	15	<5	75	54	<0.1
31/10/2017	BH09 0.5-0.6	2.8	<5	<10	<1	<50	<1	4	<2	<5	<5	22	<2	<5	15	13	<0.1
31/10/2017	BH09 1.5-1.6	22	<5	120	<1	<50	<1	12	10	37	120	142	11	<5	45	115	0.9
31/10/2017	BH09 2.5-2.6	16	<5	10	<1	<50	<1	17	19	24	11	148	20	<5	48	76	<0.1
31/10/2017	BH09 2.9-3.0	21	<5	10	<1	<50	<1	15	27	41	12	116	25	<5	61	61	<0.1

Table 26 Soil Analytical Results Compared Against NEPM (2013) Health Investigation Limit Guidelines

Bold - Indicates LOR Exceedance in Non Metalic Compounds		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		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
LOR		0.5	0.5	0.5	0.5	0.5	0.5	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																		300	3
HIL B High Density Residential																		400	4
HIL C Recreational																		300	3
HIL D Comercial/Industrial																		4000	40
Sample date:	Sample ID																		
31/10/2017	BH01 1.5-1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH01 2.5-2.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH01 2.7-2.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH02 0.7-0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH02 1.5-1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH02 2.5-2.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH02 2.7-2.8	**1.6**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**1.6**	<0.5
31/10/2017	BH03 0.5-0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH03 1.5-1.6	<0.5	**0.6**	<0.5	<0.5	**2.4**	**0.9**	**6.2**	**6.9**	**4.0**	**3.9**	**5.4**	**2.0**	**4.2**	**2.2**	**0.6**	**2.8**	**42.1**	**6.2**
31/10/2017	BH03 2.5-2.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH03 2.7-2.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH04 0.5-0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH04 1.5-1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH04 2.5-2.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH04 2.9-3.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH05 0.5-0.6	**1.0**	**3.4**	<0.5	**1.3**	**9.9**	**3.5**	**15.9**	**17.7**	**9.4**	**9.4**	**13.7**	**5.9**	**12.6**	**6.2**	**1.8**	**7.7**	**119.0**	**18**
31/10/2017	BH05 1.5-1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH05 2.5-2.6	<0.5	<0.5	<0.5	<0.5	**1.2**	<0.5	**1.1**	**1.0**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**3.3**	<0.5
31/10/2017	BH05 3.6-3.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH06 0.5-0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH06 1.5-1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH06 2.4-2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH07 0.5-0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH07 1.5-1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH07 2.5-2.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH08 1.5-1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH08 3.4-3.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH09 0.5-0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH09 1.5-1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH09 2.5-2.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31/10/2017	BH09 2.9-3.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

12 INDOOR INHABITANT PVI ASSESSMENT – HSL’s

This PVI assessment has been conducted in accordance with relevant CRC CARE Technical Documentation and NEPM 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 odors;
- Flammable risk in confined spaces; and/or
- Health complaints from occupants.

Based on the preliminary site visit, 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.

The following checklists have been filled in for this assessment:

- Appendix 10. Health Screening Level Application Checklist. CRC CARE Technical Report No.10 Part 2, Appendix A (Friebel & Nadebaum 2011b);

12.1 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 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. Site land use class and land use class of downgradient receptors (where onsite HSL exceedances have been identified) are indicated in Table 27.

Table 27 Summary of Land Use Setting and Density for Determining Exposure Risk

Property	**Land Use Class**	**Land Use Density**	**Paved Area**	**Sensitive Land Use**
67 Harrington Street	D	High	100%	No

A land use class D has been applied (in accordance with Friebel & Nadebaum 2011) on the basis that a the ground floor carpark is proposed which will vent and create a vapour barrier with the overlying residential apartments. Ground floor retail shops are similarly classed as commercial.

12.2 Selected Media for Assessing PVI Risk

Table 28 presents a summary of the preferred HSL approach to assessing PVI risk.

Table 28 Preferred Methods for Determining Site PVI Risk

Media Analysed	**Method**	**Limitations**	**Order of Preference**
Soil Gas	Concentrations of a 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 all which create significant bias in threshold values. Reliance is placed on utilizing groundwater analysis over soil.	Tertiary

12.3 Soil

12.3.1 Guidelines

Soil HSL’s are specific to each soil sample and involves characterisation based on the following variables:

- Land use class;
- Dominant grain size class of material at the soil sample depth or based on the dominant grain class of the 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 1 m; 1 to 2 m; 2 to 4 m; and greater than 4 m;

Table 29 summarises soil bores and land use classification used to characterise PVI risk for various properties near the site.

Table 29 Classification Used to Assess Petroleum Vapour Intrusion Risk to Local Receptors from Soil

Property	***Soil Bores***	***Land Use Class***
67 Harrington Street	*All soil Bores*	*D*

12.3.2 Findings

Residual soil samples soil samples (non-excavated soil which is to remain at the site) have been assessed against the elected NEPM (2013) health screening levels (HSL) to determine potential hydrocarbon vapour risk to site users. Laboratory analytical results are presented in Appendix 9.

Specific grain, depth and land use classes are presented in Table 30.

Concentrations which exceeded laboratory LOR are highlighted in bold, and HSL exceedances are highlighted with a colored cell.

Table 30 Soil Analytical Results Compared Against HSL A

Soil Hydrocarbon HSL's for Assessing Indoor Vapour Intrusion (NEPM 2013) **Soil Sample Analysis**					EP080: BTEXN					EP080/071: TRH	
Bold - Indicates LOR Exceedances Colour Shading - Indicates HSL Exceedances: >1 x, * 2-5 x, ** 5-20 x, *** 20-50 x, **** >50 x					Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	F1	F2
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 1.5-1.6	31/10/2017	2 - 4	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH01 2.5-2.6	31/10/2017	4+	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH01 2.7-2.8	31/10/2017	4+	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH02 0.7-0.8	31/10/2017	2 - 4	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH02 1.5-1.6	31/10/2017	2 - 4	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH02 2.5-2.6	31/10/2017	4+	SAND	D	<0.2	<0.5	**1**	**1.4**	<1	**16**	<50
BH02 2.7-2.8	31/10/2017	4+	SAND	D	<0.2	<0.5	**3.1**	**4.6**	**2**	**74**	**120**
BH03 0.5-0.6	31/10/2017	2 - 4	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH03 1.5-1.6	31/10/2017	2 - 4	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH03 2.5-2.6	31/10/2017	4+	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH03 2.7-2.8	31/10/2017	4+	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH04 0.5-0.6	31/10/2017	2 - 4	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH04 1.5-1.6	31/10/2017	2 - 4	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH04 2.5-2.6	31/10/2017	4+	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH04 2.9-3.0	31/10/2017	4+	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	**160**
BH05 0.5-0.6	31/10/2017	1 - 2	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH05 1.5-1.6	31/10/2017	2 - 4	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH05 2.5-2.6	31/10/2017	2 - 4	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH05 3.6-3.7	31/10/2017	4+	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH06 0.5-0.6	31/10/2017	2 - 4	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH06 1.5-1.6	31/10/2017	2 - 4	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH06 2.4-2.5	31/10/2017	4+	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH07 0.5-0.6	31/10/2017	1 - 2	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH07 1.5-1.6	31/10/2017	2 - 4	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH07 2.5-2.6	31/10/2017	2 - 4	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH08 1.5-1.6	31/10/2017	1 - 2	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH08 3.4-3.5	31/10/2017	2 - 4	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH09 0.5-0.6	31/10/2017	2 - 4	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH09 1.5-1.6	31/10/2017	2 - 4	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH09 2.5-2.6	31/10/2017	4+	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	**230**
BH09 2.9-3.0	31/10/2017	4+	SAND	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50

None of the soil samples exceeded HSL limits for assessing petroleum vapour intrusion risk.

12.4 Groundwater

12.4.1 LNAPL Classification

Determining the presence of LNAPL at the site is important for understanding petroleum vapour intrusion risk and refining the conceptual site model. 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.

12.4.2 HSL Guidelines

Concentrations of hydrocarbons in groundwater have been assessed against NEPM (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 US Agriculture Soil Classification System (SCS) 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 31 summarises groundwater wells and land use classification to characterise PVI risk at the site. The land use classification adopted for the site is HSL D which all analytical results will be compared against.

Table 31 Classification Used to Assess Petroleum Vapour Intrusion Risk to Local Receptors from Soil

Property	**Monitoring Wells**	**Land Use Class**
67 Harrington Street	All Monitoring Wells	D

12.4.3 Findings

Groundwater sampling results Certificate of Analysis is presented in Appendix 9. Hydrocarbon concentrations within groundwater have been compared against CRC CARE 2013 Guidelines for Assessing for the Presence of LNAPL in Table 32. No LNAPL has been identified at the site.

Groundwater has been assessed against the elected NEPM ASC health screening levels (HSL) to determine potential hydrocarbon vapour risks to site users. Specific grain, depth and land use classes as well as nominated guideline limits are presented in Table 33.

Although two of the historically impacted wells located on the northeastern side of the site could not be sampled, it is expected that the low-level impacted groundwater will have migrated offsite and largely biodegraded over the space of 10 years. The historical vapour intrusion assessment (Coffey 2007) did not reveal any petroleum vapour intrusion risks based on indoor vapour intrusion model. In this case, the basement carpark presents a lower risk due to the potential for mixing and ventilation within the carpark space.

There are no HSL exceedances identified in groundwater collected from the site indicating there is a low risk of petroleum vapour intrusion into the underground carpark.

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 Likley 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**																		
25/09/2017	CC1	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	<20	<20	<20	<100	<100	<100	<100	<100
25/09/2017	CC2	<1	<2	<2	<2	<2	<2	<1	<5	40	<50	20	20	20	<100	<100	<100	<100	<100
25/09/2017	CC4	<1	<2	<2	<2	<2	<2	<1	<5	130	<50	120	120	120	<100	<100	<100	<100	<100
26/09/2017	CC6	<1	<2	<2	<2	<2	<2	<1	<5	160	<50	150	150	150	<100	<100	<100	<100	<100

Table 32 Summary of Groundwater Concentrations Compared Against CRC CARE (Friebel & Nadebaum, 2011) Guidelines for Assessing for the Presence of LNAPL

Table 33 Summary of Groundwater Samples That Exceeded Threshold HSL Limits

						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								
CC1	25/9/17	4 - 8	Clay	D	Limit	30000	NL	NL	NL	NL	NL	NL
					Result	<1	<2	<2	<2	<5	<20	<100
CC2	25/9/17	2 - 4	Clay	D	Limit	30000	NL	NL	NL	NL	NL	NL
					Result	<1	<2	<2	<2	<5	20	<100
CC4	25/9/17	2 - 4	Clay	D	Limit	30000	NL	NL	NL	NL	NL	NL
					Result	<1	<2	<2	<2	<5	120	<100
CC6	26/9/17	2 - 4	Clay	D	Limit	30000	NL	NL	NL	NL	NL	NL
					Result	<1	<2	<2	<2	<5	150	<100

#N/A - Requires alternative assessment approach if PHC identified ie. soil vapour assessment
NL – Non Limiting applicable as any derived HSL will exceed analyte solubility limit

13 TRENCH WORKER PVI ASSESSMENT – HSL's

13.1 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 the 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;

13.2 Findings

13.2.1 Soil

Laboratory analytical results are presented in Appendix 9.

Table 34 compares soil analytical results for residual samples (non-excavated soil which is to remain at the site) against relevant CRC CARE HSL's for shallow intrusive maintenance workers. Concentrations which exceeded laboratory levels of reporting (LOR) are highlighted in bold, and ESL exceedances are highlighted with a colored cell.

Of all samples collected only three samples exceeded the laboratory LOR. None of the soil samples collected at the site exceeds the hydrocarbon HSL's for assessing petroleum vapour intrusion risk to intrusive maintenance workers

Table 34 Summary of Soil Analytical Results Compared against HSL's for Assessing PVI Risk to Trench Workers

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
BH01 1.5-1.6	31/10/2017	2 to 4m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH01 2.5-2.6	31/10/2017	4 to 8m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH01 2.7-2.8	31/10/2017	4 to 8m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH02 0.7-0.8	31/10/2017	2 to 4m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH02 1.5-1.6	31/10/2017	2 to 4m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH02 2.5-2.6	31/10/2017	4 to 8m	SAND	<0.2	<0.5	**1**	**1.4**	<1	**18**	<50
BH02 2.7-2.8	31/10/2017	4 to 8m	SAND	<0.2	<0.5	**3.1**	**4.6**	**2**	**81**	**120**
BH03 0.5-0.6	31/10/2017	2 to 4m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH03 1.5-1.6	31/10/2017	2 to 4m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH03 2.5-2.6	31/10/2017	4 to 8m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH03 2.7-2.8	31/10/2017	4 to 8m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH04 0.5-0.6	31/10/2017	2 to 4m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH04 1.5-1.6	31/10/2017	2 to 4m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH04 2.5-2.6	31/10/2017	4 to 8m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH04 2.9-3.0	31/10/2017	4 to 8m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	**160**
BH05 0.5-0.6	31/10/2017	0 to 2m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH05 1.5-1.6	31/10/2017	2 to 4m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH05 2.5-2.6	31/10/2017	2 to 4m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH05 3.6-3.7	31/10/2017	4 to 8m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH06 0.5-0.6	31/10/2017	2 to 4m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH06 1.5-1.6	31/10/2017	2 to 4m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH06 2.4-2.5	31/10/2017	4 to 8m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH07 0.5-0.6	31/10/2017	0 to 2m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH07 1.5-1.6	31/10/2017	2 to 4m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH07 2.5-2.6	31/10/2017	2 to 4m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH08 1.5-1.6	31/10/2017	0 to 2m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH08 3.4-3.5	31/10/2017	2 to 4m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH09 0.5-0.6	31/10/2017	2 to 4m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH09 1.5-1.6	31/10/2017	2 to 4m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH09 2.5-2.6	31/10/2017	4 to 8m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	**230**
BH09 2.9-3.0	31/10/2017	4 to 8m	SAND	<0.2	<0.5	<0.5	<0.5	<1	<10	<50

14 SOIL DISPOSAL ASSESSSMENT

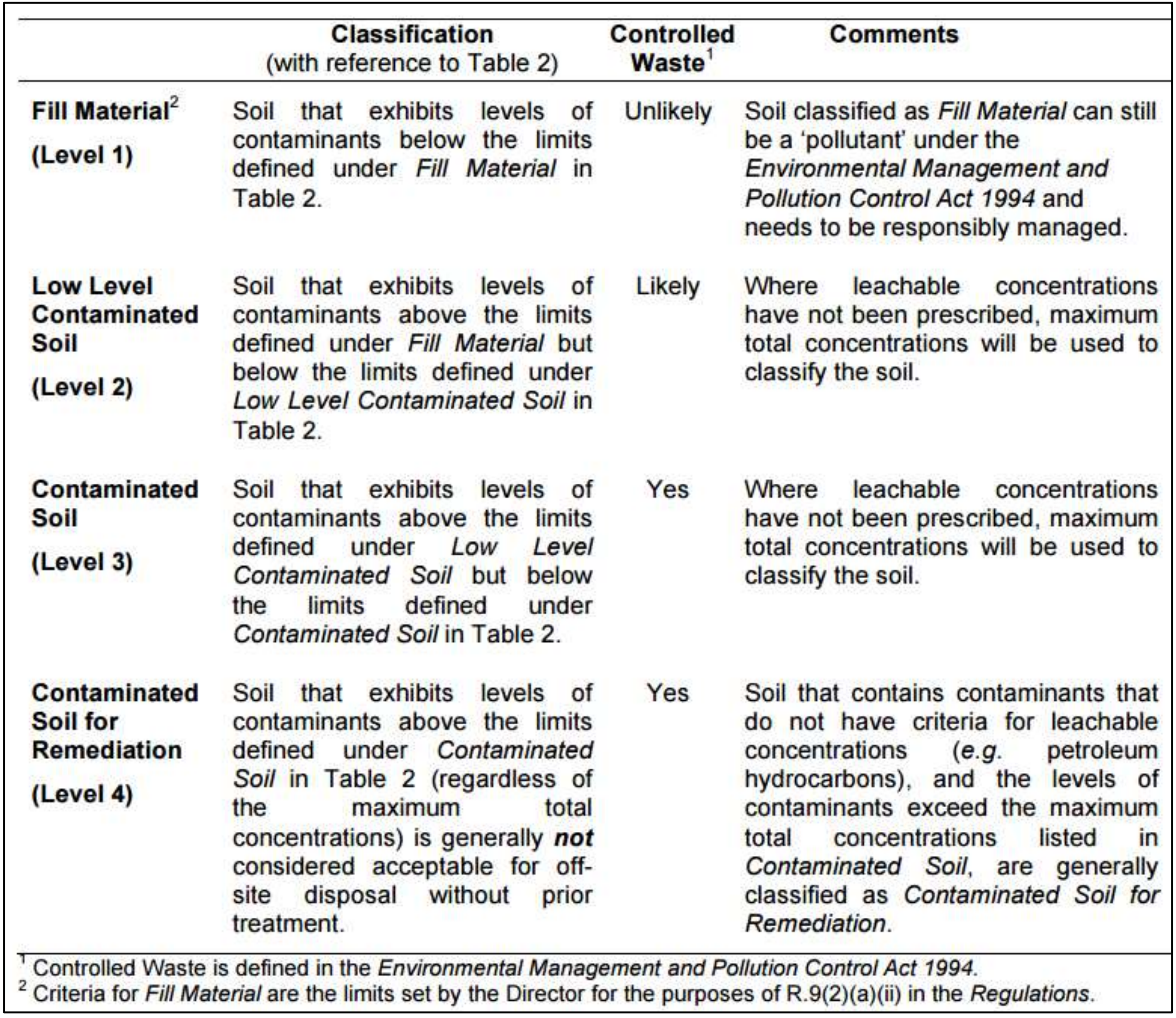
14.1.1 Guidelines

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 EPA uses 4 categories to classify contaminated soil as per Table 35:

- (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 35 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*.

14.1.2 Findings

With the revised site finished floor levels of 32.1 and 32.7 m AHD, there is minimal excavation disturbance. There are no soil bores within the proposed excavation zone on the southeast corner of the site and all soil which is proposed to be excavated soil should be stockpiled and tested against IB105 guidelines before it is potentially reused onsite, removed offsite to a landfill or to a licensed storage and handling facility for managing contaminated soil.

15 CONCEPTUAL SITE MODEL

15.1 Primary Sources of Contamination

15.1.1 Potential Primary Sources

Primary sources of contamination include:

- Leaded and diesel fuel historically stored at the site;
- Heavy metals and hydrocarbons (including PAH's) sourcing from the interceptor trap on the northern corner of the site;
- Residual hydrocarbons including PAH compounds which are likely to source from leaking oils within the former wrecking yard on the northern side of the lot;
- Lead from disused batteries within the former wreckers;
- Zinc from corroding galvanized iron products (corrugated roofing etc); and
- Residual hydrocarbons including PAH compounds as well as heavy metals sourcing from fill at the site.

Upgradient offsite potential primary sources have not been identified in the historical information search.

There may be other unknown potential sources of onsite or offsite impact (outside of the sampling areas) which GES are unaware of and therefore have not been investigated within this assessment.

Contaminates of potential concern associated with these potential sources have already been identified in a previous section.

15.1.2 Confirmed Primary Sources

The following primary sources have been identified:

- Leaded and diesel fuel historically stored at the site;
- Heavy metals and hydrocarbons (including PAH's) sourcing from the interceptor trap on the northern corner of the site; and
- Zinc from corroding galvanized iron products (corrugated roofing etc).

15.2 Potential Secondary Sources of Contamination

Secondary source is contamination which may sources from a primary source (soil, groundwater, surface water and vapour). Secondary sources are typically spatially separated from the primary source, and may have a direct pathway linkage impacting or affecting receptors of interest.

15.2.1 Soil

Potential secondary soil impact may occur because of:

- Leaking underground storage tanks and associated fuel lines; and
- Interceptor traps which may be beyond their service life.

15.2.2 Groundwater

Potential groundwater impact may occur as a result of leaking underground storage tanks or fuel lines. For groundwater impact to occur, the tanks or fuel lines must have perished and be leaking directly to the water table via infiltration through permeable soils.

The aquifer system at the site is expected to be an:

- Tertiary age, poorly-consolidated interbedded claystone, sandstone and pebble conglomerate.

15.3 Identified Secondary Source of Contamination

15.3.1 Soil

The following contaminants have been identified based on the current and historical site investigations:

- PAH compounds (including benzo(a)pyrene) and various heavy metals sourcing from the interceptor trap; and
- Petroleum hydrocarbons sourcing from underground storage tanks.

15.3.2 Groundwater

The following can be summarized about site groundwater impact:

- Historically, hydrocarbon impacted water was encountered on the northeastern side of the site. The impact is not hydraulically downgradient (spread to the northeast as opposed to the east to south/east) of the bowsers and UST's, and it is inferred that the hydrocarbons may have migrated downhill (to then northeast) within perched aquifer on top of the natural clays in the base of the granular fill material; and
- Hydrocarbon impact historically identified in the aquifer at the site is largely depleted to concentrations near the laboratory limits of reporting. BTEX compounds are no longer identified (where they have been historically) and residual hydrocarbon contaminants identified are in the F1 type category (TRH C6 to C10 less BTEX).
- Groundwater impact has not been identified in upgradient wells at the site indicating unlikely upgradient groundwater impact.

15.4 Potential Receptors

The following presents a summary of all potential receptors considered in the assessment.

15.4.1 Potential Onsite Receptors

- Commercial workers developing the site;
- Commercial workers inhabiting the site;
- Residential receptors inhabiting all levels above the ground floor level; and
- All people using the basement carpark (visitors, residences, commercial workers)

15.4.2 Potential Offsite Receptors

- Residential receptors downgradient of and immediately adjacent to the site to the east which includes 75, 77, 81 & 83 Patrick Street; and
- Commercial receptors downgradient of the site to the east which includes Audi Centre at 246 Murray Street, and the Tasmanian Key Service at 240-244 Murray Street;

15.5 Transport Mechanisms

Potential contaminant migration pathways for the chemicals of concern include:

- Vertical percolation with rainwater to underlying soils and groundwater;
- Horizontal groundwater flow in the aquifers;
- Vertical movement within the vadose zone through seasonal fluctuations in groundwater levels;
- Volatilization of soil-gas through the vadose zone from impacted soils and groundwater; and,
- Surface runoff.

15.6 Exposure Routes

15.6.1 Incomplete Contaminant Exposure Pathways

Incomplete contaminant exposure pathways relate to present unmanaged risk. **Error! Reference source not found.** presents a summary of potential receptors identified in Section **Error! Reference source not found.** with incomplete exposure pathways deducted based on site desktop assessment or soil analysis.

Table 36 Summary of Incomplete Contaminant Exposure Pathways

Medium	Pathways Ruled Out	Specific Receptor	Basis
Soil	Dust inhalation Soil Ingestion	Onsite inhabitants, construction workers & future trench workers	There are no HIL exceedances based land used class D for limited soil access
	Dermal contact	Onsite inhabitants, construction workers & future trench workers	There are no HSL exceedances.
	Plant root absorption & burrowing animals	Ecosystem - Onsite flora and fauna	No sensitive onsite flora and fauna
Groundwater	Groundwater Use	Drinking Water	Not a PEV given groundwater is identified as Class B (State Policy on Water Quality Management EPA Tasmania 1997)
		Stock, Irrigation, industry	No applicable to the land use setting
		Ecosystem	No receptors within 750 m of the site.
Petroleum Hydrocarbon Vapours	Onsite Indoor Vapour Inhalation	Commercial & Residential Spaces	The risk of hazardous vapour migration into indoor commercial and residential spaces is considered low as identified soil vapour analysis and Tier 1 groundwater HSL screening.
	Onsite Trench and Excavation Vapour Inhalation	Trench and construction workers	The risk of hazardous vapour migration into trenches and excavations is considered low as identified soil vapour analysis and Tier 1 groundwater HSL screening.

15.6.2 Potential Pathways

Potential and plausible transport mechanisms and exposure routes are presented in Table 37 and Figure 11 model. Incomplete exposure pathways are not included in Figure 11.

The following potential pathways have been identified:

- GES have not investigated offsite migration of any potential contaminant plume, and therefore a petroleum vapour intrusion risk to offsite residential and commercial receptors has not been identified and therefore remains a plausible pathway unless proven otherwise;
- There is a potential pathway for shallow impacted soil (exceeding ESL's) to erode/discharge offsite. Provided that a soil and water management plan is put in place, the is unlikely to present a risk and become a plausible contaminant exposure pathway.

Table 37 Summary of Potential Complete Contaminant Exposure Pathways

Medium	Specific Pathway	Receptors	Basis
Soil	Soil erosion and water discharge to storm water drains	Ecosystem – Marine environment	HSL's exceeded for primarily benzo(a)pyrene
Petroleum Hydrocarbon Vapours	Offsite Indoor Vapour Inhalation	Commercial & Residential Spaces	The risk of hazardous vapour migration into indoor commercial and residential spaces located to the east of the site is unknown and unidentified.

15.6.3 Plausible Contaminant Exposure Pathway Details

Provided that the soil is adequately managed as indicated in the recommendations, plausible exposure pathways are not identified at the site.

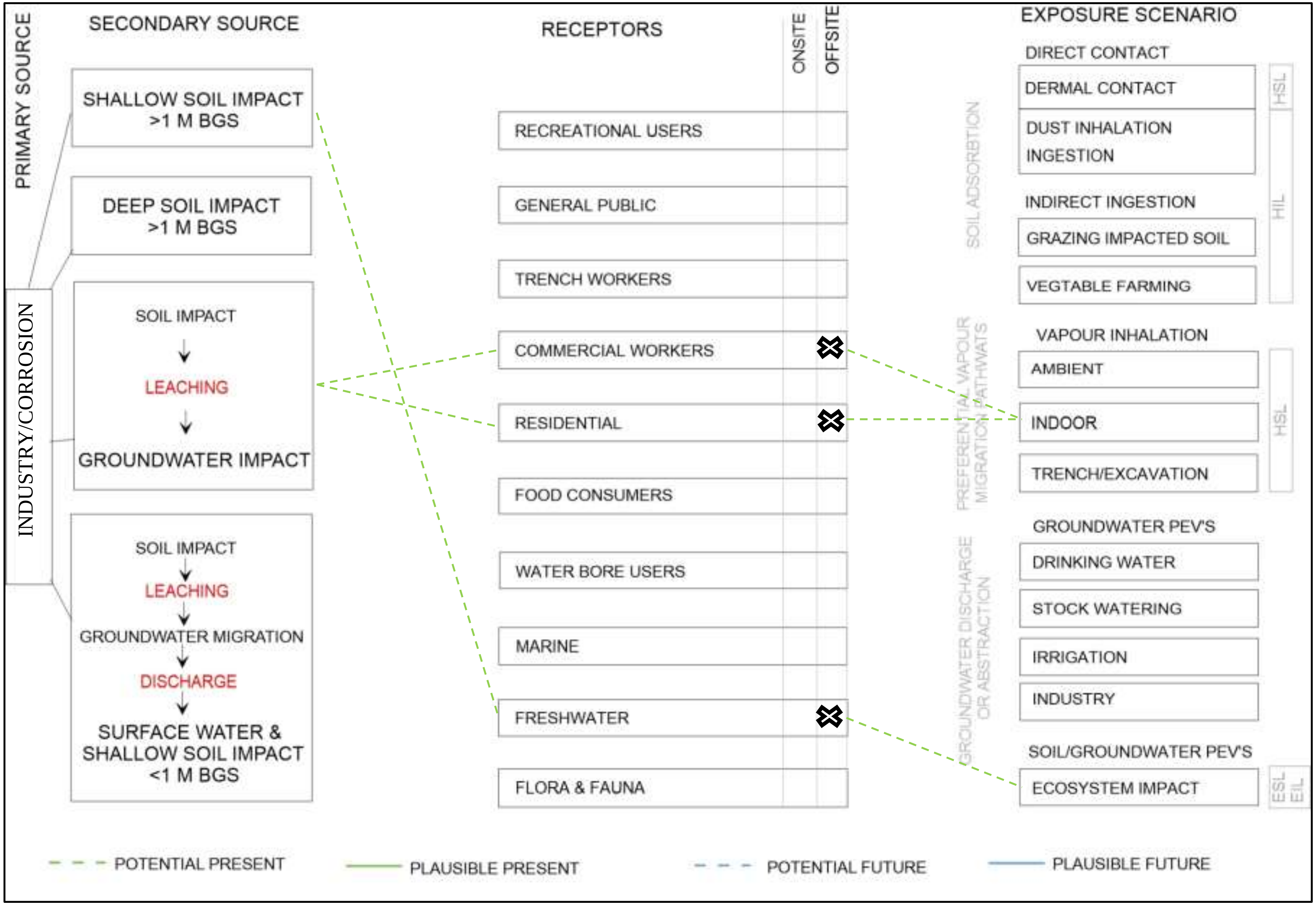


Figure 11 Conceptual Site Model Identifying Contamination Source, Receptors and Transport Mechanisms/Exposure Routes

16 CONCLUSIONS

16.1 Desktop Assessment

From the desktop assessment, it is concluded that:

- Based on a review of previous environmental site assessments, it has been identified that there was historical hydrocarbon impact in both soil and groundwater at the site;
- Historical contaminating activities were identified on the northern three lots which included:
    - The northern two lots were historically used as a vehicle wrecking/storage yard;
    - City Cabs yard in which underground petroleum storage systems were used at the site which is expected to be historical source of hydrocarbons in groundwater and soil;
    - The city Cabs yard had a triple interceptor trap which is likely to be source of heavy metals and hydrocarbons;

16.2 Adopted Guideline Settings

The following investigation limits were adopted for the site:

- Ecosystem – Commercial/industrial land use;
- Future land users access to soil – limited soil access in commercial space (all paved) therefore:
    - HIL D for soil ingestion and inhalation and
    - HSL D for dermal contact;
- Future land users vapour inhalation risk – HSL D for commercial workers
- Site development works & future trench workers
    - HSL D for vapour intrusion risk based on commercial land use;
    - Standard guidelines for assessing dermal contact risk; and
    - HIL D for assessing dust inhalation and soil ingestion risk
- Groundwater at the site is classified as Category B and PEV's need to be protected include Freshwater ecosystems. As the groundwater is not Category A, it is not considered a potable water source. Other PEV's needing to be protected including groundwater use for irrigation, stock watering and industrial purposes are not relevant to the site.

16.3 Soil Assessment

The following can be summarized:

- There were no vapour intrusion risks (PVI HSL) to site development workers, future land users and future trench workers;
- A soil ingestion and dust inhalation risk (HIL) and a dermal contact (HSL) risk has not been identified for site development workers, future land users and future trench workers; and
- EIL's were not exceeded, but given ESL's were exceeded for benzo(a)pyrene, management measures need to be put in place to manage offsite sediment transport from stormwater and vehicle trafficking.

16.4 Groundwater Assessment

The following can be summarized:

- Groundwater at the site did not exceed guidelines for assessing risk to freshwater ecosystems;
- Petroleum hydrocarbon concentrations are below threshold investigation limits for assessing petroleum vapour intrusion risk;
- Although not all hydrocarbon impacted wells were sampled, no further vapour intrusion assessment is required given the basement mixing environment and carpark ventilation requirements; and
- Assessing offsite groundwater impact was not in the scope of works of this assessment. Onsite groundwater quality does not present an impediment to site development works.

16.5 Proposed Development Works

In summary, provided the recommendations herein are implemented, the following conclusions can be made:

- A risk to potential receptors has not been identified during and after development.
- All samples collected at the site are below threshold concentrations for assessing risk to human health;
- No particular health and safety issues are identified which may originate from onsite contamination activities;
- Other than advice provided within the recommendations section of this report, there are no specific remediation and protection measures required to be implemented before excavation commences;
- As a result of proposed site infilling, there is a very low human health risk to future users of the site; and
- GES advise that during site excavation works for site redevelopment, there is a low risk that site contamination will present an environmental risk.

17 RECOMMENDATIONS

GES recommends that a dust screen is placed around the site in conjunction with a general fence barrier to be erected.

A soil and water management plan is required to reduce the spread of onsite soils and water. Water should be collected and tested before it is discharged to the stormwater system.

Level 2 and 3 materials proposed to be excavated which require management were identified in fill and natural soils on the western corner of the site and near the former interceptor trap.

An excavation management plan is recommended to minimize the risk of contaminating clean Level 1 soil at the site which is proposed to be excavated. Additional soil sampling prior to excavation works is optional to further classify proposed material for disposal at a licensed landfill.

Yours faithfully,

Kris J Taylor BSc (Hons)

Environmental Geologist

18 REFERENCES

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LIMITATIONS STATEMENT

This monitoring Report has been prepared in accordance with the scope of services between Geo-Environmental Solutions Pty. Ltd. (GES) and Chau Nominees Pty Ltd (‘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 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

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 Author and Principle Environmental Consultant
- PhD in Environmental Soil Chemistry from the University of Tasmania in 2007
- 12 years' experience in environmental contamination assessment and site remediation.

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
- 15 years professional work experience and six years contaminated site assessment

Mr Kris Taylor Bsc (Hons)

- Senior Environmental & Engineering Geologist
- Honours in Environmental Geology at the University of Tasmania in 1998
- 15 years' experience in environmental contamination assessments and hydrogeology (including honours in mine site tailing pollution assessment)

Mr Grant McDonald (Adv. cert. hort.)

- Soil Technician
- 6 years' experience in hydrocarbon and heavy metal contamination sampling of soils and groundwater.

GES STAFF – CONTAMINATED SITES EXPERIENCE

Mr Aaron Plummer(Cert. IV)

- Soil Technician
- 3 years' experience in hydrocarbon and heavy metal contamination sampling of soils and groundwater.

Mr Mark Downie B.Agr.Sc (Hons)

- Soil Scientist
- 3 Year experience in contamination assessment and reporting of soils and groundwater.

Mr Sam Rees B.Agr.Sc (Phd)

- Soil & Environmental Scientist
- 6 years' experience in hydrocarbon and heavy metal contamination assessment and reporting of soils and groundwater.

Ms Robyn Doyle B.Agr.Sc (Hons)

- Soil & Environmental Scientist
- 3 Years' experience in contamination assessment and reporting of soils and groundwater.

Ms Peri Lucas B.Agr.Sc (Hons)

- Soil Scientist
- 1 Year experience in contamination assessment and reporting of soils and groundwater.

Appendix 2 Site Photographs

View of the former City Cabs Carpark From Harrington Street

Small Carpark Fronting on Patrick Street

Small Yard Servicing The Side Entry Door

Northern Corner of the Former City Cabs Site

Northern Corner of the Former City Cabs Site

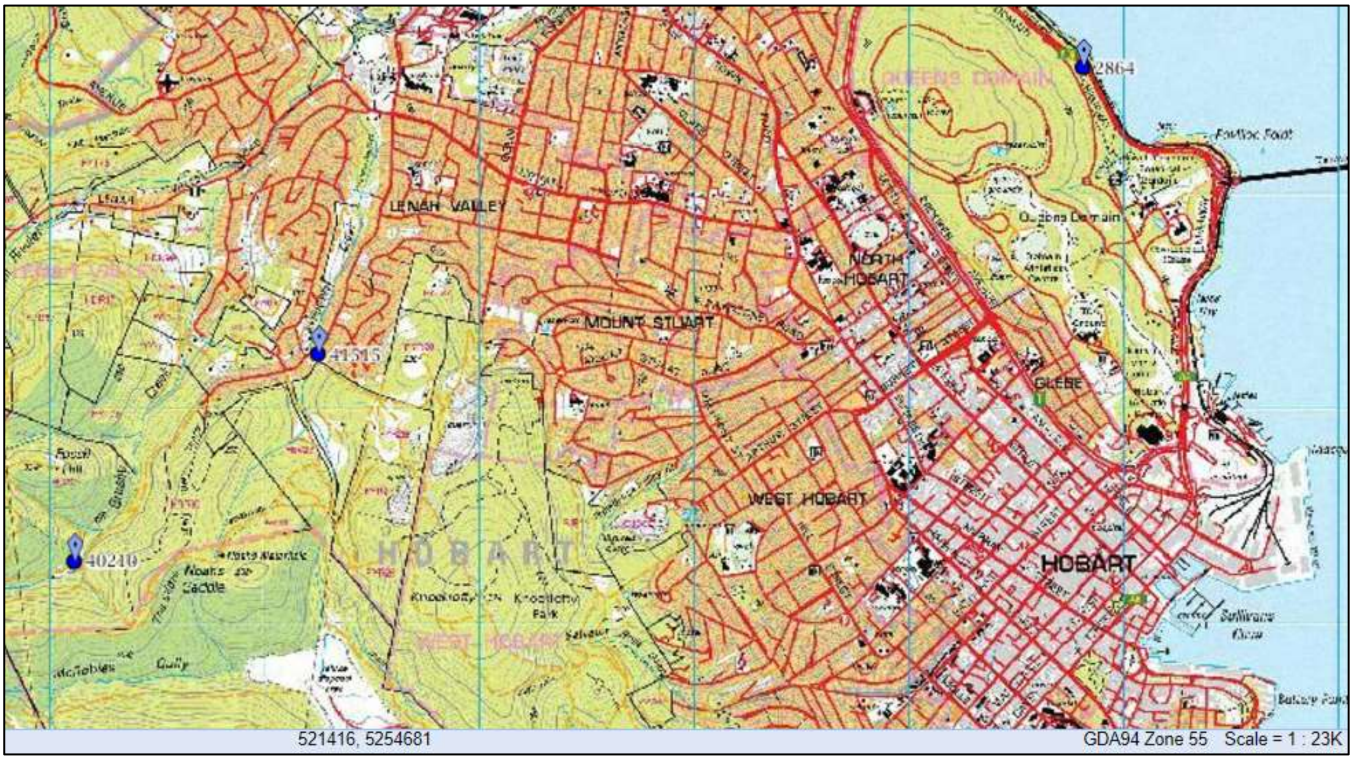
Western Corner and Street Frontage of the Former City Cabs Site

Norther End of the Former City Cabs Call Centre Building

Entrance to The Existing Carpark

View to the Northwest through to the Northeast From the Centre of the Former City Cabs Site

Appendix 3 Registered Water Bore Database



Groundwater Feature Detailed Report

Identification

Feature id: 2864 **Feature type:** Bore

Location

Locality: Hobart
Easting: 526814 **Datum:** GDA94
Northing: 5254583 **Accuracy:** 200
Ground level (m ASL):

Construction

Date drilled: 21/02/1983
Drilling company: Mines Department (=Tasmania Department of Mines)
Depth (metres): 54.00
Initial yield (L/sec): 0.23
Initial EC (µS/cm):

Bore diameters

From (m)	To (m)	Diameter (mm)	Drilling technique
0.0	54.0	54.00	Air Percussion (Rotary air - R)

Casings

From (m)	To (m)	Inside diameter (mm)	Outside diameter (mm)	Material
NA				

Screens

From (m)	To (m)	Inlet type
NA		

Seals

From (m)	To (m)	Material type
NA		

Geological / Hydrogeological Information

Lithological Log

From (m)	To (m)	Lithological description
0.0	3.0	soil and boulders
3.0	54.0	dolerite

Depth to water struck

Date	From (m)	To (m)	Cumulative yield
21/02/1983	40.0		0.23

Main aquifer geology: Jurassic Dolerite
Final TDS (mg/L): 1800

Standing Water Levels

Standing water levels

Date	SWL (metres)
NA	

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Groundwater Feature Detailed Report

Current status

Last recorded statuses

Type	Value	Date recorded
function	Unknown	21/02/1983

03/07/2017

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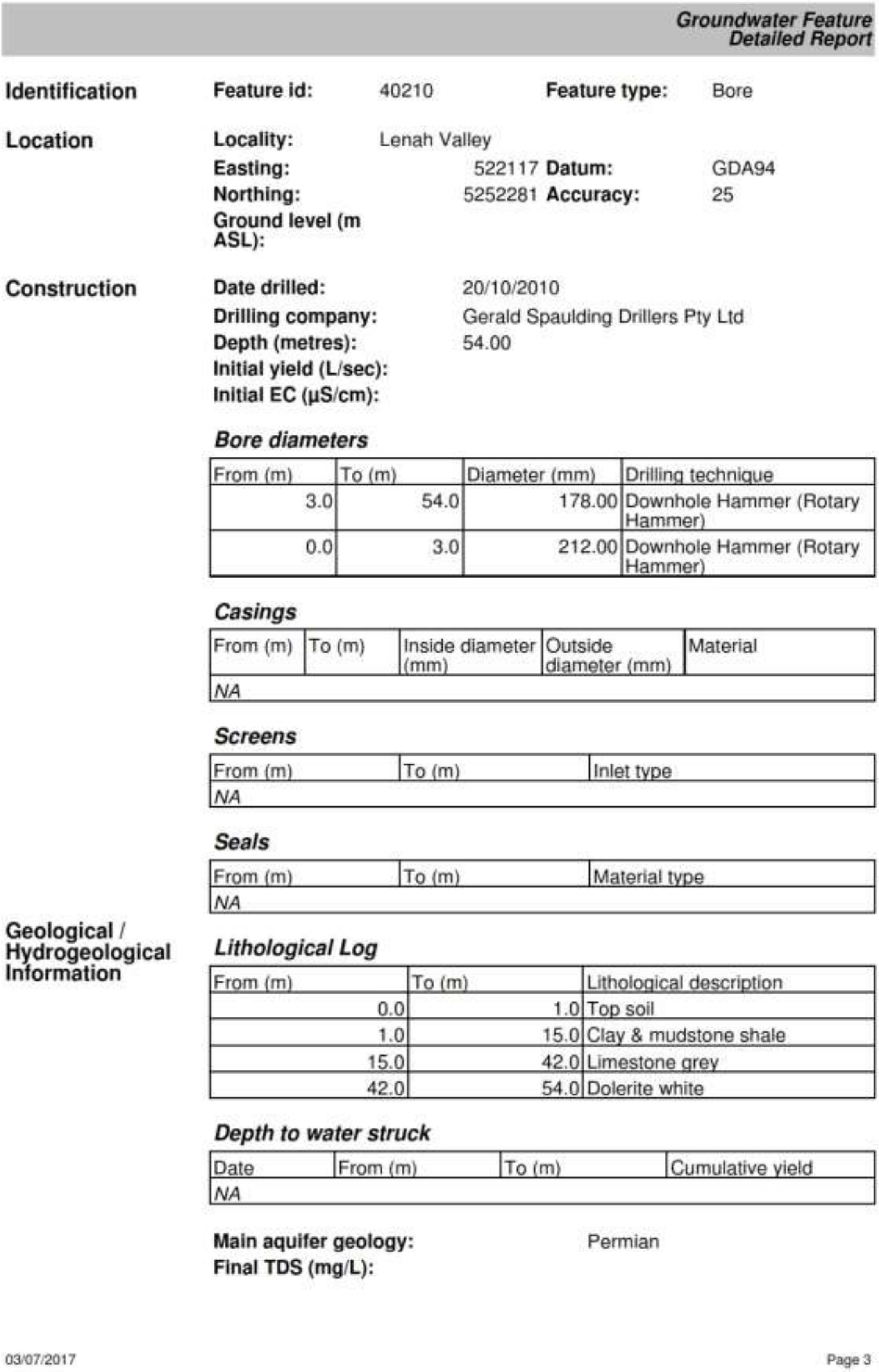

Groundwater Feature Detailed Report

Identification

Feature id: 40210 **Feature type:** Bore

Location

Locality: Lenah Valley
Easting: 522117 **Datum:** GDA94
Northing: 5252281 **Accuracy:** 25
Ground level (m ASL):

Construction

Date drilled: 20/10/2010
Drilling company: Gerald Spaulding Drillers Pty Ltd
Depth (metres): 54.00
Initial yield (L/sec):
Initial EC (µS/cm):

Bore diameters

From (m)	To (m)	Diameter (mm)	Drilling technique
3.0	54.0	178.00	Downhole Hammer (Rotary Hammer)
0.0	3.0	212.00	Downhole Hammer (Rotary Hammer)

Casings

From (m)	To (m)	Inside diameter (mm)	Outside diameter (mm)	Material
NA				

Screens

From (m)	To (m)	Inlet type
NA		

Seals

From (m)	To (m)	Material type
NA		

Geological / Hydrogeological Information

Lithological Log

From (m)	To (m)	Lithological description
0.0	1.0	Top soil
1.0	15.0	Clay & mudstone shale
15.0	42.0	Limestone grey
42.0	54.0	Dolerite white

Depth to water struck

Date	From (m)	To (m)	Cumulative yield
NA			

Main aquifer geology: Permian
Final TDS (mg/L):

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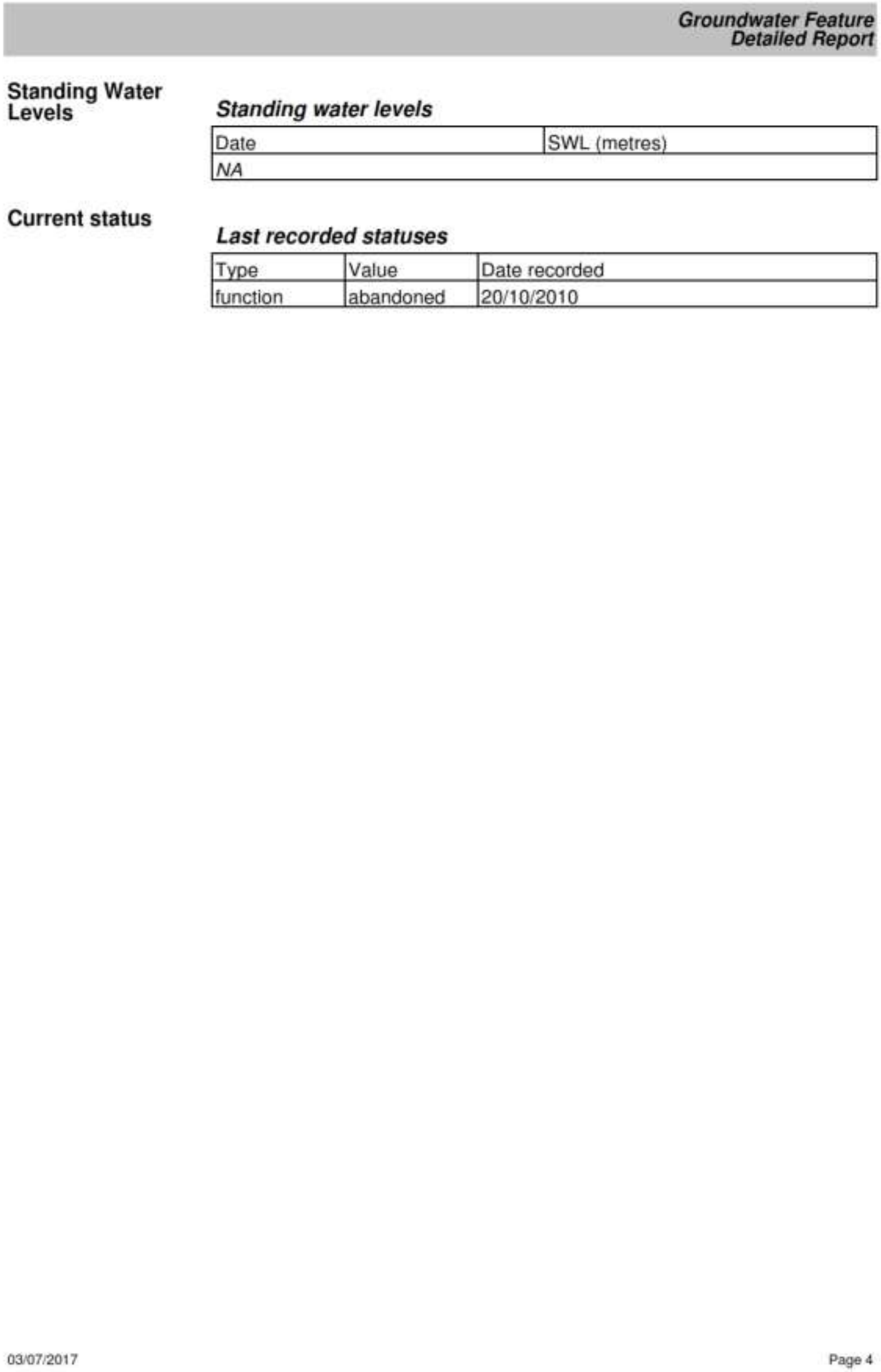

Groundwater Feature Detailed Report

Standing Water Levels

Standing water levels

Date	SWL (metres)
NA	

Current status

Last recorded statuses

Type	Value	Date recorded
function	abandoned	20/10/2010

03/07/2017

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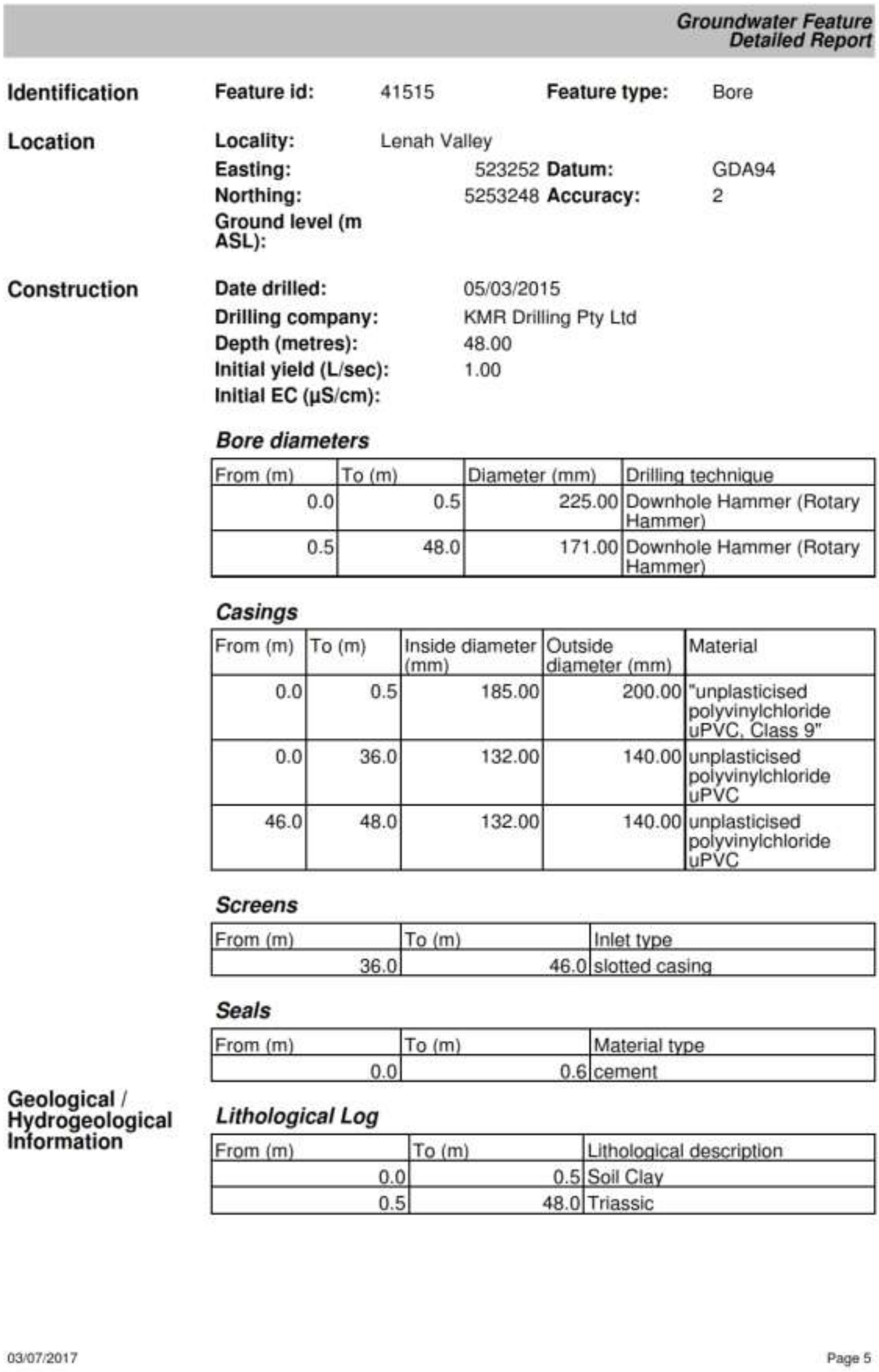

Groundwater Feature Detailed Report

Identification	**Feature id:**	41515	**Feature type:**	Bore
Location	**Locality:**	Lenah Valley		
	Easting:	523252	**Datum:**	GDA94
	Northing:	5253248	**Accuracy:**	2
	Ground level (m ASL):			
Construction	**Date drilled:**	05/03/2015		
	Drilling company:	KMR Drilling Pty Ltd		
	Depth (metres):	48.00		
	Initial yield (L/sec):	1.00		
	Initial EC (µS/cm):			

Bore diameters

From (m)	To (m)	Diameter (mm)	Drilling technique
0.0	0.5	225.00	Downhole Hammer (Rotary Hammer)
0.5	48.0	171.00	Downhole Hammer (Rotary Hammer)

Casings

From (m)	To (m)	Inside diameter (mm)	Outside diameter (mm)	Material
0.0	0.5	185.00	200.00	"unplasticised polyvinylchloride uPVC, Class 9"
0.0	36.0	132.00	140.00	unplasticised polyvinylchloride uPVC
46.0	48.0	132.00	140.00	unplasticised polyvinylchloride uPVC

Screens

From (m)	To (m)	Inlet type
36.0	46.0	slotted casing

Seals

From (m)	To (m)	Material type
0.0	0.6	cement

Geological / Hydrogeological Information

Lithological Log

From (m)	To (m)	Lithological description
0.0	0.5	Soil Clay
0.5	48.0	Triassic

03/07/2017

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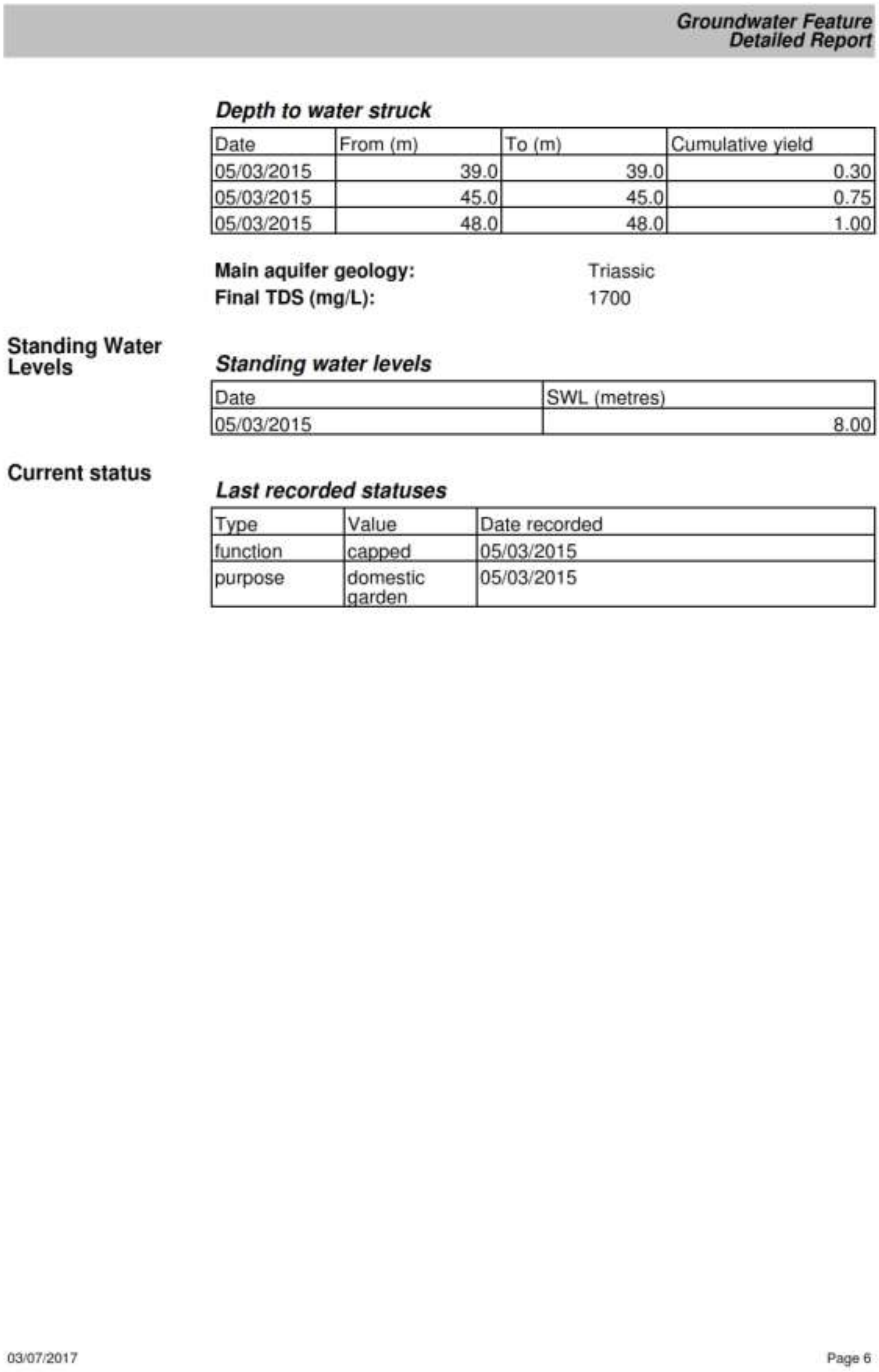


Depth to water struck

Date	From (m)	To (m)	Cumulative yield
05/03/2015	39.0	39.0	0.30
05/03/2015	45.0	45.0	0.75
05/03/2015	48.0	48.0	1.00

Main aquifer geology: Triassic

Final TDS (mg/L): 1700

Standing Water Levels

Standing water levels

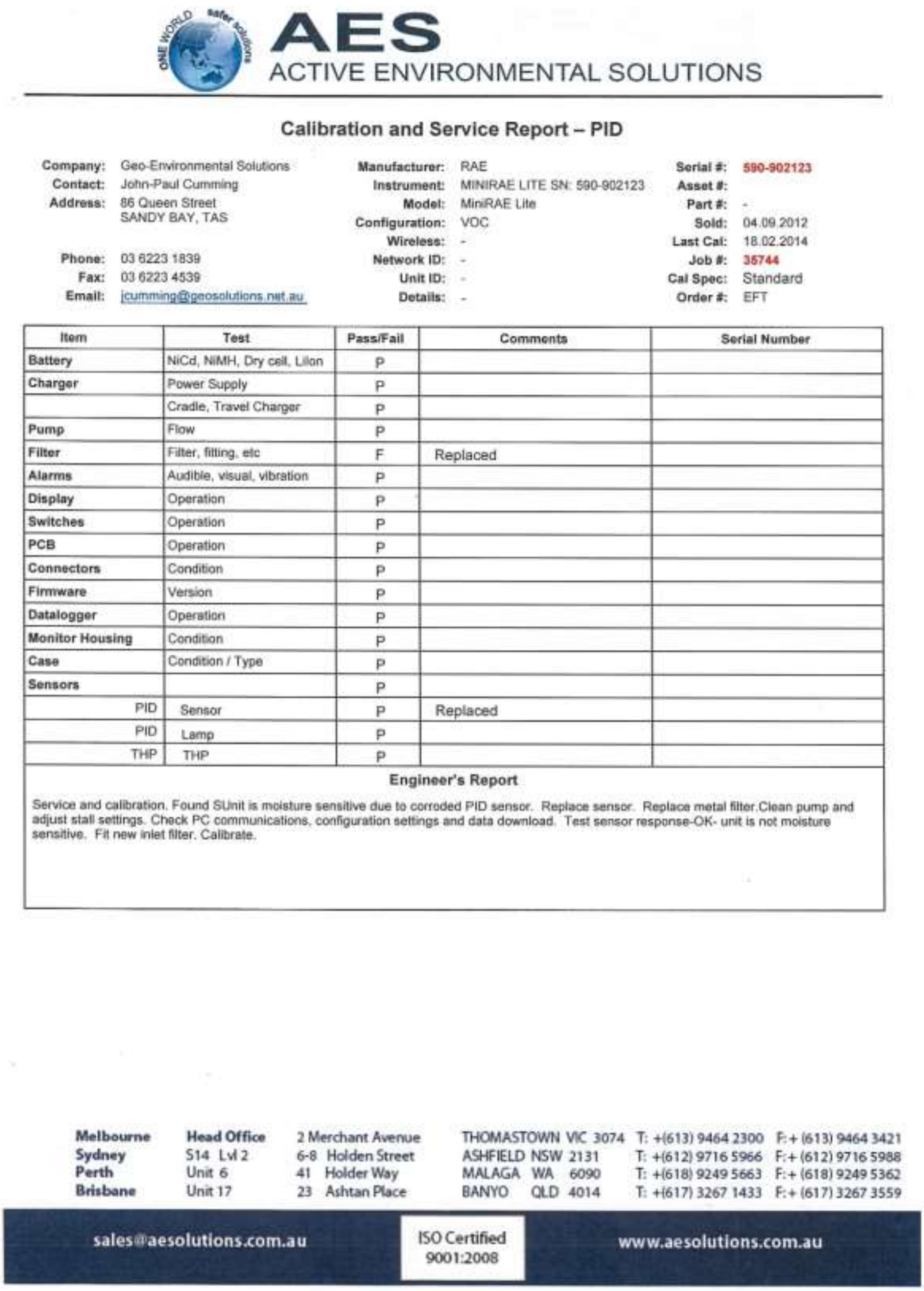
Date	SWL (metres)
05/03/2015	8.00

Current status

Last recorded statuses

Type	Value	Date recorded
function	capped	05/03/2015
purpose	domestic garden	05/03/2015

Appendix 4 Equipment (PID Meter) Calibration Certificates



AES
ACTIVE ENVIRONMENTAL SOLUTIONS

Calibration and Service Report – PID

Company: Geo-Environmental Solutions
Contact: John-Paul Cumming
Address: 86 Queen Street
SANDY BAY, TAS
Phone: 03 6223 1839
Fax: 03 6223 4539
Email: jcumming@geosolutions.net.au

Manufacturer: RAE
Instrument: MINIRAE LITE SN: 590-902123
Model: MiniRAE Lite
Configuration: VOC
Wireless: -
Network ID: -
Unit ID: -
Details: -

Serial #: 590-902123
Asset #:
Part #: -
Sold: 04.09.2012
Last Cal: 18.02.2014
Job #: 35744
Cal Spec: Standard
Order #: EFT

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		
Filter	Filter, fitting, etc	F	Replaced	
Alarms	Audible, visual, vibration	P		
Display	Operation	P		
Switches	Operation	P		
PCB	Operation	P		
Connectors	Condition	P		
Firmware	Version	P		
Datalogger	Operation	P		
Monitor Housing	Condition	P		
Case	Condition / Type	P		
Sensors		P		
PID	Sensor	P	Replaced	
PID	Lamp	P		
THP	THP	P		

Engineer's Report

Service and calibration. Found SUnit is moisture sensitive due to corroded PID sensor. Replace sensor. Replace metal filter.Clean pump and adjust stall settings. Check PC communications, configuration settings and data download. Test sensor response-OK- unit is not moisture sensitive. Fit new inlet filter. Calibrate.

Melbourne	**Head Office**	2 Merchant Avenue	THOMASTOWN VIC 3074	T: +(613) 9464 2300	F:+ (613) 9464 3421
Sydney	S14 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

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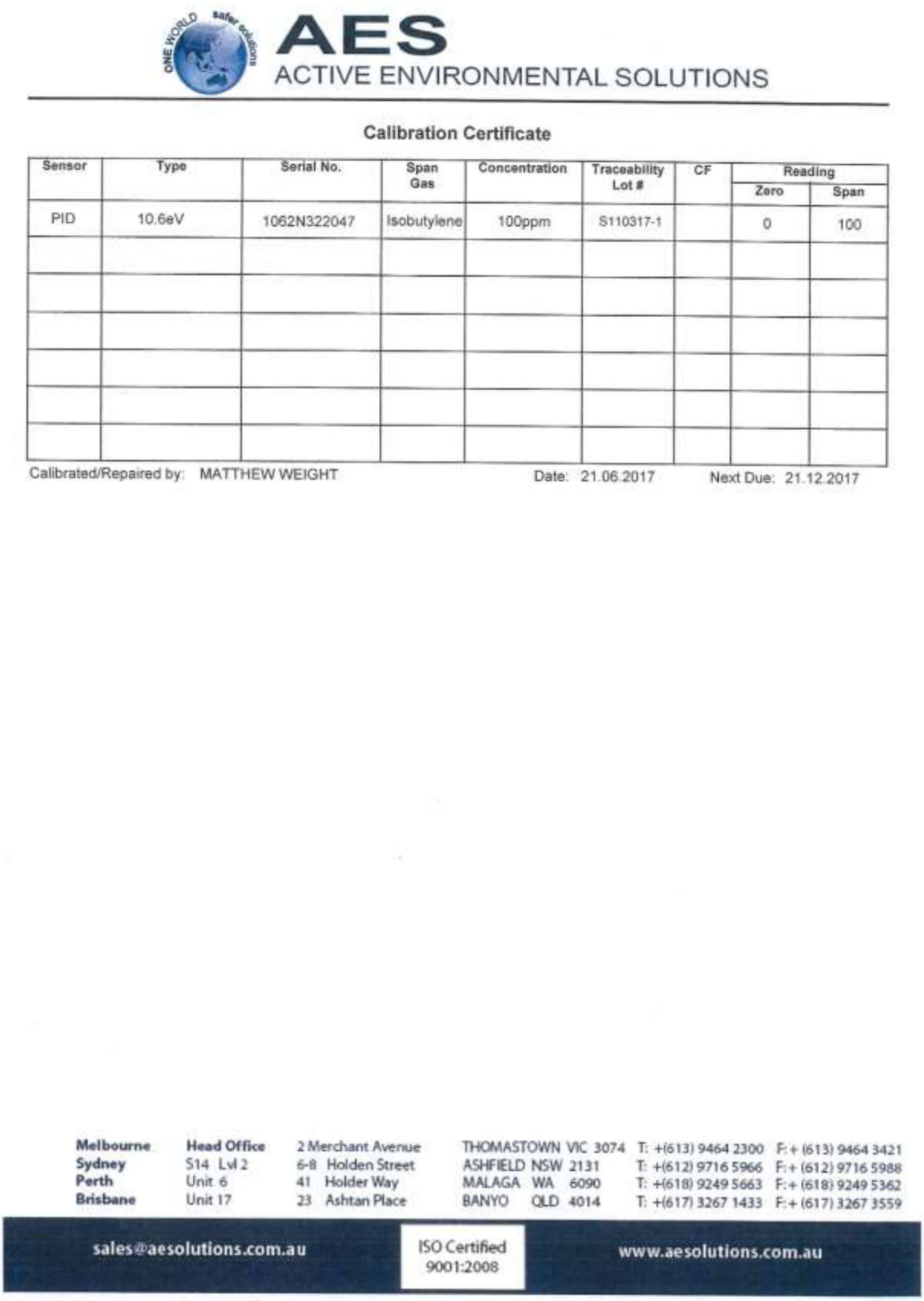
9001:2008
www.aesolutions.com.au



AES
ACTIVE ENVIRONMENTAL SOLUTIONS

Calibration Certificate

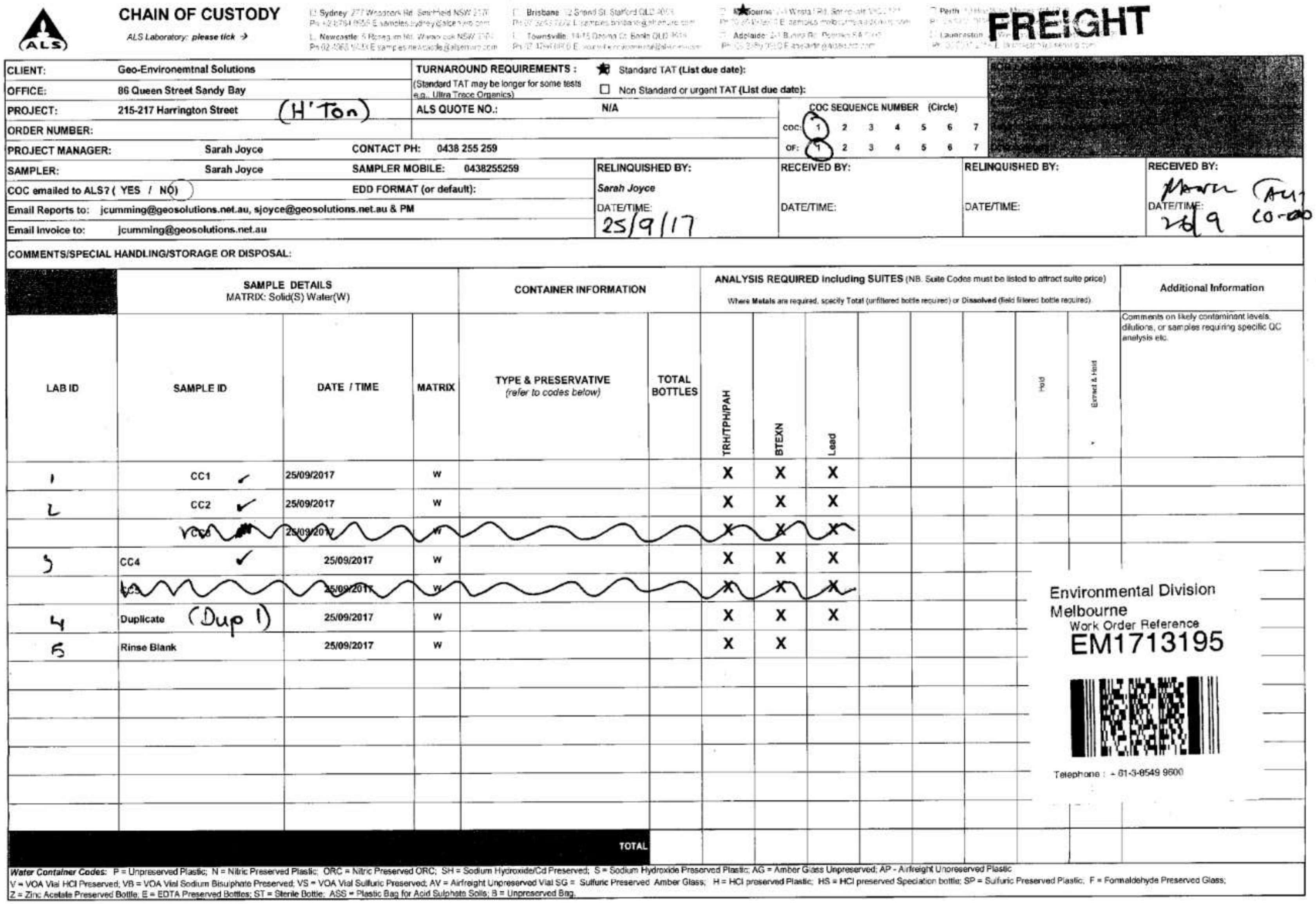
Sensor	Type	Serial No.	Span Gas	Concentration	Traceability Lot #	CF	Reading	
							Zero	Span
PID	10.6eV	1062N322047	Isobutylene	100ppm	S110317-1		0	100

Calibrated/Repaired by: MATTHEW WEIGHT Date: 21.06.2017 Next Due: 21.12.2017

Melbourne	**Head Office**	2 Merchant Avenue	THOMASTOWN VIC 3074	T: +(613) 9464 2300	F:+ (613) 9464 3421
Sydney	S14 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 5 Laboratory Chain of Custody (COC)



CHAIN OF CUSTODY

ALS Laboratory: please tick →

Sydney · Newcastle · Brisbane · Townsville · ★ Melbourne · Adelaide · Perth · Launceston

FREIGHT

CLIENT:	Geo-Environemtnal Solutions	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)	★ Standard TAT **(List due date):** ☐ Non Standard or urgent TAT **(List due date):**
OFFICE:	86 Queen Street Sandy Bay		
PROJECT:	215-217 Harrington Street (H'Ton)	**ALS QUOTE NO.:**	N/A
ORDER NUMBER:		**COC SEQUENCE NUMBER (Circle)**	COC: [✓ 1] 2 3 4 5 6 7 OF: [✓ 1] 2 3 4 5 6 7
PROJECT MANAGER:	Sarah Joyce	**CONTACT PH:**	0438 255 259
SAMPLER:	Sarah Joyce	**SAMPLER MOBILE:**	0438255259
COC emailed to ALS? (YES / [✓ NO])		**EDD FORMAT (or default):**	
Email Reports to:	jcumming@geosolutions.net.au, sjoyce@geosolutions.net.au & PM		
Email Invoice to:	jcumming@geosolutions.net.au		

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Sarah Joyce			(Au)
DATE/TIME: 25/9/17	DATE/TIME:	DATE/TIME:	DATE/TIME: 26/9 10-00

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

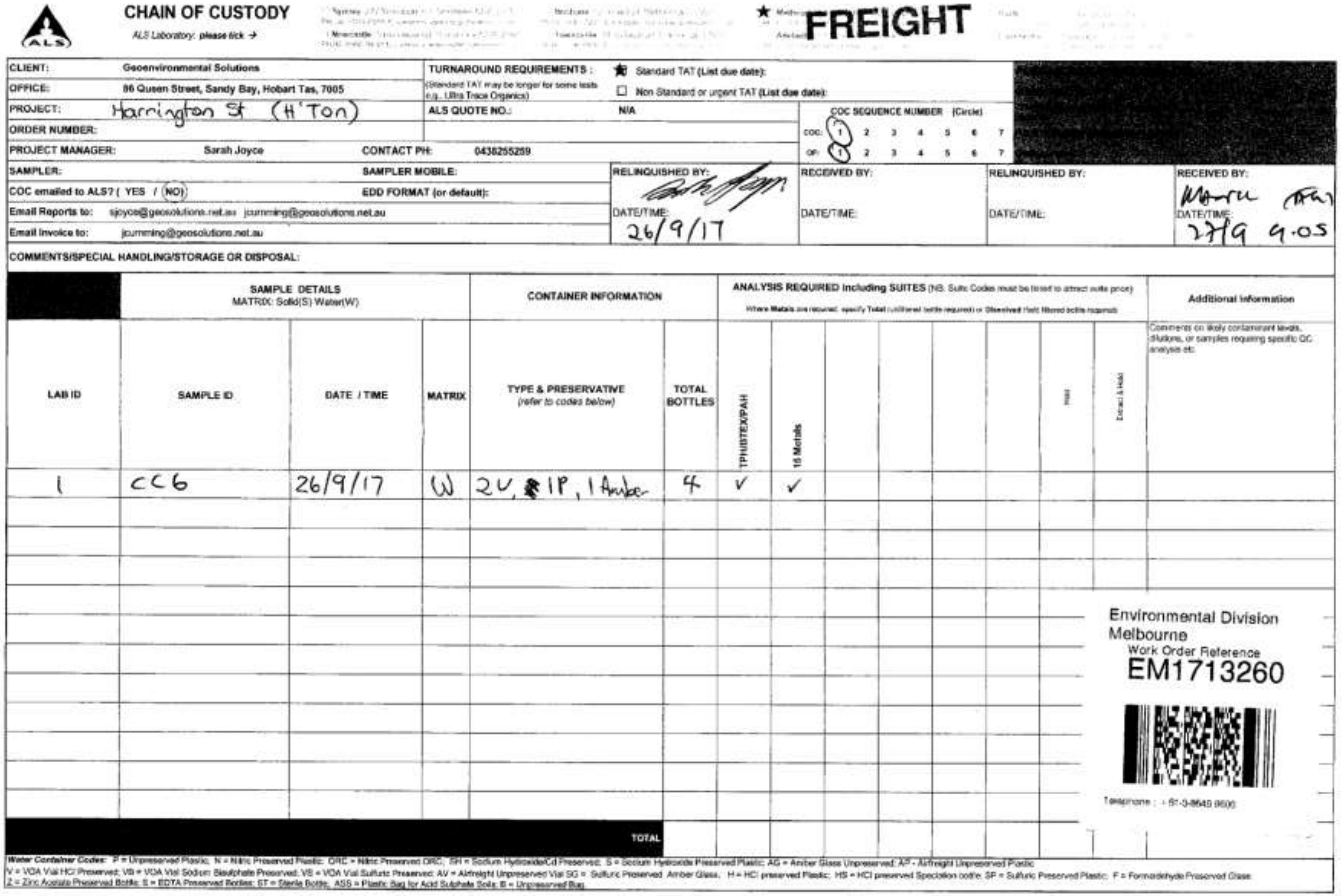
SAMPLE DETAILS MATRIX: Solid(S) Water(W) · **CONTAINER INFORMATION** · **ANALYSIS REQUIRED including SUITES** (NB. Suite Codes must be listed to attract suite price) Where **Metals** are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required). · **Additional Information**

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	TRH/TPH/PAH	BTEXN	Lead					Hold	Extract & Hold	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	CC1 ✓	25/09/2017	W			X	X	X							
2	CC2 ✓	25/09/2017	W			X	X	X							
	~~CC3~~	~~25/09/2017~~	~~W~~			~~X~~	~~X~~	~~X~~							
3	CC4 ✓	25/09/2017	W			X	X	X							
	~~CC5~~	~~25/09/2017~~	~~W~~			~~X~~	~~X~~	~~X~~							
4	Duplicate (Dup 1)	25/09/2017	W			X	X	X							
5	Rinse Blank	25/09/2017	W			X	X								
					TOTAL										

Environmental Division
Melbourne
Work Order Reference
EM1713195

Telephone : + 61-3-8549 9600

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 Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.



CHAIN OF CUSTODY

ALS Laboratory: please tick → ★ **FREIGHT**

[redacted]

CLIENT:	Geoenvironmental Solutions	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	★ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	86 Queen Street, Sandy Bay, Hobart Tas, 7005		
PROJECT:	Harrington St (H'Ton)	**ALS QUOTE NO.:**	N/A
ORDER NUMBER:		**COC SEQUENCE NUMBER (Circle)**	COC: [✓ 1] 2 3 4 5 6 7 OF: [✓ 1] 2 3 4 5 6 7
PROJECT MANAGER:	Sarah Joyce	**CONTACT PH:**	0438255259
SAMPLER:		**SAMPLER MOBILE:**	
COC emailed to ALS? (YES / [✓ NO])		**EDD FORMAT (or default):**	
Email Reports to:	sjoyce@geosolutions.net.au jcumming@geosolutions.net.au		
Email Invoice to:	jcumming@geosolutions.net.au		

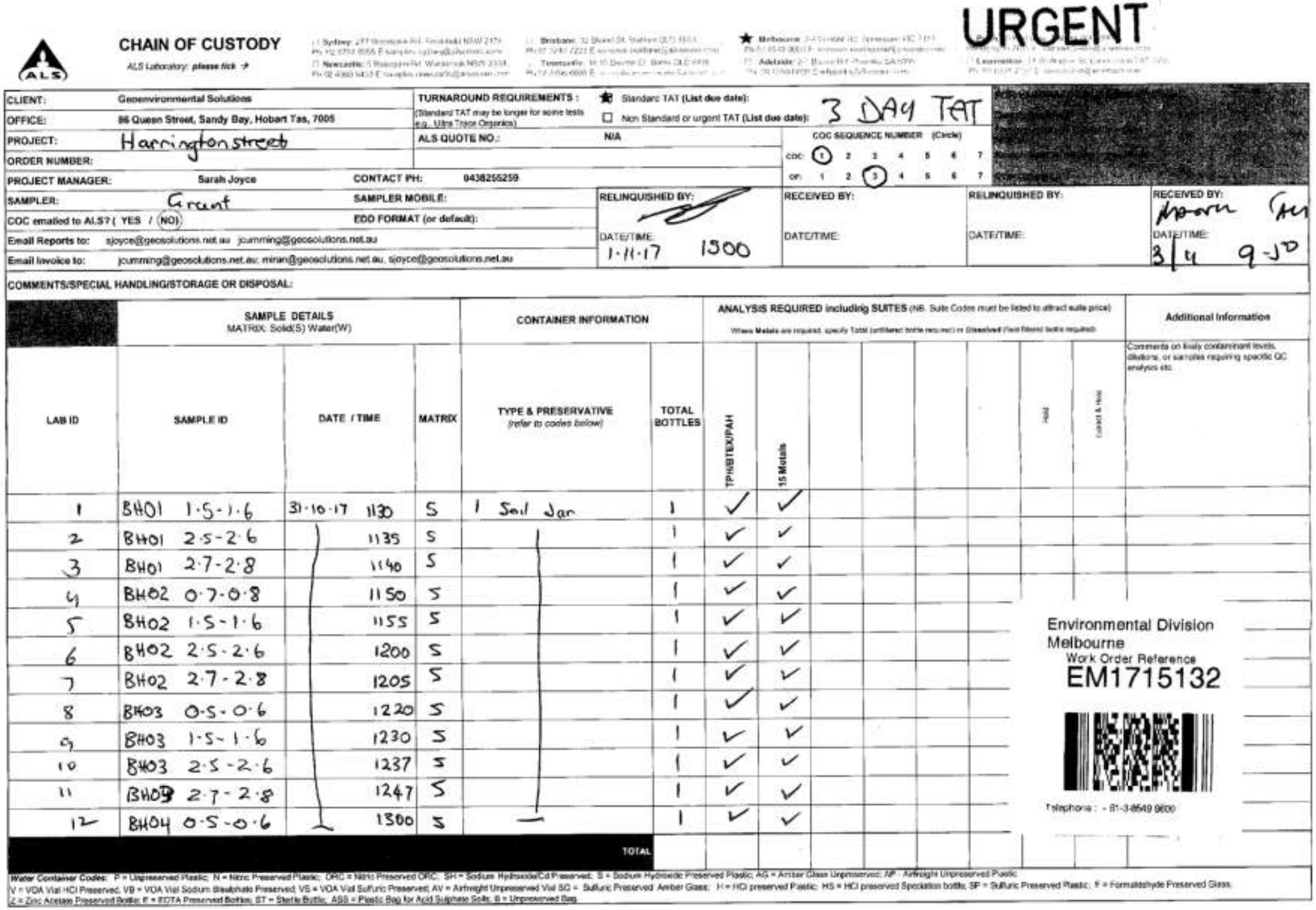
RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
			Maru (FF)
DATE/TIME: 26/9/17	DATE/TIME:	DATE/TIME:	DATE/TIME: 27/9 9.05

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		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 *(refer to codes below)*	TOTAL BOTTLES	TPH/BTEX/PAH	15 Metals					Hold	Extract & Hold	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	CC6	26/9/17	W	2V, 1P, 1 Amber	4	✓	✓							
				TOTAL										

Environmental Division
Melbourne
Work Order Reference
EM1713260
Telephone : + 61-3-8549 9600

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 Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag



URGENT

CHAIN OF CUSTODY

ALS Laboratory: please tick →

★ Melbourne

[redacted]

CLIENT:	Geoenvironmental Solutions	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	★ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date): 3 DAY TAT
OFFICE:	86 Queen Street, Sandy Bay, Hobart Tas, 7005		
PROJECT:	Harrington street	**ALS QUOTE NO.:**	N/A
ORDER NUMBER:			COC SEQUENCE NUMBER (Circle) coc: [✓ 1] 2 3 4 5 6 7 of: 1 2 [✓ 3] 4 5 6 7
PROJECT MANAGER:	Sarah Joyce	**CONTACT PH:**	0438255259
SAMPLER:	Grant	**SAMPLER MOBILE:**	
COC emailed to ALS? (YES / [✓ NO])		**EDD FORMAT (or default):**	
Email Reports to:	sjoyce@geosolutions.net.au jcumming@geosolutions.net.au		
Email Invoice to:	jcumming@geosolutions.net.au; miran@geosolutions.net.au, sjoyce@geosolutions.net.au		

RELINQUISHED BY:	**RECEIVED BY:**	**RELINQUISHED BY:**	**RECEIVED BY:**
DATE/TIME: 1·11·17 1500	DATE/TIME:	DATE/TIME:	DATE/TIME: 3/4 9-30

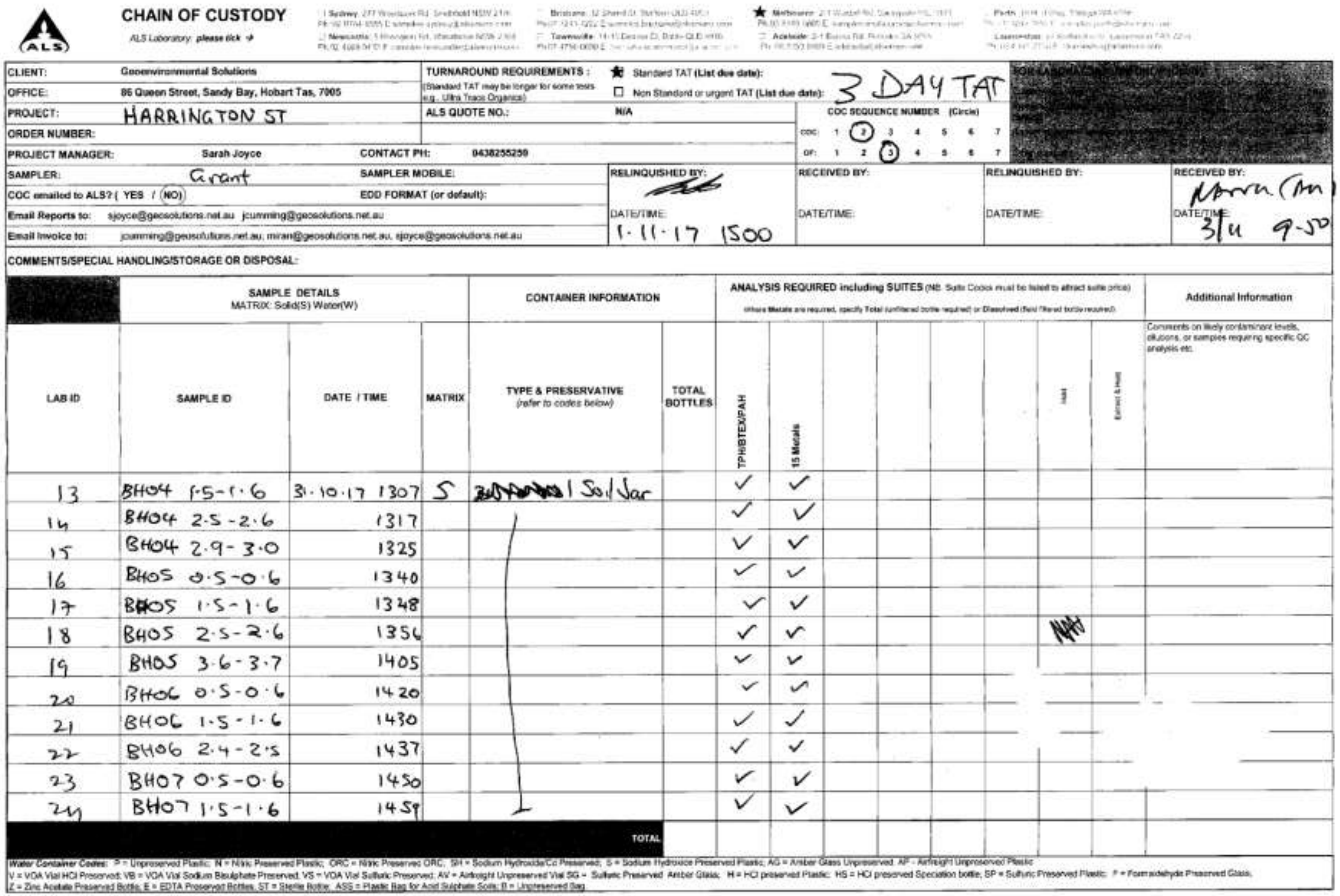
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		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** (refer to codes below)	**TOTAL BOTTLES**	TPH/BTEX/PAH	15 Metals					Hold	Extract & Hold	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	BH01 1·5-1·6	31·10·17 1130	S	1 Soil Jar	1	✓	✓							
2	BH01 2·5-2·6	1135	S		1	✓	✓							
3	BH01 2·7-2·8	1140	S		1	✓	✓							
4	BH02 0·7-0·8	1150	S		1	✓	✓							
5	BH02 1·5-1·6	1155	S		1	✓	✓							
6	BH02 2·5-2·6	1200	S		1	✓	✓							
7	BH02 2·7-2·8	1205	S		1	✓	✓							
8	BH03 0·5-0·6	1220	S		1	✓	✓							
9	BH03 1·5-1·6	1230	S		1	✓	✓							
10	BH03 2·5-2·6	1237	S		1	✓	✓							
11	BH03 2·7-2·8	1247	S		1	✓	✓							
12	BH04 0·5-0·6	1300	S		1	✓	✓							
				TOTAL										

Environmental Division
Melbourne
Work Order Reference
EM1715132

Telephone : + 61-3-8549 9600

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 Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.



CHAIN OF CUSTODY

ALS Laboratory: please tick →

CLIENT:	Geoenvironmental Solutions	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	★ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date): 3 DAY TAT
OFFICE:	86 Queen Street, Sandy Bay, Hobart Tas, 7005		
PROJECT:	HARRINGTON ST	ALS QUOTE NO.:	N/A
ORDER NUMBER:		COC SEQUENCE NUMBER (Circle)	COC: 1 [✓ 2] 3 4 5 6 7 OF: 1 2 [✓ 3] 4 5 6 7
PROJECT MANAGER: Sarah Joyce		CONTACT PH:	0438255259
SAMPLER: Grant		SAMPLER MOBILE:	
COC emailed to ALS? (YES / [✓ NO])		EDD FORMAT (or default):	
Email Reports to:	sjoyce@geosolutions.net.au jcumming@geosolutions.net.au		
Email Invoice to:	jcumming@geosolutions.net.au; miran@geosolutions.net.au, sjoyce@geosolutions.net.au		

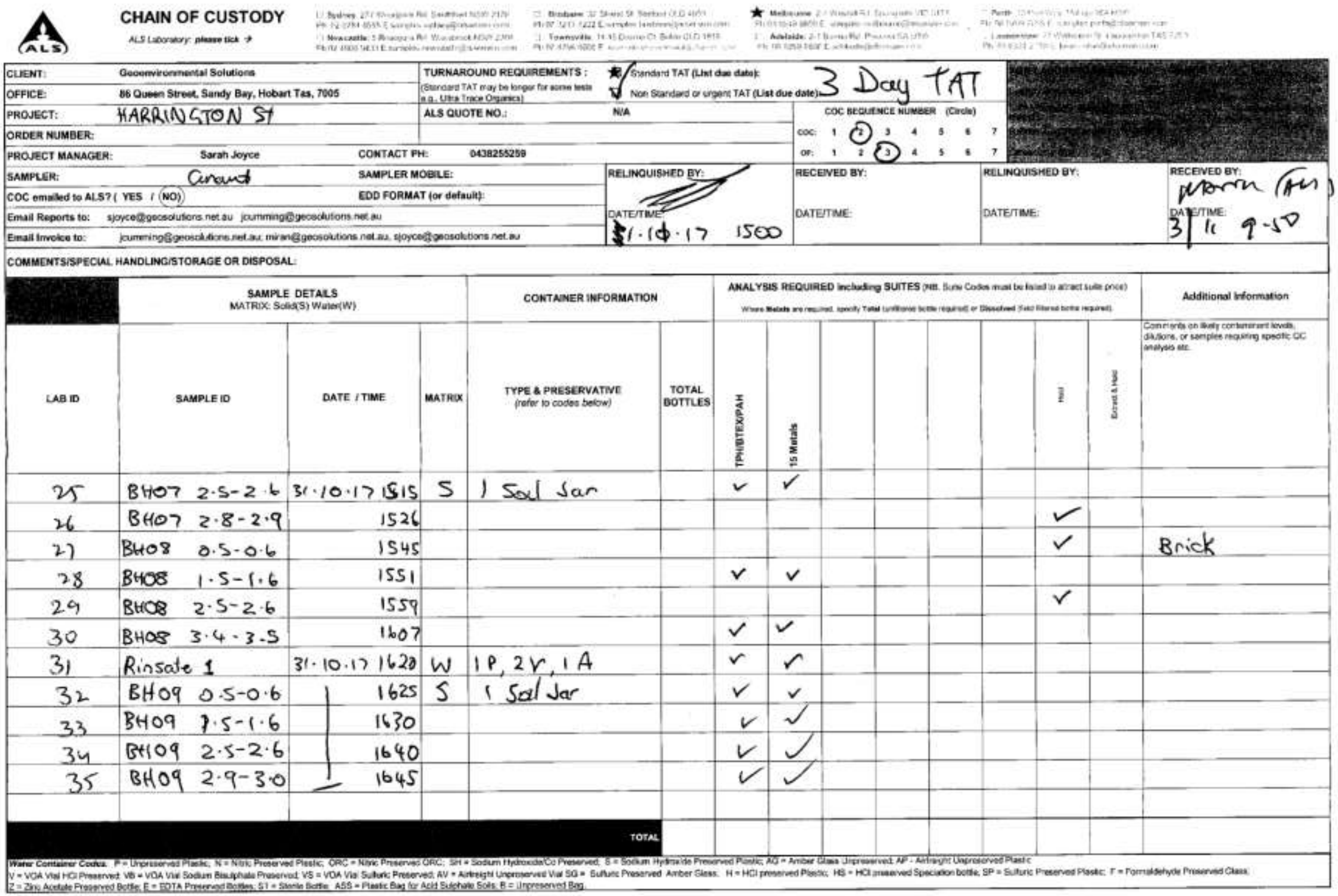
[redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
			Marra (An)
DATE/TIME: 1.11.17 1500	DATE/TIME:	DATE/TIME:	DATE/TIME: 3/11 9.50

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		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 (refer to codes below)	TOTAL BOTTLES	TPH/BTEX/PAH	15 Metals					Hold	Extract & Hold	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
13	BH04 1.5-1.6	31.10.17 1307	S	1 Soil Jar		✓	✓							
14	BH04 2.5-2.6	1317				✓	✓							
15	BH04 2.9-3.0	1325				✓	✓							
16	BH05 0.5-0.6	1340				✓	✓							
17	BH05 1.5-1.6	1348				✓	✓							
18	BH05 2.5-2.6	1356				✓	✓							
19	BH05 3.6-3.7	1405				✓	✓							
20	BH06 0.5-0.6	1420				✓	✓							
21	BH06 1.5-1.6	1430				✓	✓							
22	BH06 2.4-2.5	1437				✓	✓							
23	BH07 0.5-0.6	1450				✓	✓							
24	BH07 1.5-1.6	1459				✓	✓							
					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 Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag



CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ Sydney ☐ Newcastle ☐ Brisbane ☐ Townsville ★ Melbourne ☐ Adelaide ☐ Perth ☐ Launceston

[redacted]

CLIENT:	Geoenvironmental Solutions
OFFICE:	86 Queen Street, Sandy Bay, Hobart Tas, 7005
PROJECT:	HARRINGTON ST
ORDER NUMBER:	
PROJECT MANAGER:	Sarah Joyce
CONTACT PH:	0438255259
SAMPLER:	Cirount
SAMPLER MOBILE:	
COC emailed to ALS? (YES / NO)	[✓ NO]
EDD FORMAT (or default):	
Email Reports to:	sjoyce@geosolutions.net.au jcumming@geosolutions.net.au
Email Invoice to:	jcumming@geosolutions.net.au; miran@geosolutions.net.au, sjoyce@geosolutions.net.au

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)

☐ Standard TAT (List due date):

✓ Non Standard or urgent TAT (List due date): 3 Day TAT

ALS QUOTE NO.: N/A

COC SEQUENCE NUMBER (Circle)

COC: 1 [✓ 2] 3 4 5 6 7

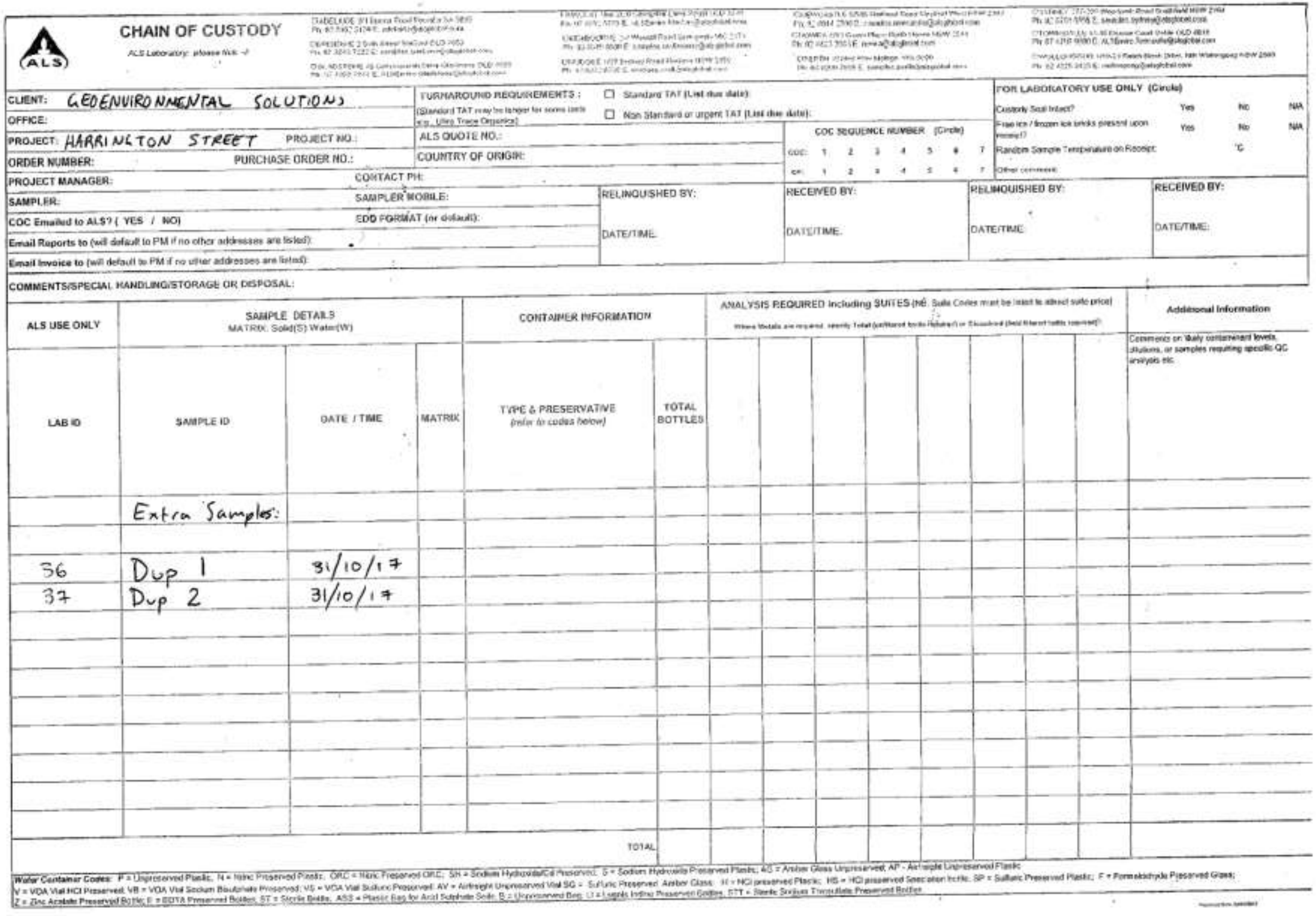
OF: 1 2 [✓ 3] 4 5 6 7

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
			Moron (ALS)
DATE/TIME: 31·10·17 1500	DATE/TIME:	DATE/TIME:	DATE/TIME: 3/11 9·50

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		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 (refer to codes below)	TOTAL BOTTLES	TPH/BTEX/PAH	15 Metals					Hold	Extract & Hold	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
25	BH07 2·5-2·6	31·10·17 1515	S	1 Soil Jar		✓	✓							
26	BH07 2·8-2·9	1526										✓		
27	BH08 0·5-0·6	1545										✓		Brick
28	BH08 1·5-1·6	1551				✓	✓							
29	BH08 2·5-2·6	1559										✓		
30	BH08 3·4-3·5	1607				✓	✓							
31	Rinsate 1	31·10·17 1620	W	1P, 2V, 1A		✓	✓							
32	BH09 0·5-0·6	1625	S	1 Soil Jar		✓	✓							
33	BH09 1·5-1·6	1630				✓	✓							
34	BH09 2·5-2·6	1640				✓	✓							
35	BH09 2·9-3·0	1645				✓	✓							
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 Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.



CHAIN OF CUSTODY

ALS Laboratory: please tick →

CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE:
PROJECT: HARRINGTON STREET PROJECT NO.:
ORDER NUMBER: PURCHASE ORDER NO.:
PROJECT MANAGER: CONTACT PH:
SAMPLER: SAMPLER MOBILE:
COC Emailed to ALS? (YES / NO) EDD FORMAT (or default):
Email Reports to (will default to PM if no other addresses are listed):
Email Invoice to (will default to PM if no other addresses are listed):
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)
☐ Standard TAT (List due date):
☐ Non Standard or urgent TAT (List due date):
ALS QUOTE NO.:
COUNTRY OF ORIGIN:

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comment:

RELINQUISHED BY:
DATE/TIME:

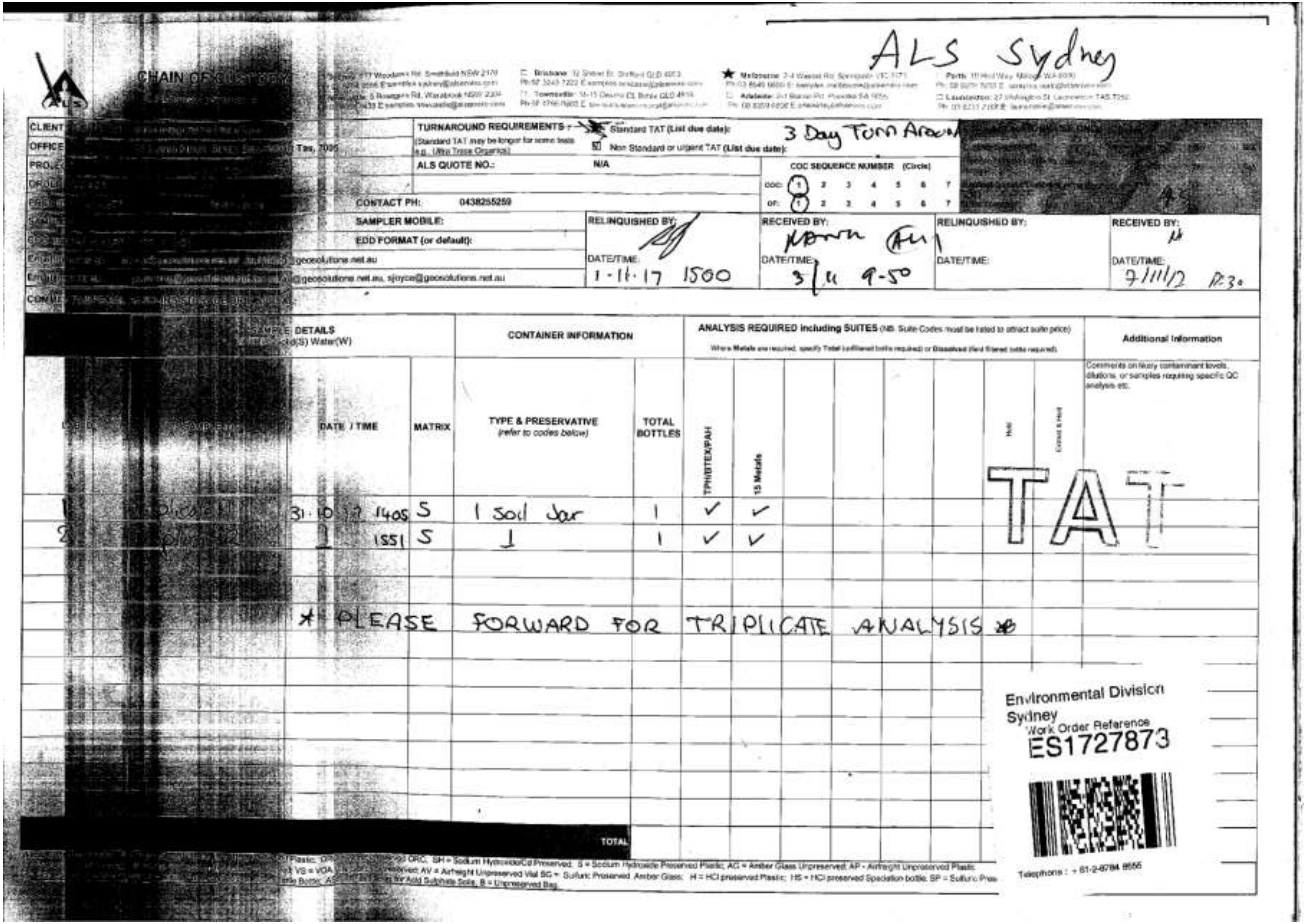
RECEIVED BY:
DATE/TIME:

RELINQUISHED BY:
DATE/TIME:

RECEIVED BY:
DATE/TIME:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		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 (refer to codes below)	TOTAL BOTTLES									Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	Extra Samples:													
36	Dup 1	31/10/17												
37	Dup 2	31/10/17												
				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 Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.



ALS Sydney

CHAIN OF CUSTODY

CLIENT:	[illegible]
OFFICE:	[illegible] Tas, 7000
PROJECT:	[illegible]
ORDER NUMBER:	[illegible]
PROJECT MANAGER:	[illegible]
SAMPLER:	[illegible]
COC emailed to ALS?	[illegible]
Email Reports to:	[illegible]@geosolutions.net.au
Email Invoice to:	[illegible]@geosolutions.net.au, sjoyce@geosolutions.net.au
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:	[illegible]
CONTACT PH:	0438255259
SAMPLER MOBILE:	
EDD FORMAT (or default):	

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)

☐ Standard TAT (List due date): 3 Day Turn Around

☒ Non Standard or urgent TAT (List due date):

ALS QUOTE NO.: N/A

COC SEQUENCE NUMBER (Circle)

COC: [✓ 1] 2 3 4 5 6 7

OF: [✓ 1] 2 3 4 5 6 7

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
	Karen (ALS)		
DATE/TIME: 1-11-17 1500	DATE/TIME: 3/11 9-50	DATE/TIME:	DATE/TIME: 7/11/17 12:30

SAMPLE DETAILS MATRIX: Solid(S) Water(W) · CONTAINER INFORMATION · 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

[illegible]	[illegible]	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	TPH/BTEX/PAH	15 Metals						Hold	Extract & Hold	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	[illegible]	31.10.17 1405	S	1 Soil Jar	1	✓	✓								
2	[illegible]	" 1551	S	"	1	✓	✓								

TAT

* PLEASE FORWARD FOR TRIPLICATE ANALYSIS *

TOTAL

Water Container Codes: [illegible] Plastic; ORC = [illegible] ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic; VS = VOA [illegible] AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Pres[illegible] [illegible] Bottle; AS[illegible] for Acid Sulphate Soils; B = Unpreserved Bag

Environmental Division
Sydney
Work Order Reference
ES1727873
Telephone : + 61-2-8784 8555

Appendix 6 Quality Control

Duplicate Comparrison		EG005T: Total Metals by ICP-AES												EG035T	EP075(SIM)B: Polyr	
		Arsenic	Barium	Beryllium	Cadmium	Chromium Total	Cobalt	Copper	Lead	Manganese	Nickel	Vanadium	Zinc	Mercury	Naphthalene	Acenaphthylene
31/10/2017	TRIPLICATE 1	<5	120	<1	<1	19	24	40	9	424	24	70	44	<0.1	<0.5	<0.5
31/10/2017	BH01 1.5-1.6	<5	90	<1	<1	16	16	22	12	456	12	66	32	<0.1	<0.5	<0.5
Relative Percentage Difference (RPD) %		NA	28.6	NA	NA	17.1	40.0	58.1	28.6	7.3	66.7	5.9	31.6	NA	NA	NA
Method Detection Limit (MDL)		NA	200	NA	NA	40	40	100	100	>500	40	500	100	NA	NA	NA
MDL Class		NONE	LOW	NONE	NONE	LOW	LOW	LOW	LOW	HIGH	LOW	MED	LOW	NONE	NONE	NONE
RPD Compliance With MDL?		YES	YES	YES	YES	YES	YES	NO	YES	YES	NO	YES	YES	YES	YES	YES
Deviation from MDL (%)		NONE	21	NONE	NONE	33	10	-8	21	8	-17	44	18	NONE	NONE	NONE
31/10/2017	TRIPLICATE 2	<5	140	<1	<1	13	10	25	10	78	13	68	20	<0.1	<0.5	<0.5
31/10/2017	BH06 0.5-0.6	<5	90	<1	<1	16	19	21	10	85	18	60	31	<0.1	<0.5	<0.5
Relative Percentage Difference (RPD) %		NA	43.5	NA	NA	20.7	62.1	17.4	0.0	8.6	32.3	12.5	43.1	NA	NA	NA
Method Detection Limit (MDL)		NA	200	NA	NA	40	40	100	100	500	40	100	100	NA	NA	NA
MDL Class		NONE	LOW	NONE	NONE	LOW	LOW	LOW	LOW	MED	LOW	LOW	LOW	NONE	NONE	NONE
RPD Compliance With MDL?		YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES
Deviation from MDL (%)		NONE	7	NONE	NONE	29	-12	33	50	21	18	38	7	NONE	NONE	NONE

Duplicate Comparrison		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 hydro	Benzo(a)pyrene TEQ (WHO)
31/10/2017	TRIPLICATE 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
31/10/2017	BH01 1.5-1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Relative Percentage Difference (RPD) %		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Method Detection Limit (MDL)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MDL Class		NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
RPD Compliance With MDL?		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Deviation from MDL (%)		NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
31/10/2017	TRIPLICATE 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
31/10/2017	BH06 0.5-0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Relative Percentage Difference (RPD) %		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Method Detection Limit (MDL)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MDL Class		NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
RPD Compliance With MDL?		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Deviation from MDL (%)		NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE

Date Collected	**Water Sample**	**Benzene**	**Toluene**	**Ethyl-benzene**	**Xylene**			**BTEX**	**Napth-**	**TPH Carbon Chain Fractions**					**Metal**
					M, P	**O**	**Total**	**Total**	**alene**	**6 - 9**	**10 - 14**	**15 - 28**	**29 - 36**	**10 - 36**	**Pb**
Blanks															
25/09/2017	Rinse Blank	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	<100	<50	<50	----
Groundwater Splits - Fixed RPD Method															
25/09/2017	Duplicate	<1	<2	<2	<2	<2	<2	<1	<5	140	<50	<100	<50	<50	<0.001
25/09/2017	CC1	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	<100	<50	<50	<0.001
RPD		**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
25/09/2017	CC1	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	<100	<50	<50	<0.001
RPD		**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Date Collected	**Water Sample**	**Benzene**	**Toluene**	**Ethyl-benzene**	**Xylene**			**BTEX**	**Napth-**	**TPH Carbon Chain Fractions**					**Metal**
					M, P	**O**	**Total**	**Total**	**alene**	**6 - 9**	**10 - 14**	**15 - 28**	**29 - 36**	**10 - 36**	**Pb**
Groundwater Splits - MDL Method															
Mean Detection Limit		<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	<100	<50	<50	0.001
Duplicate															
Level Calculation		NONE	NONE	NONE	NONE	NONE	NONE		NONE	LOW	NONE	NONE	NONE	NONE	NONE
Compliance?		**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**FALSE**	**YES**	**NO**	**YES**	**YES**	**YES**	**YES**	**YES**
Triplicate															
Hide This Row															
Hide This Row		1	2	2	2	2	2	0	5	20	50	100	50	50	<0.001
Level Calculation		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Compliance?		**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

ALS Environmental

QUALITY CONTROL REPORT

Work Order : **EM1715132**

Client : **GEO-ENVIRONMENTAL SOLUTIONS**
Contact : SARAH JOYCE
Address : 29 KIRKSWAY PLACE
BATTERY POINT TASMANIA, AUSTRALIA 7004
Telephone : +61 03 6223 1839
Project : Harrington Street
Order number : ----
C-O-C number : ----
Sampler : Grant
Site : ----
Quote number : Blanket quote 2017
No. of samples received : 37
No. of samples analysed : 32

Page : 1 of 17

Laboratory : Environmental Division Melbourne
Contact : Shirley LeCornu
Address : 4 Westall Rd Springvale VIC Australia 3171
Telephone : +61-3-8549 9630
Date Samples Received : 03-Nov-2017
Date Analysis Commenced : 03-Nov-2017
Issue Date : 09-Nov-2017

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:

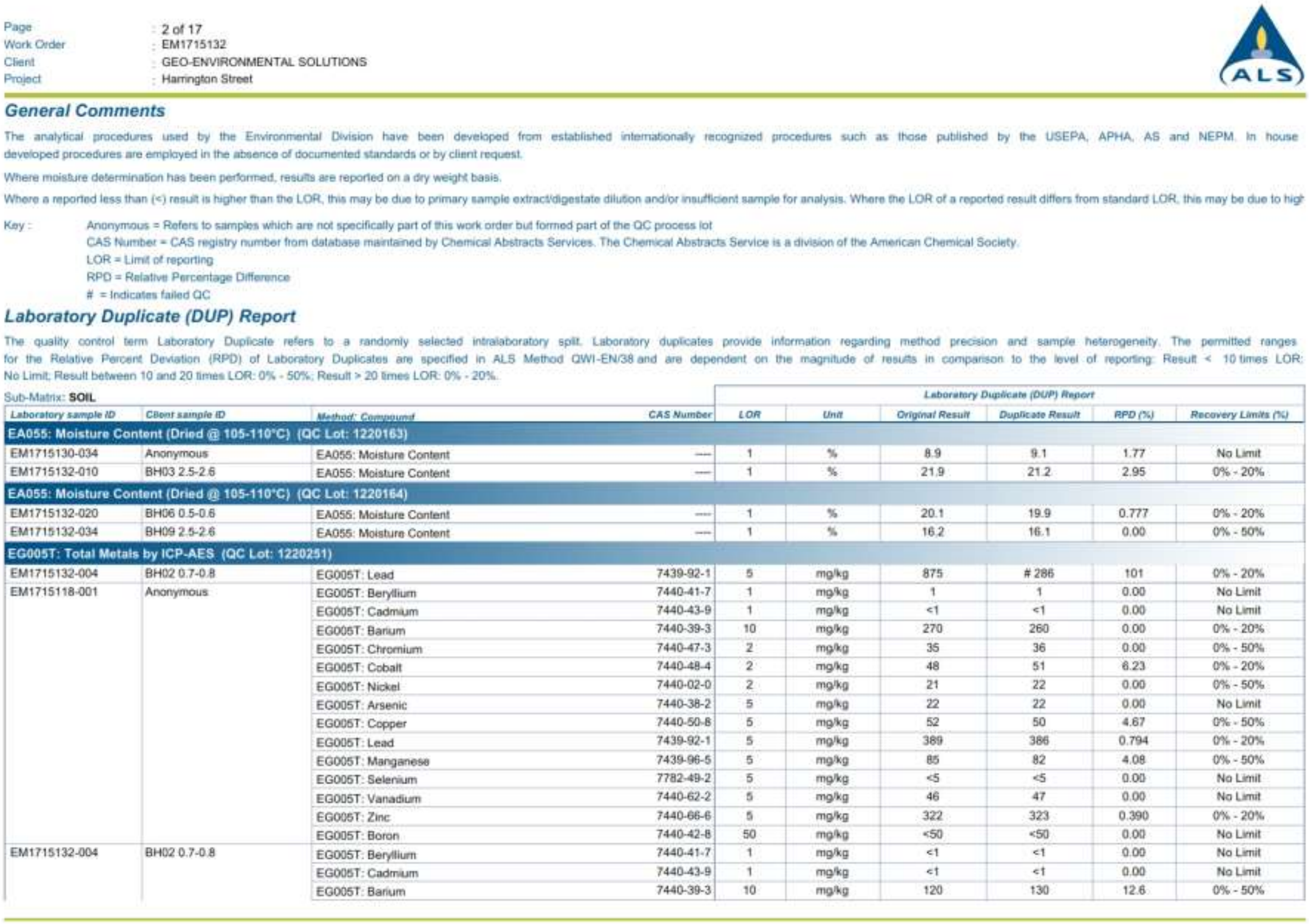
- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

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*
Chris Lemaitre	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Eric Chau	Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nancy Wang	Senior Semivolatile Instrument Chemist	Melbourne Organics, Springvale, VIC
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

RIGHT SOLUTIONS | RIGHT PARTNER



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Work Order : EM1715132
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Harrington Street

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

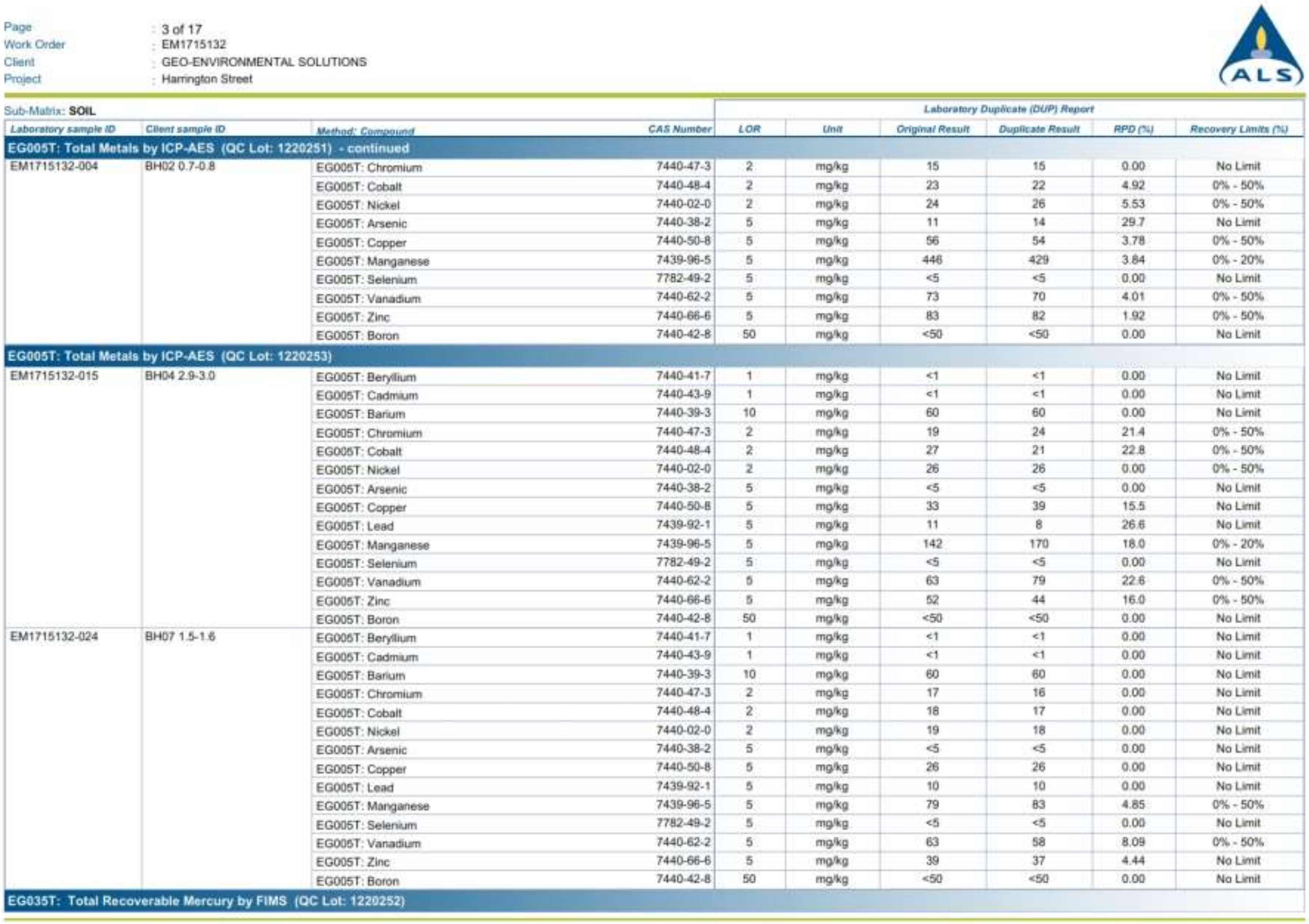
Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit 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: 1220163)									
EM1715130-034	Anonymous	EA055: Moisture Content	----	1	%	8.9	9.1	1.77	No Limit
EM1715132-010	BH03 2.5-2.6	EA055: Moisture Content	----	1	%	21.9	21.2	2.95	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1220164)									
EM1715132-020	BH06 0.5-0.6	EA055: Moisture Content	----	1	%	20.1	19.9	0.777	0% - 20%
EM1715132-034	BH09 2.5-2.6	EA055: Moisture Content	----	1	%	16.2	16.1	0.00	0% - 50%
EG005T: Total Metals by ICP-AES (QC Lot: 1220251)									
EM1715132-004	BH02 0.7-0.8	EG005T: Lead	7439-92-1	5	mg/kg	875	# 286	101	0% - 20%
EM1715118-001	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	270	260	0.00	0% - 20%
		EG005T: Chromium	7440-47-3	2	mg/kg	35	36	0.00	0% - 50%
		EG005T: Cobalt	7440-48-4	2	mg/kg	48	51	6.23	0% - 20%
		EG005T: Nickel	7440-02-0	2	mg/kg	21	22	0.00	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	22	22	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	52	50	4.67	0% - 50%
		EG005T: Lead	7439-92-1	5	mg/kg	389	386	0.794	0% - 20%
		EG005T: Manganese	7439-96-5	5	mg/kg	85	82	4.08	0% - 50%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	46	47	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	322	323	0.390	0% - 20%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EM1715132-004	BH02 0.7-0.8	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	120	130	12.6	0% - 50%



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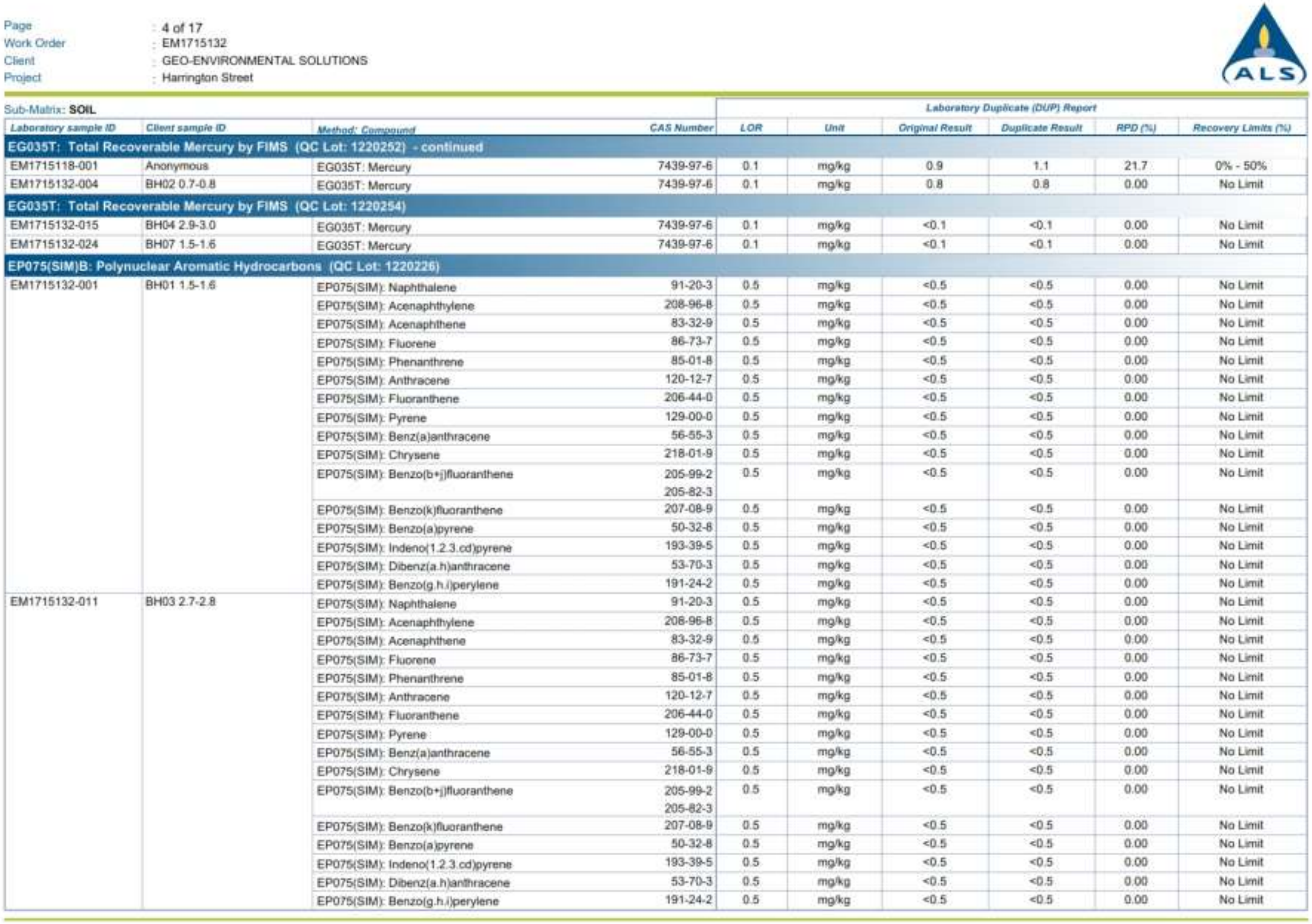
Work Order : EM1715132
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Harrington Street

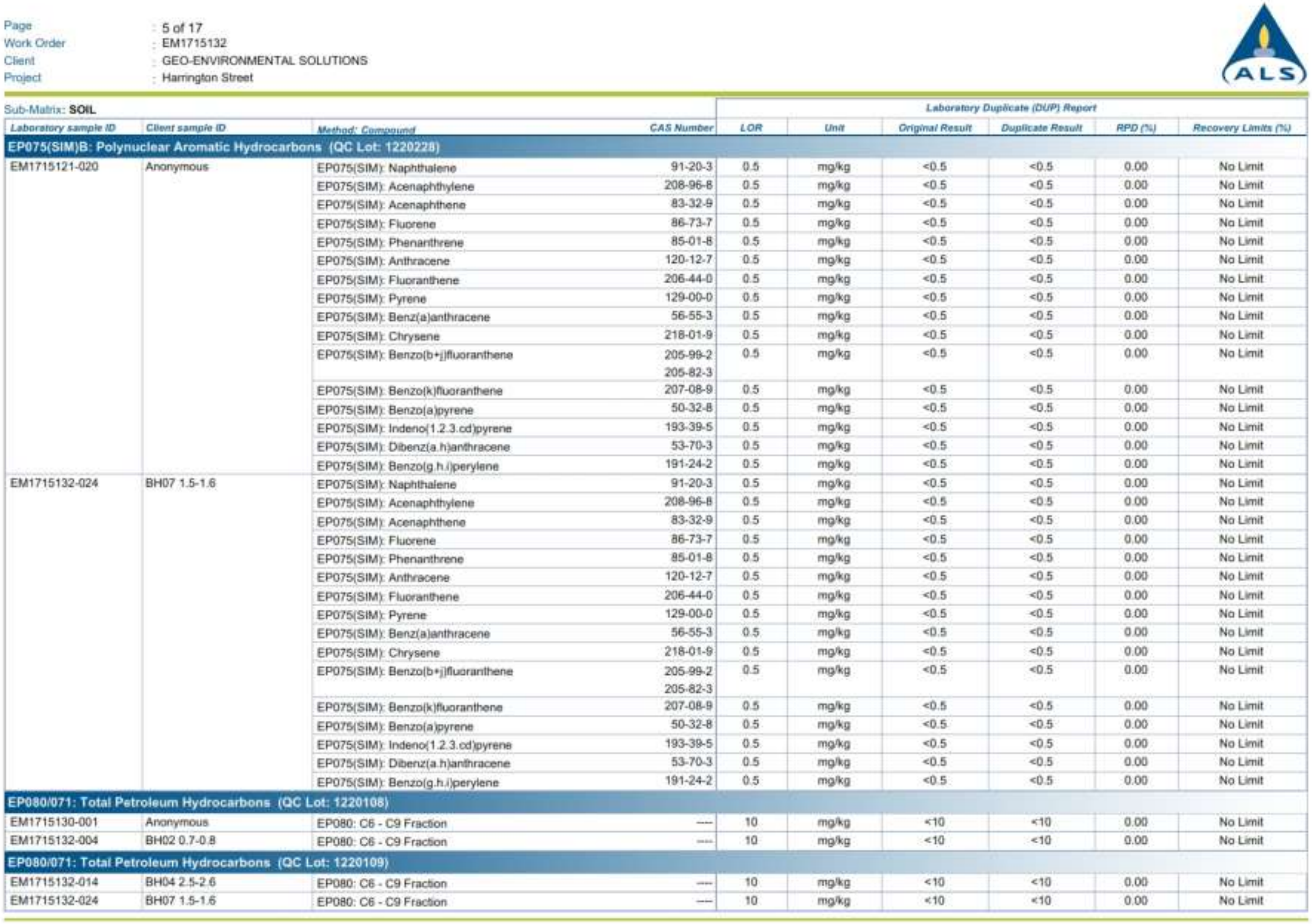
Sub-Matrix: **SOIL**

				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: 1220251) - continued									
EM1715132-004	BH02 0.7-0.8	EG005T: Chromium	7440-47-3	2	mg/kg	15	15	0.00	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	23	22	4.92	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	24	26	5.53	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	11	14	29.7	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	56	54	3.78	0% - 50%
		EG005T: Manganese	7439-96-5	5	mg/kg	446	429	3.84	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	73	70	4.01	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	83	82	1.92	0% - 50%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 1220253)									
EM1715132-015	BH04 2.9-3.0	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	19	24	21.4	0% - 50%
		EG005T: Cobalt	7440-48-4	2	mg/kg	27	21	22.8	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	26	26	0.00	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	33	39	15.5	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	11	8	26.6	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	142	170	18.0	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	63	79	22.6	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	52	44	16.0	0% - 50%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EM1715132-024	BH07 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	60	60	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	17	16	0.00	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	18	17	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	19	18	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	26	26	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	10	10	0.00	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	79	83	4.85	0% - 50%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	63	58	8.09	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	39	37	4.44	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1220252)									



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 (%)*
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1220252) - continued									
EM1715118-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.9	1.1	21.7	0% - 50%
EM1715132-004	BH02 0.7-0.8	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.8	0.8	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1220254)									
EM1715132-015	BH04 2.9-3.0	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EM1715132-024	BH07 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: 1220226)									
EM1715132-001	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
EM1715132-011	BH03 2.7-2.8	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



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Work Order : EM1715132
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Harrington Street

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: 1220228)									
EM1715121-020	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
EM1715132-024	BH07 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
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1220108)									
EM1715130-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EM1715132-004	BH02 0.7-0.8	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1220109)									
EM1715132-014	BH04 2.5-2.6	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EM1715132-024	BH07 1.5-1.6	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit

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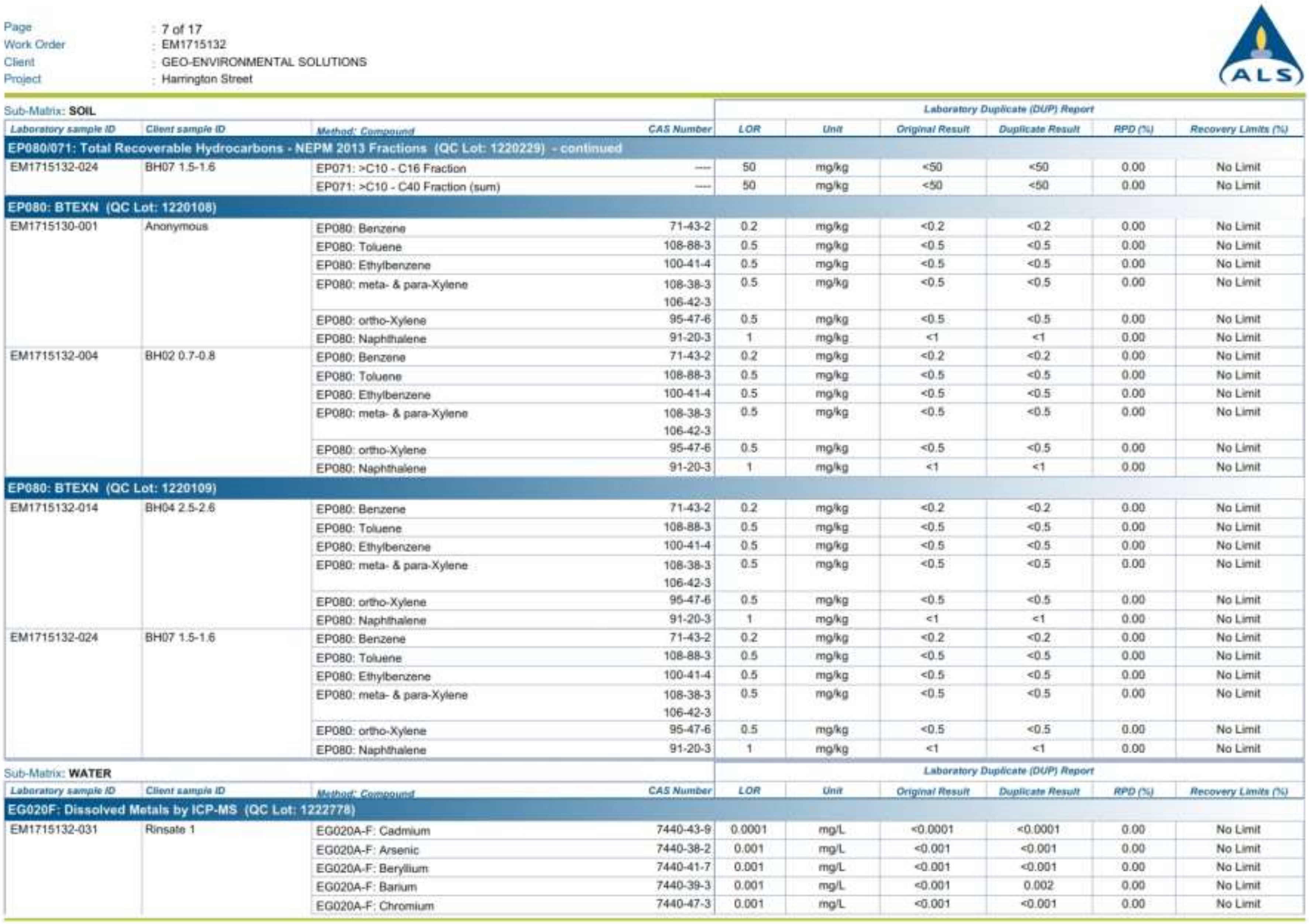
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Harrington Street

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: 1220227)									
EM1715132-001	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
EM1715132-011	BH03 2.7-2.8	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: 1220229)									
EM1715121-020	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
EM1715132-024	BH07 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
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1220108)									
EM1715130-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EM1715132-004	BH02 0.7-0.8	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: 1220109)									
EM1715132-014	BH04 2.5-2.6	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EM1715132-024	BH07 1.5-1.6	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: 1220227)									
EM1715132-001	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
EM1715132-011	BH03 2.7-2.8	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: 1220229)									
EM1715121-020	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
EM1715132-024	BH07 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



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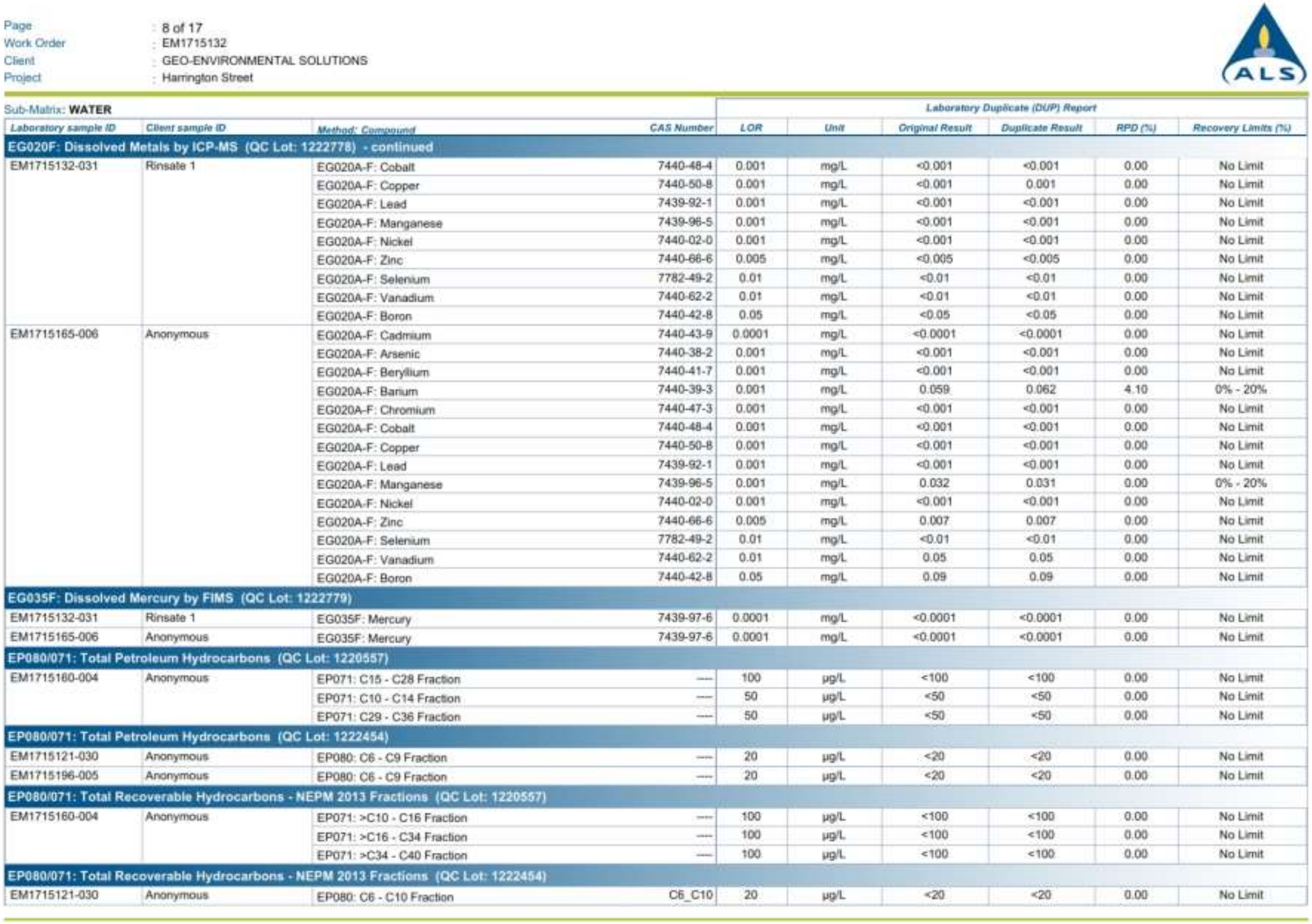
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Harrington Street

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 Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1220229) - continued									
EM1715132-024	BH07 1.5-1.6	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: 1220108)									
EM1715130-001	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
EM1715132-004	BH02 0.7-0.8	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: 1220109)									
EM1715132-014	BH04 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
EM1715132-024	BH07 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

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: 1222778)									
EM1715132-031	Rinsate 1	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	0.002	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit



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Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Harrington Street

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: 1222778) - continued									
EM1715132-031	Rinsate 1	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
EM1715165-006	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	0.059	0.062	4.10	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	<0.001	<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	0.032	0.031	0.00	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	0.007	0.007	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	0.05	0.05	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.09	0.09	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 1222779)									
EM1715132-031	Rinsate 1	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EM1715165-006	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: 1220557)									
EM1715160-004	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1222454)									
EM1715121-030	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EM1715196-005	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1220557)									
EM1715160-004	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1222454)									
EM1715121-030	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit

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Client : GEO-ENVIRONMENTAL SOLUTIONS
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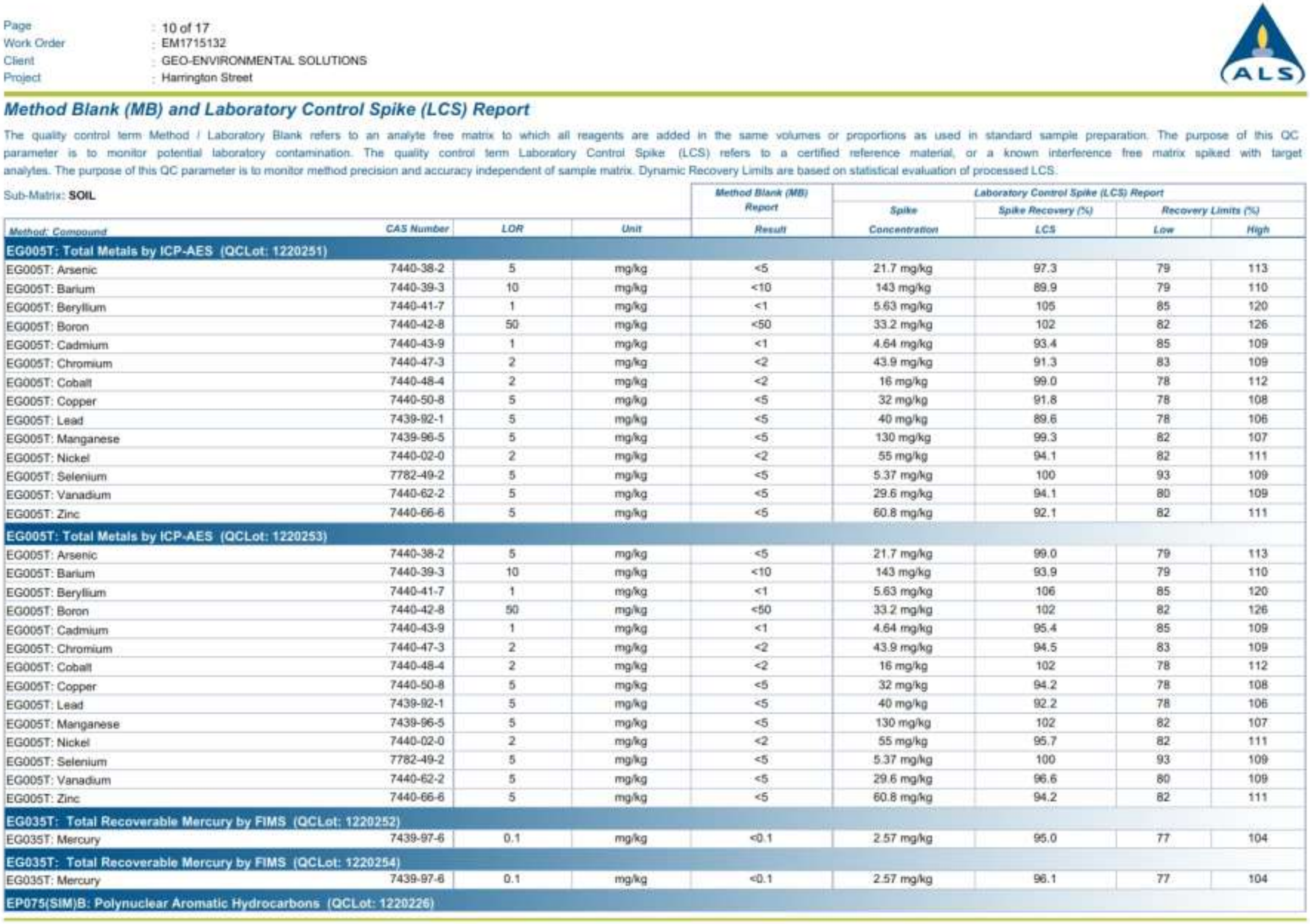
Sub-Matrix: **WATER**

				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 Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1222454) - continued									
EM1715196-005	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1222454)									
EM1715121-030	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
EM1715196-005	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



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Method Blank (MB) and Laboratory Control Spike (LCS) Report

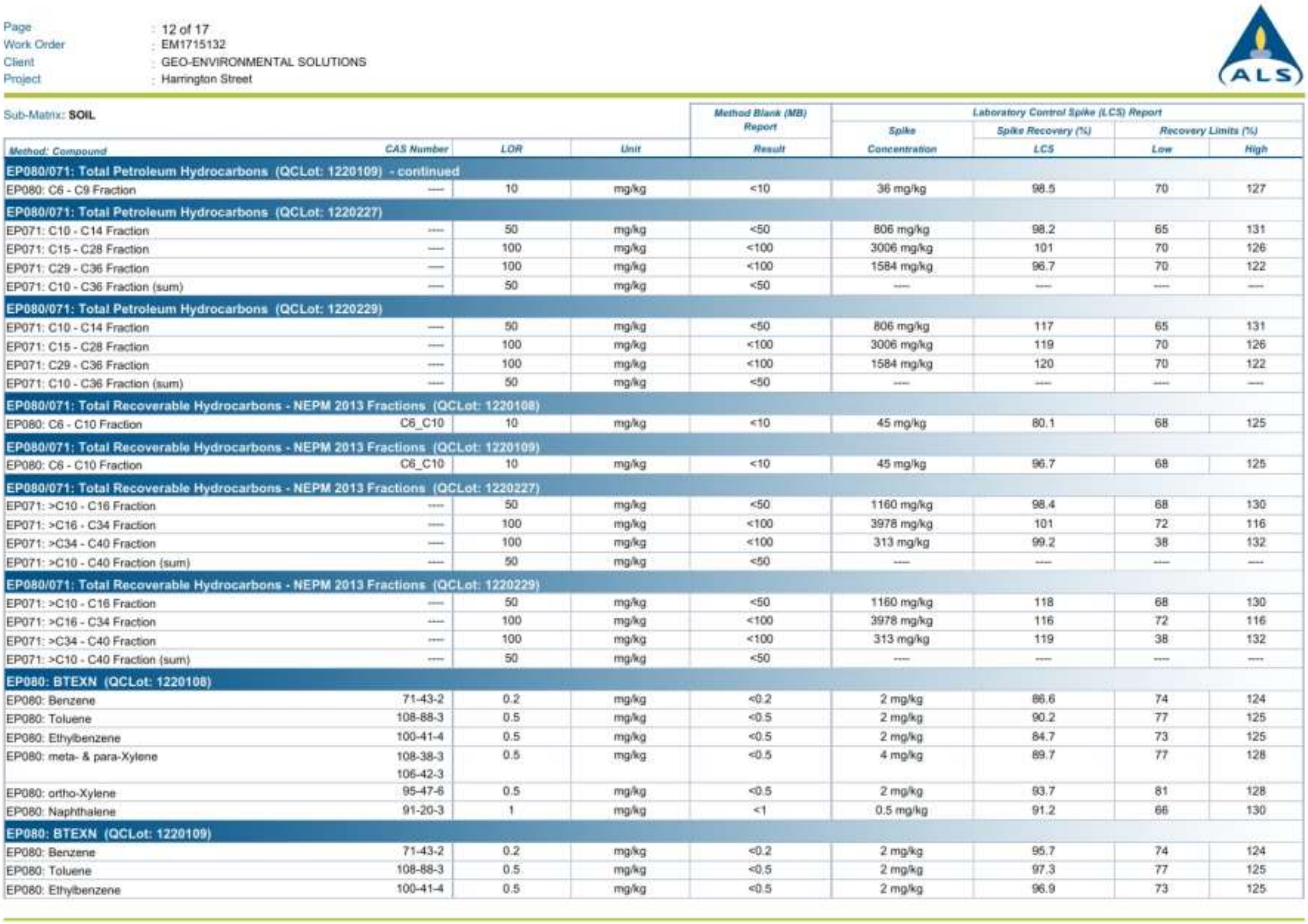
The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory 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: 1220251)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	97.3	79	113
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	89.9	79	110
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	105	85	120
EG005T: Boron	7440-42-8	50	mg/kg	<50	33.2 mg/kg	102	82	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	93.4	85	109
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	91.3	83	109
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	99.0	78	112
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	91.8	78	108
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	89.6	78	106
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	99.3	82	107
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	94.1	82	111
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	100	93	109
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	94.1	80	109
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	92.1	82	111
EG005T: Total Metals by ICP-AES (QCLot: 1220253)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	99.0	79	113
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	93.9	79	110
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	106	85	120
EG005T: Boron	7440-42-8	50	mg/kg	<50	33.2 mg/kg	102	82	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	95.4	85	109
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	94.5	83	109
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	102	78	112
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	94.2	78	108
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	92.2	78	106
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	102	82	107
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	95.7	82	111
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	100	93	109
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	96.6	80	109
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	94.2	82	111
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1220252)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	95.0	77	104
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1220254)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	96.1	77	104
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1220226)								

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: 1220226) - continued								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	97.6	80	121
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	85.0	70	130
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	107	80	120
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	108	70	124
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	110	80	122
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	1.5 mg/kg	121	80	126
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	116	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	104	70	130
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	111	80	126
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	101	70	124
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	107	75	125
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	90.5	65	125
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	83.8	65	128
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	84.4	65	126
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	77.5	65	127
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1220228)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	109	80	121
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	118	70	130
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	112	80	120
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	120	70	124
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	116	80	122
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	1.5 mg/kg	116	80	126
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	118	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	119	70	130
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	115	80	126
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	112	70	124
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	111	75	125
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	99.2	65	125
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	99.2	65	128
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	107	65	126
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	89.8	65	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1220108)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	36 mg/kg	82.9	70	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1220109)								



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Sub-Matrix: **SOIL**

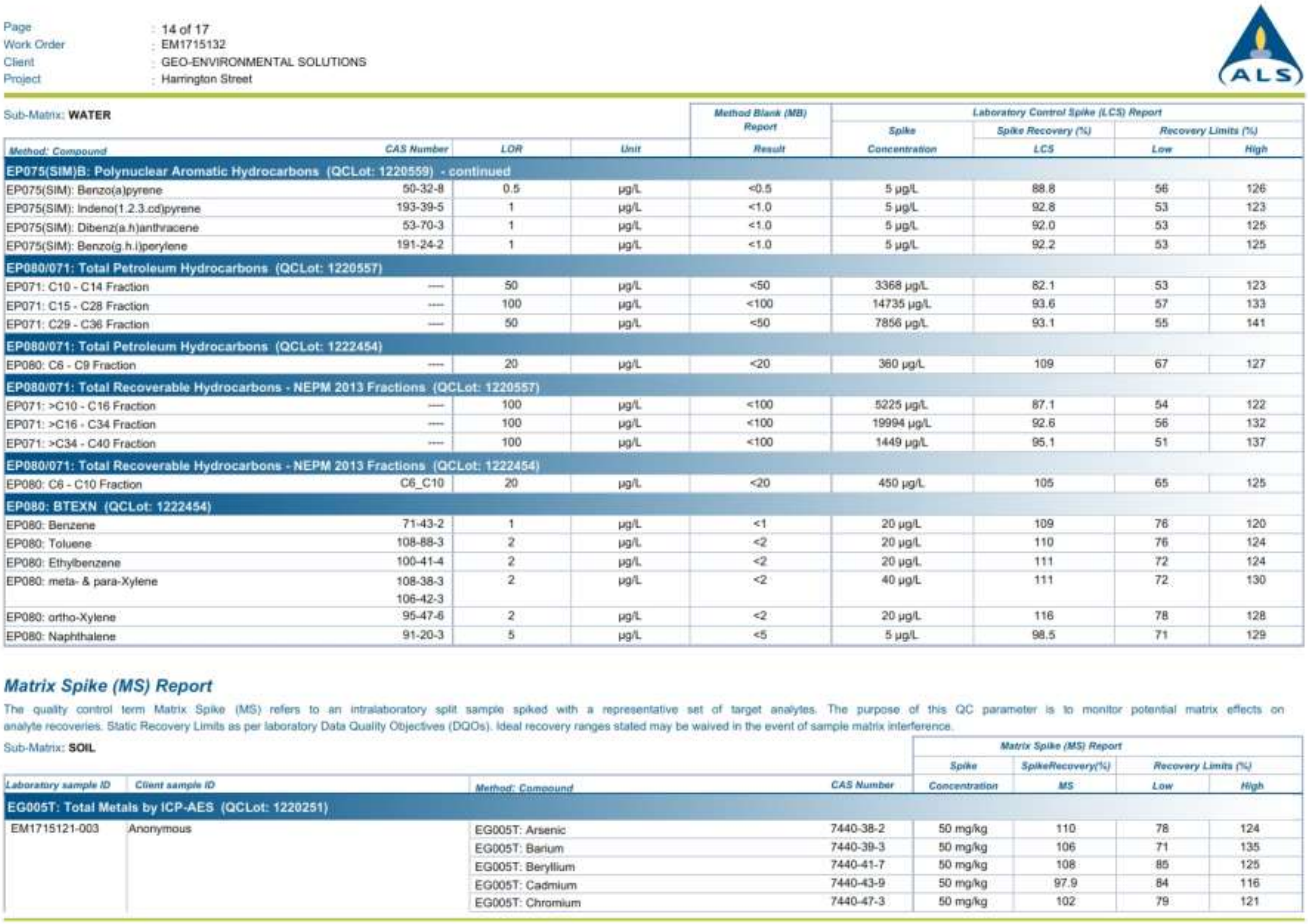
				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1220109) - continued								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	36 mg/kg	98.5	70	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1220227)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	806 mg/kg	98.2	65	131
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3006 mg/kg	101	70	126
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	1584 mg/kg	96.7	70	122
EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1220229)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	806 mg/kg	117	65	131
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3006 mg/kg	119	70	126
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	1584 mg/kg	120	70	122
EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1220108)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	80.1	68	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1220109)								
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: 1220227)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	1160 mg/kg	98.4	68	130
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	3978 mg/kg	101	72	116
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	313 mg/kg	99.2	38	132
EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1220229)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	1160 mg/kg	118	68	130
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	3978 mg/kg	116	72	116
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	313 mg/kg	119	38	132
EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080: BTEXN (QCLot: 1220108)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	86.6	74	124
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	90.2	77	125
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	84.7	73	125
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	89.7	77	128
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	93.7	81	128
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	91.2	66	130
EP080: BTEXN (QCLot: 1220109)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	95.7	74	124
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	97.3	77	125
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	96.9	73	125

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: 1220109) - continued								
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	98.3	77	128
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	101	81	128
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	90.0	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: 1222778)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	97.0	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	102	84	106
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	100.0	84	104
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	93.5	83	103
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	92.9	83	106
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	90.7	82	103
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	92.8	83	105
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	95.4	83	105
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	93.4	82	106
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	94.3	82	109
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	94.4	83	106
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	100	85	109
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	97.1	84	116
EG035F: Dissolved Mercury by FIMS (QCLot: 1222779)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	85.2	81	114
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1220559)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	62.5	39	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	70.7	40	124
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	71.4	47	117
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	79.9	51	118
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	92.3	53	119
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	2.5 µg/L	68.0	51	113
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	92.4	59	123
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	85.4	58	123
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	85.8	52	126
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	91.5	55	123
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	92.5	52	131
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	94.9	57	126



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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: 1220559) - continued								
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	88.8	56	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	92.8	53	123
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	92.0	53	125
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	92.2	53	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1220557)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	3368 µg/L	82.1	53	123
EP071: C15 - C28 Fraction	----	100	µg/L	<100	14735 µg/L	93.6	57	133
EP071: C29 - C36 Fraction	----	50	µg/L	<50	7856 µg/L	93.1	55	141
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1222454)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	109	67	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1220557)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	5225 µg/L	87.1	54	122
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	19994 µg/L	92.6	56	132
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1449 µg/L	95.1	51	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1222454)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	105	65	125
EP080: BTEXN (QCLot: 1222454)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	109	76	120
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	110	76	124
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	111	72	124
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	111	72	130
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	116	78	128
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	98.5	71	129

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	*SpikeRecovery(%)*	*Recovery Limits (%)*	
				Concentration	*MS*	*Low*	*High*
EG005T: Total Metals by ICP-AES (QCLot: 1220251)							
EM1715121-003	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	110	78	124
		EG005T: Barium	7440-39-3	50 mg/kg	106	71	135
		EG005T: Beryllium	7440-41-7	50 mg/kg	108	85	125
		EG005T: Cadmium	7440-43-9	50 mg/kg	97.9	84	116
		EG005T: Chromium	7440-47-3	50 mg/kg	102	79	121

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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: 1220251) - continued							
EM1715121-003	Anonymous	EG005T: Copper	7440-50-8	50 mg/kg	110	82	124
		EG005T: Lead	7439-92-1	50 mg/kg	96.1	76	124
		EG005T: Manganese	7439-96-5	50 mg/kg	97.7	68	136
		EG005T: Nickel	7440-02-0	50 mg/kg	94.8	78	120
		EG005T: Selenium	7782-49-2	50 mg/kg	98.8	71	125
		EG005T: Vanadium	7440-62-2	50 mg/kg	105	76	124
		EG005T: Zinc	7440-66-6	50 mg/kg	95.0	74	128
EG005T: Total Metals by ICP-AES (QCLot: 1220253)							
EM1715132-016	BH05 0.5-0.6	EG005T: Arsenic	7440-38-2	50 mg/kg	105	78	124
		EG005T: Barium	7440-39-3	50 mg/kg	95.3	71	135
		EG005T: Beryllium	7440-41-7	50 mg/kg	105	85	125
		EG005T: Cadmium	7440-43-9	50 mg/kg	99.4	84	116
		EG005T: Chromium	7440-47-3	50 mg/kg	95.8	79	121
		EG005T: Copper	7440-50-8	50 mg/kg	94.4	82	124
		EG005T: Lead	7439-92-1	50 mg/kg	# Not Determined	76	124
		EG005T: Manganese	7439-96-5	50 mg/kg	# Not Determined	68	136
		EG005T: Nickel	7440-02-0	50 mg/kg	96.0	78	120
		EG005T: Selenium	7782-49-2	50 mg/kg	91.6	71	125
		EG005T: Vanadium	7440-62-2	50 mg/kg	93.5	76	124
		EG005T: Zinc	7440-66-6	50 mg/kg	83.1	74	128
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1220252)							
EM1715121-003	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	100	76	116
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1220254)							
EM1715132-016	BH05 0.5-0.6	EG035T: Mercury	7439-97-6	5 mg/kg	91.0	76	116
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1220226)							
EM1715132-002	BH01 2.5-2.6	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	116	67	117
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	121	52	148
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1220228)							
EM1715121-021	Anonymous	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	107	67	117
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	120	52	148
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1220108)							
EM1715130-002	Anonymous	EP080: C6 - C9 Fraction	----	28 mg/kg	89.5	42	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1220109)							
EM1715132-015	BH04 2.9-3.0	EP080: C6 - C9 Fraction	----	28 mg/kg	86.4	42	131

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: 1220227)							
EM1715132-003	BH01 2.7-2.8	EP071: C10 - C14 Fraction	----	806 mg/kg	95.4	53	123
		EP071: C15 - C28 Fraction	----	3006 mg/kg	98.4	70	124
		EP071: C29 - C36 Fraction	----	1584 mg/kg	93.5	64	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1220229)							
EM1715121-022	Anonymous	EP071: C10 - C14 Fraction	----	806 mg/kg	113	53	123
		EP071: C15 - C28 Fraction	----	3006 mg/kg	110	70	124
		EP071: C29 - C36 Fraction	----	1584 mg/kg	103	64	118
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1220108)							
EM1715130-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	85.4	39	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1220109)							
EM1715132-015	BH04 2.9-3.0	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	83.8	39	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1220227)							
EM1715132-003	BH01 2.7-2.8	EP071: >C10 - C16 Fraction	----	1160 mg/kg	95.9	65	123
		EP071: >C16 - C34 Fraction	----	3978 mg/kg	97.9	67	121
		EP071: >C34 - C40 Fraction	----	313 mg/kg	93.2	44	126
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1220229)							
EM1715121-022	Anonymous	EP071: >C10 - C16 Fraction	----	1160 mg/kg	113	65	123
		EP071: >C16 - C34 Fraction	----	3978 mg/kg	108	67	121
		EP071: >C34 - C40 Fraction	----	313 mg/kg	101	44	126
EP080: BTEXN (QCLot: 1220108)							
EM1715130-002	Anonymous	EP080: Benzene	71-43-2	2 mg/kg	92.3	50	136
		EP080: Toluene	108-88-3	2 mg/kg	92.3	56	139
EP080: BTEXN (QCLot: 1220109)							
EM1715132-015	BH04 2.9-3.0	EP080: Benzene	71-43-2	2 mg/kg	122	50	136
		EP080: Toluene	108-88-3	2 mg/kg	118	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: 1222778)							
EM1715132-031	Rinsate 1	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	96.1	85	131
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	104	73	141
		EG020A-F: Barium	7440-39-3	0.2 mg/L	96.4	75	127
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	99.6	81	133
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	94.0	71	135
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	95.8	78	132
		EG020A-F: Copper	7440-50-8	0.2 mg/L	91.4	76	130

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Work Order : EM1715132
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Harrington Street

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: 1222778) - continued							
EM1715132-031	Rinsate 1	EG020A-F: Lead	7439-92-1	0.2 mg/L	94.3	75	133
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	95.0	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	95.4	73	131
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	97.4	75	131
EG035F: Dissolved Mercury by FIMS (QCLot: 1222779)							
EM1715163-037	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	92.6	70	120
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1220557)							
EM1715160-004	Anonymous	EP071: C10 - C14 Fraction	----	3368 µg/L	87.6	50	130
		EP071: C15 - C28 Fraction	----	14735 µg/L	101	54	136
		EP071: C29 - C36 Fraction	----	7856 µg/L	101	50	142
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1222454)							
EM1715132-031	Rinsate 1	EP080: C6 - C9 Fraction	----	280 µg/L	96.9	43	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1220557)							
EM1715160-004	Anonymous	EP071: >C10 - C16 Fraction	----	5225 µg/L	93.1	50	128
		EP071: >C16 - C34 Fraction	----	19994 µg/L	99.8	50	150
		EP071: >C34 - C40 Fraction	----	1449 µg/L	103	51	159
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1222454)							
EM1715132-031	Rinsate 1	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	93.2	44	122
EP080: BTEXN (QCLot: 1222454)							
EM1715132-031	Rinsate 1	EP080: Benzene	71-43-2	20 µg/L	109	68	130
		EP080: Toluene	108-88-3	20 µg/L	112	72	132

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM1715132**	Page	: 1 of 12
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: SARAH JOYCE	Telephone	: +61-3-8549 9630
Project	: Harrington Street	Date Samples Received	: 03-Nov-2017
Site	: ----	Issue Date	: 09-Nov-2017
Sampler	: Grant	No. of samples received	: 37
Order number	: ----	No. of samples analysed	: 32

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.**

RIGHT SOLUTIONS | RIGHT PARTNER

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Work Order : EM1715132
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Harrington Street

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	EM1715132--004	BH02 0.7-0.8	**Lead**	7439-92-1	101 %	0% - 20%	**RPD exceeds LOR based limits**
Matrix Spike (MS) Recoveries							
EG005T: Total Metals by ICP-AES	EM1715132--016	BH05 0.5-0.6	**Lead**	7439-92-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG005T: Total Metals by ICP-AES	EM1715132--016	BH05 0.5-0.6	**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	2	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	1	17	5.88	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

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*

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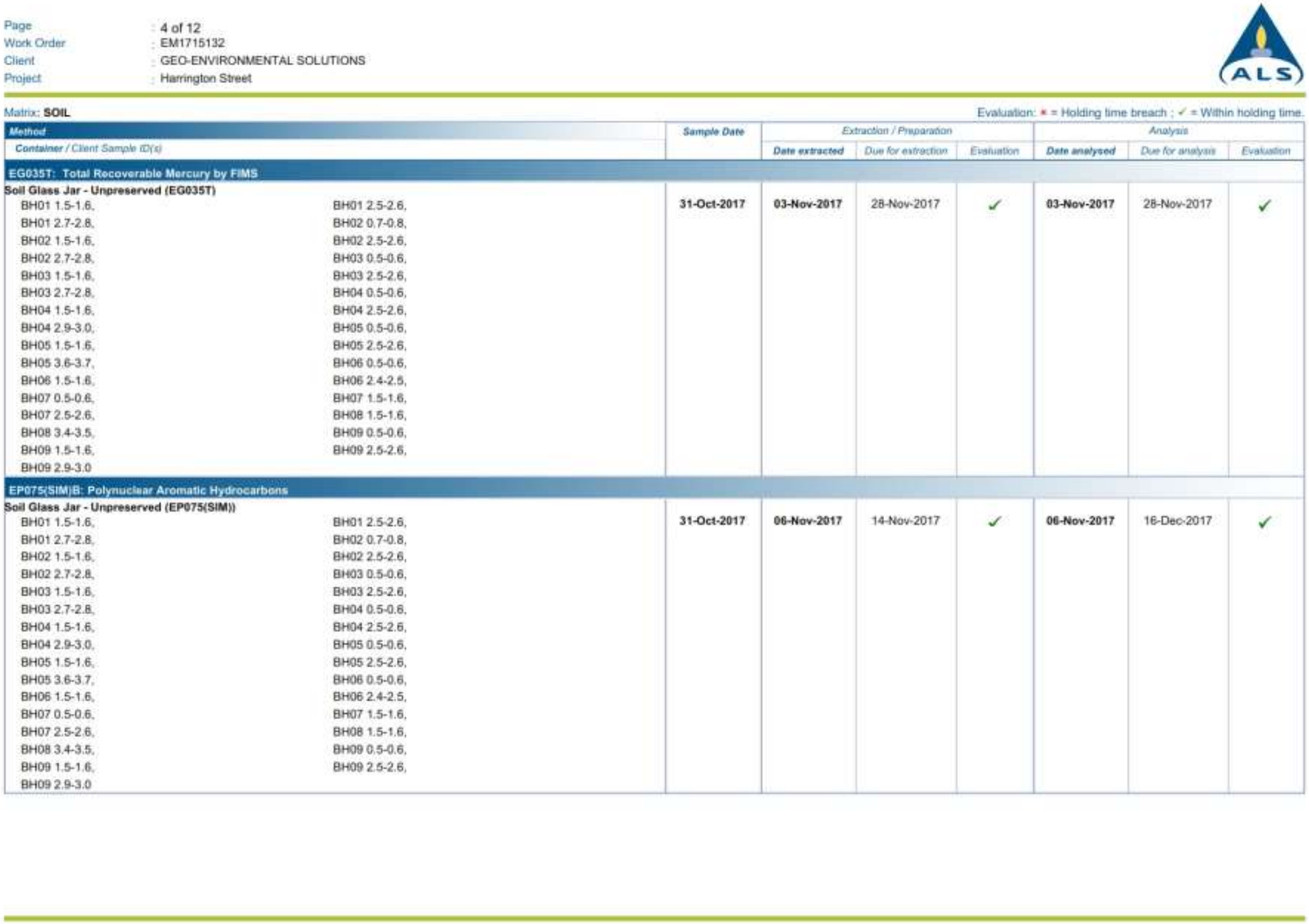
Work Order : EM1715132
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Harrington Street

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

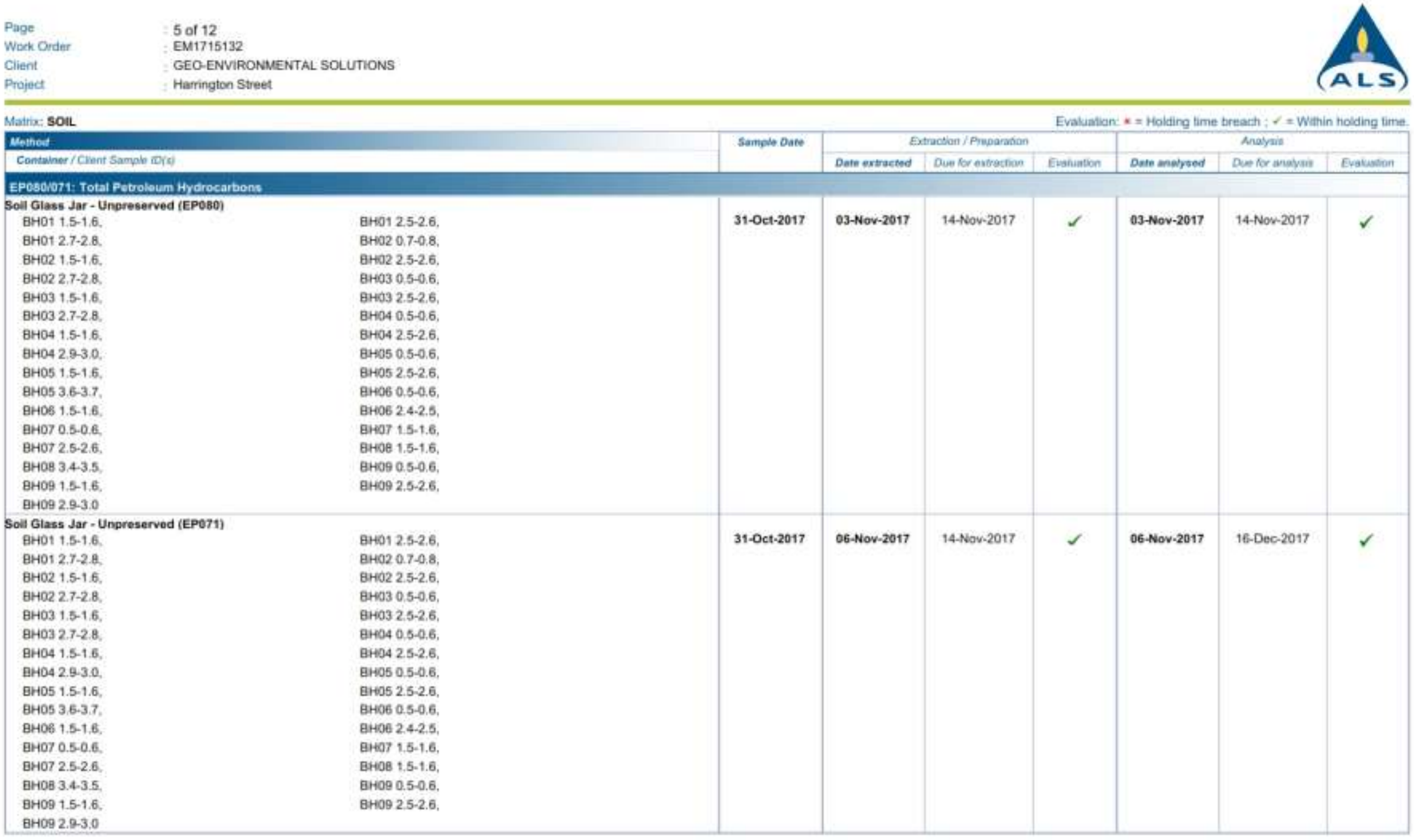
Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
BH01 1.5-1.6,	BH01 2.5-2.6,	**31-Oct-2017**	----	----	----	**03-Nov-2017**	14-Nov-2017	✓
BH01 2.7-2.8,	BH02 0.7-0.8,							
BH02 1.5-1.6,	BH02 2.5-2.6,							
BH02 2.7-2.8,	BH03 0.5-0.6,							
BH03 1.5-1.6,	BH03 2.5-2.6,							
BH03 2.7-2.8,	BH04 0.5-0.6,							
BH04 1.5-1.6,	BH04 2.5-2.6,							
BH04 2.9-3.0,	BH05 0.5-0.6,							
BH05 1.5-1.6,	BH05 2.5-2.6,							
BH05 3.6-3.7,	BH06 0.5-0.6,							
BH06 1.5-1.6,	BH06 2.4-2.5,							
BH07 0.5-0.6,	BH07 1.5-1.6,							
BH07 2.5-2.6,	BH08 1.5-1.6,							
BH08 3.4-3.5,	BH09 0.5-0.6,							
BH09 1.5-1.6,	BH09 2.5-2.6,							
BH09 2.9-3.0								
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
BH01 1.5-1.6,	BH01 2.5-2.6,	**31-Oct-2017**	**03-Nov-2017**	29-Apr-2018	✓	**03-Nov-2017**	29-Apr-2018	✓
BH01 2.7-2.8,	BH02 0.7-0.8,							
BH02 1.5-1.6,	BH02 2.5-2.6,							
BH02 2.7-2.8,	BH03 0.5-0.6,							
BH03 1.5-1.6,	BH03 2.5-2.6,							
BH03 2.7-2.8,	BH04 0.5-0.6,							
BH04 1.5-1.6,	BH04 2.5-2.6,							
BH04 2.9-3.0,	BH05 0.5-0.6,							
BH05 1.5-1.6,	BH05 2.5-2.6,							
BH05 3.6-3.7,	BH06 0.5-0.6,							
BH06 1.5-1.6,	BH06 2.4-2.5,							
BH07 0.5-0.6,	BH07 1.5-1.6,							
BH07 2.5-2.6,	BH08 1.5-1.6,							
BH08 3.4-3.5,	BH09 0.5-0.6,							
BH09 1.5-1.6,	BH09 2.5-2.6,							
BH09 2.9-3.0								



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) BH01 1.5-1.6, BH01 2.5-2.6, BH01 2.7-2.8, BH02 0.7-0.8, BH02 1.5-1.6, BH02 2.5-2.6, BH02 2.7-2.8, BH03 0.5-0.6, BH03 1.5-1.6, BH03 2.5-2.6, BH03 2.7-2.8, BH04 0.5-0.6, BH04 1.5-1.6, BH04 2.5-2.6, BH04 2.9-3.0, BH05 0.5-0.6, BH05 1.5-1.6, BH05 2.5-2.6, BH05 3.6-3.7, BH06 0.5-0.6, BH06 1.5-1.6, BH06 2.4-2.5, BH07 0.5-0.6, BH07 1.5-1.6, BH07 2.5-2.6, BH08 1.5-1.6, BH08 3.4-3.5, BH09 0.5-0.6, BH09 1.5-1.6, BH09 2.5-2.6, BH09 2.9-3.0	**31-Oct-2017**	**03-Nov-2017**	28-Nov-2017	✓	**03-Nov-2017**	28-Nov-2017	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) BH01 1.5-1.6, BH01 2.5-2.6, BH01 2.7-2.8, BH02 0.7-0.8, BH02 1.5-1.6, BH02 2.5-2.6, BH02 2.7-2.8, BH03 0.5-0.6, BH03 1.5-1.6, BH03 2.5-2.6, BH03 2.7-2.8, BH04 0.5-0.6, BH04 1.5-1.6, BH04 2.5-2.6, BH04 2.9-3.0, BH05 0.5-0.6, BH05 1.5-1.6, BH05 2.5-2.6, BH05 3.6-3.7, BH06 0.5-0.6, BH06 1.5-1.6, BH06 2.4-2.5, BH07 0.5-0.6, BH07 1.5-1.6, BH07 2.5-2.6, BH08 1.5-1.6, BH08 3.4-3.5, BH09 0.5-0.6, BH09 1.5-1.6, BH09 2.5-2.6, BH09 2.9-3.0	**31-Oct-2017**	**06-Nov-2017**	14-Nov-2017	✓	**06-Nov-2017**	16-Dec-2017	✓



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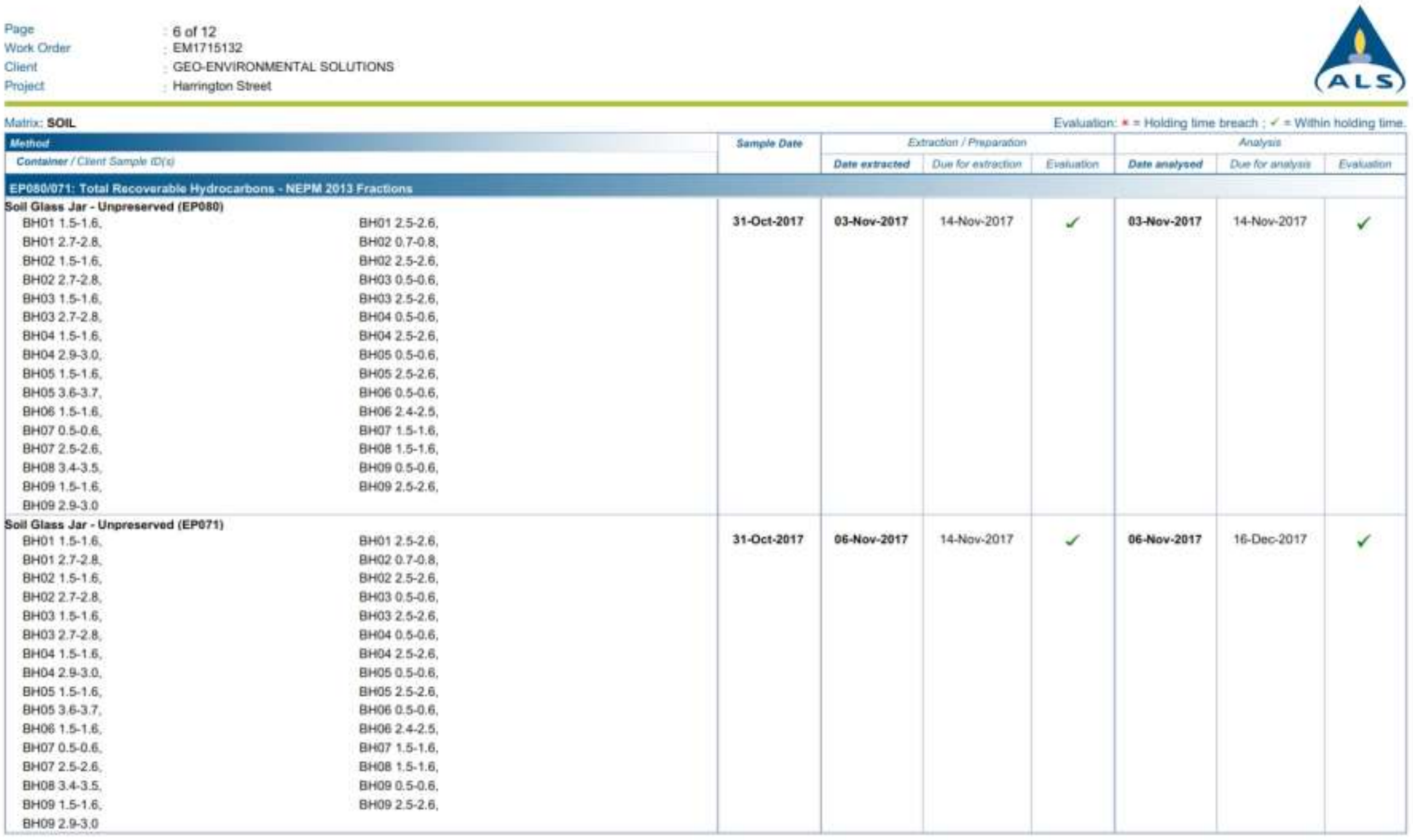
Work Order : EM1715132
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Harrington Street

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)							
BH01 1.5-1.6, BH01 2.5-2.6, BH01 2.7-2.8, BH02 0.7-0.8, BH02 1.5-1.6, BH02 2.5-2.6, BH02 2.7-2.8, BH03 0.5-0.6, BH03 1.5-1.6, BH03 2.5-2.6, BH03 2.7-2.8, BH04 0.5-0.6, BH04 1.5-1.6, BH04 2.5-2.6, BH04 2.9-3.0, BH05 0.5-0.6, BH05 1.5-1.6, BH05 2.5-2.6, BH05 3.6-3.7, BH06 0.5-0.6, BH06 1.5-1.6, BH06 2.4-2.5, BH07 0.5-0.6, BH07 1.5-1.6, BH07 2.5-2.6, BH08 1.5-1.6, BH08 3.4-3.5, BH09 0.5-0.6, BH09 1.5-1.6, BH09 2.5-2.6, BH09 2.9-3.0	31-Oct-2017	03-Nov-2017	14-Nov-2017	✓	03-Nov-2017	14-Nov-2017	✓
Soil Glass Jar - Unpreserved (EP071)							
BH01 1.5-1.6, BH01 2.5-2.6, BH01 2.7-2.8, BH02 0.7-0.8, BH02 1.5-1.6, BH02 2.5-2.6, BH02 2.7-2.8, BH03 0.5-0.6, BH03 1.5-1.6, BH03 2.5-2.6, BH03 2.7-2.8, BH04 0.5-0.6, BH04 1.5-1.6, BH04 2.5-2.6, BH04 2.9-3.0, BH05 0.5-0.6, BH05 1.5-1.6, BH05 2.5-2.6, BH05 3.6-3.7, BH06 0.5-0.6, BH06 1.5-1.6, BH06 2.4-2.5, BH07 0.5-0.6, BH07 1.5-1.6, BH07 2.5-2.6, BH08 1.5-1.6, BH08 3.4-3.5, BH09 0.5-0.6, BH09 1.5-1.6, BH09 2.5-2.6, BH09 2.9-3.0	31-Oct-2017	06-Nov-2017	14-Nov-2017	✓	06-Nov-2017	16-Dec-2017	✓



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)							
BH01 1.5-1.6, BH01 2.5-2.6, BH01 2.7-2.8, BH02 0.7-0.8, BH02 1.5-1.6, BH02 2.5-2.6, BH02 2.7-2.8, BH03 0.5-0.6, BH03 1.5-1.6, BH03 2.5-2.6, BH03 2.7-2.8, BH04 0.5-0.6, BH04 1.5-1.6, BH04 2.5-2.6, BH04 2.9-3.0, BH05 0.5-0.6, BH05 1.5-1.6, BH05 2.5-2.6, BH05 3.6-3.7, BH06 0.5-0.6, BH06 1.5-1.6, BH06 2.4-2.5, BH07 0.5-0.6, BH07 1.5-1.6, BH07 2.5-2.6, BH08 1.5-1.6, BH08 3.4-3.5, BH09 0.5-0.6, BH09 1.5-1.6, BH09 2.5-2.6, BH09 2.9-3.0	**31-Oct-2017**	**03-Nov-2017**	14-Nov-2017	✓	**03-Nov-2017**	14-Nov-2017	✓
Soil Glass Jar - Unpreserved (EP071)							
BH01 1.5-1.6, BH01 2.5-2.6, BH01 2.7-2.8, BH02 0.7-0.8, BH02 1.5-1.6, BH02 2.5-2.6, BH02 2.7-2.8, BH03 0.5-0.6, BH03 1.5-1.6, BH03 2.5-2.6, BH03 2.7-2.8, BH04 0.5-0.6, BH04 1.5-1.6, BH04 2.5-2.6, BH04 2.9-3.0, BH05 0.5-0.6, BH05 1.5-1.6, BH05 2.5-2.6, BH05 3.6-3.7, BH06 0.5-0.6, BH06 1.5-1.6, BH06 2.4-2.5, BH07 0.5-0.6, BH07 1.5-1.6, BH07 2.5-2.6, BH08 1.5-1.6, BH08 3.4-3.5, BH09 0.5-0.6, BH09 1.5-1.6, BH09 2.5-2.6, BH09 2.9-3.0	**31-Oct-2017**	**06-Nov-2017**	14-Nov-2017	✓	**06-Nov-2017**	16-Dec-2017	✓

Page	: 7 of 12
Work Order	: EM1715132
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Harrington Street

Matrix: **SOIL**

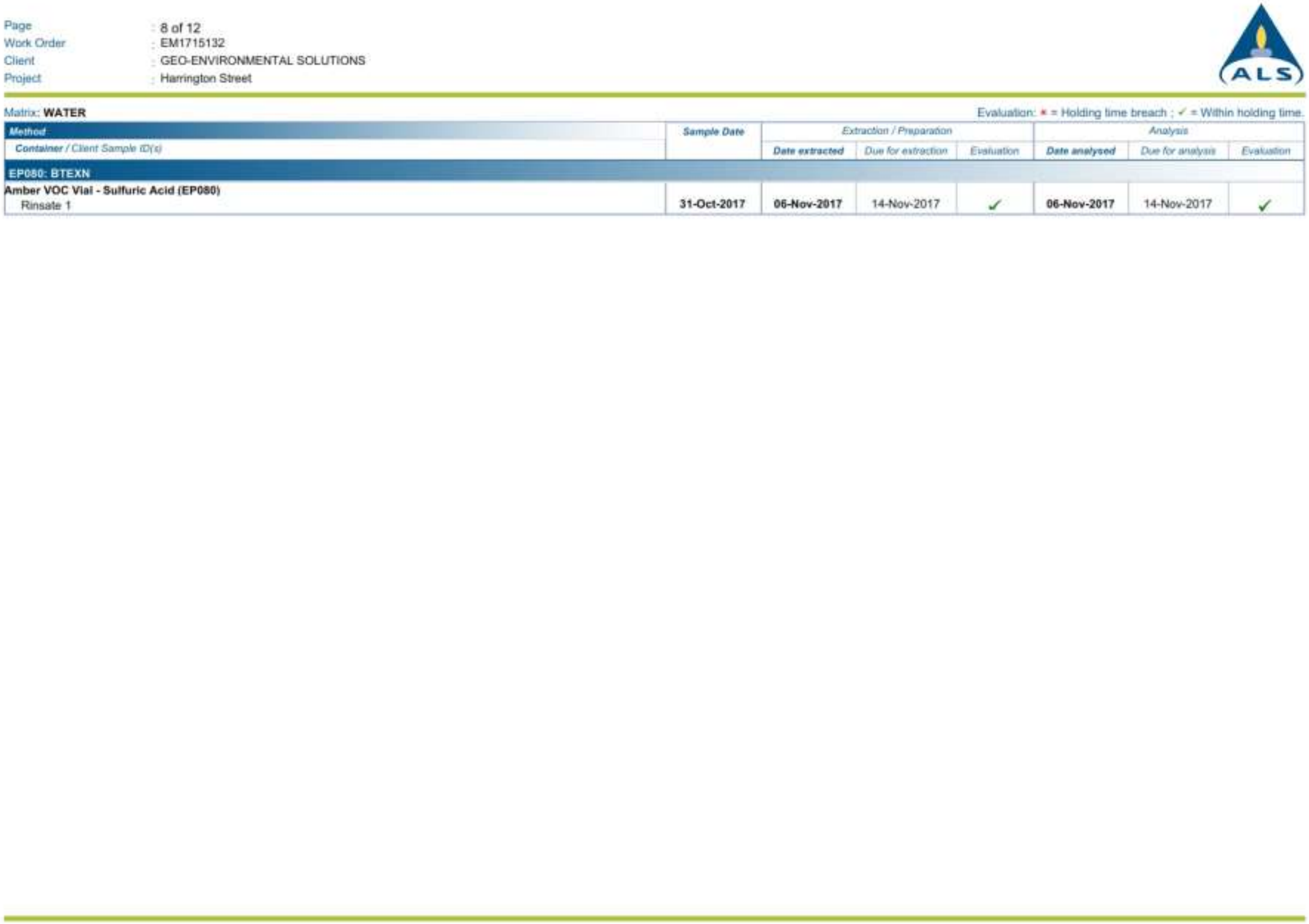
Evaluation: × = Holding time breach ; ✓ = Within holding time.

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)							
BH01 1.5-1.6, BH01 2.5-2.6, BH01 2.7-2.8, BH02 0.7-0.8, BH02 1.5-1.6, BH02 2.5-2.6, BH02 2.7-2.8, BH03 0.5-0.6, BH03 1.5-1.6, BH03 2.5-2.6, BH03 2.7-2.8, BH04 0.5-0.6, BH04 1.5-1.6, BH04 2.5-2.6, BH04 2.9-3.0, BH05 0.5-0.6, BH05 1.5-1.6, BH05 2.5-2.6, BH05 3.6-3.7, BH06 0.5-0.6, BH06 1.5-1.6, BH06 2.4-2.5, BH07 0.5-0.6, BH07 1.5-1.6, BH07 2.5-2.6, BH08 1.5-1.6, BH08 3.4-3.5, BH09 0.5-0.6, BH09 1.5-1.6, BH09 2.5-2.6, BH09 2.9-3.0	31-Oct-2017	03-Nov-2017	14-Nov-2017	✓	03-Nov-2017	14-Nov-2017	✓

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 1	31-Oct-2017	----	----	----	08-Nov-2017	29-Apr-2018	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG035F)							
Rinsate 1	31-Oct-2017	----	----	----	06-Nov-2017	28-Nov-2017	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
Rinsate 1	31-Oct-2017	06-Nov-2017	07-Nov-2017	✓	08-Nov-2017	16-Dec-2017	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
Rinsate 1	31-Oct-2017	06-Nov-2017	07-Nov-2017	✓	08-Nov-2017	16-Dec-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
Rinsate 1	31-Oct-2017	06-Nov-2017	14-Nov-2017	✓	06-Nov-2017	14-Nov-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
Rinsate 1	31-Oct-2017	06-Nov-2017	07-Nov-2017	✓	08-Nov-2017	16-Dec-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
Rinsate 1	31-Oct-2017	06-Nov-2017	14-Nov-2017	✓	06-Nov-2017	14-Nov-2017	✓



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Work Order : EM1715132
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Harrington Street

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*
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
Rinsate 1	**31-Oct-2017**	**06-Nov-2017**	14-Nov-2017	✓	**06-Nov-2017**	14-Nov-2017	✓

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Work Order : EM1715132
Client : GEO-ENVIRONMENTAL SOLUTIONS
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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**

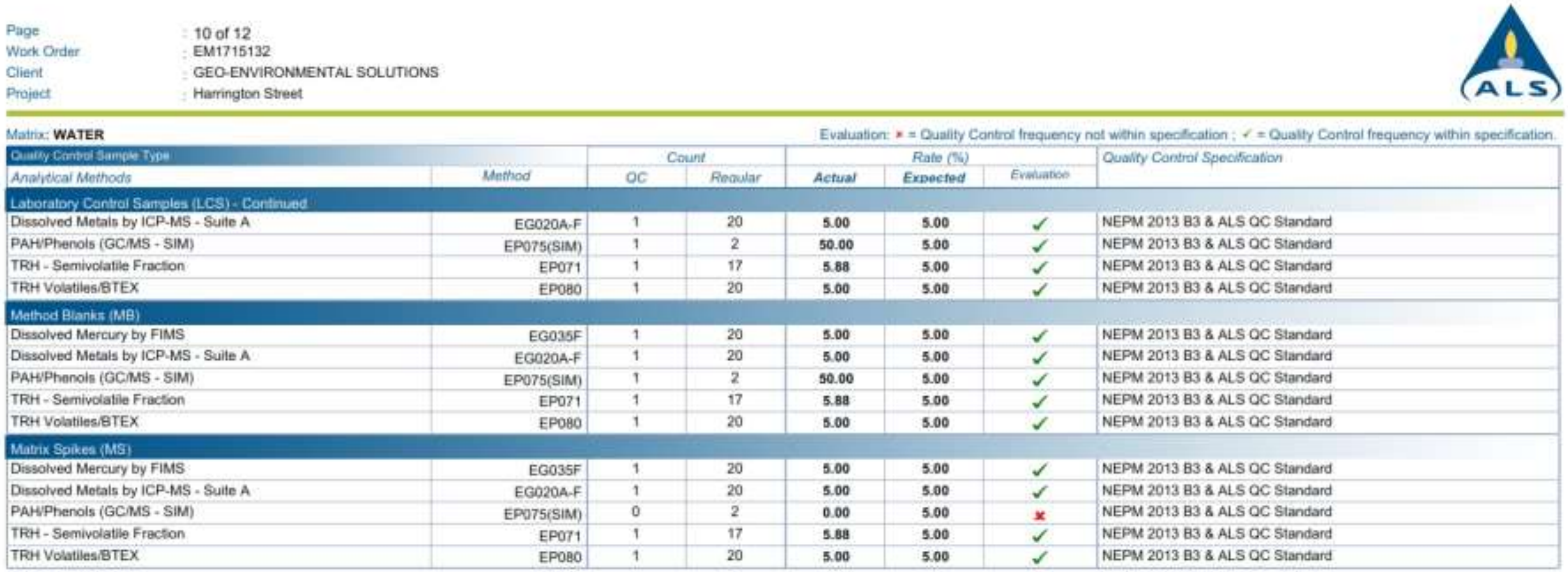
Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	4	31	**12.90**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	5	38	**13.16**	**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	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	38	**5.26**	**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	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	38	**5.26**	**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	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	38	**5.26**	**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	38	**5.26**	**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	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	2	**0.00**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	17	**5.88**	**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	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard



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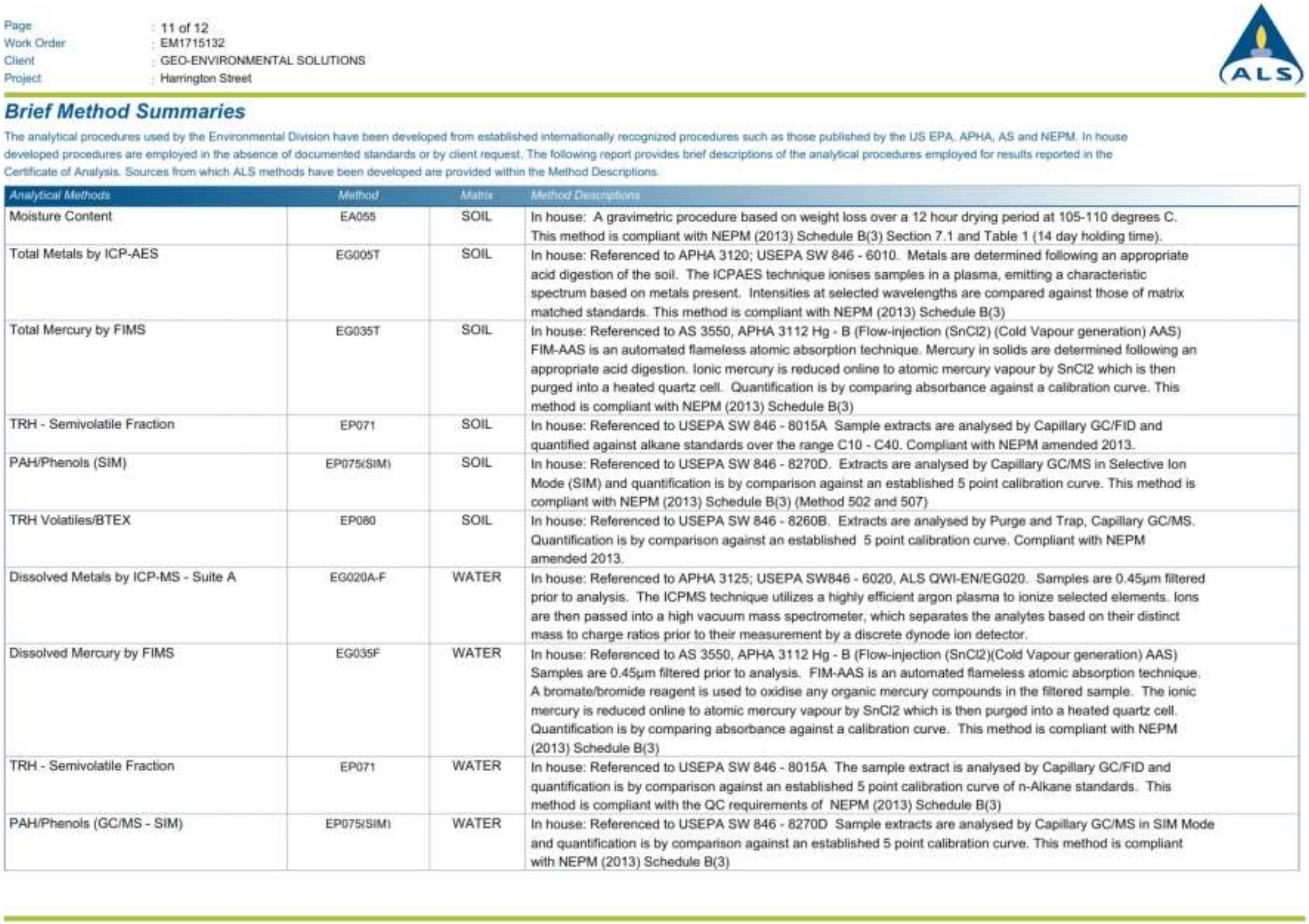
Work Order : EM1715132
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Harrington Street

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type *Analytical Methods*	*Method*	*Count* *QC*	 *Regular*	*Rate (%)* ***Actual***	 ***Expected***	 *Evaluation*	*Quality Control Specification*
Laboratory Control Samples (LCS) - Continued							
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	2	**50.00**	**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	20	**5.00**	**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	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	2	**50.00**	**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	20	**5.00**	**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	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	2	**0.00**	**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	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard



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)

ALS Environmental

QUALITY CONTROL REPORT

Work Order : **ES1727873**

Client : **GEO-ENVIRONMENTAL SOLUTIONS**
Contact : SARAH JOYCE
Address : 29 KIRKSWAY PLACE
BATTERY POINT TASMANIA, AUSTRALIA 7004
Telephone : +61 03 6223 1839
Project : HARRINGTON ST
Order number : ----
C-O-C number : ----
Sampler : GRANT M
Site : ----
Quote number : Blanket quote 2017
No. of samples received : 2
No. of samples analysed : 2

Page : 1 of 7

Laboratory : Environmental Division Sydney
Contact : Shirley LeCornu
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-3-8549 9630
Date Samples Received : 07-Nov-2017
Date Analysis Commenced : 08-Nov-2017
Issue Date : 10-Nov-2017

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:

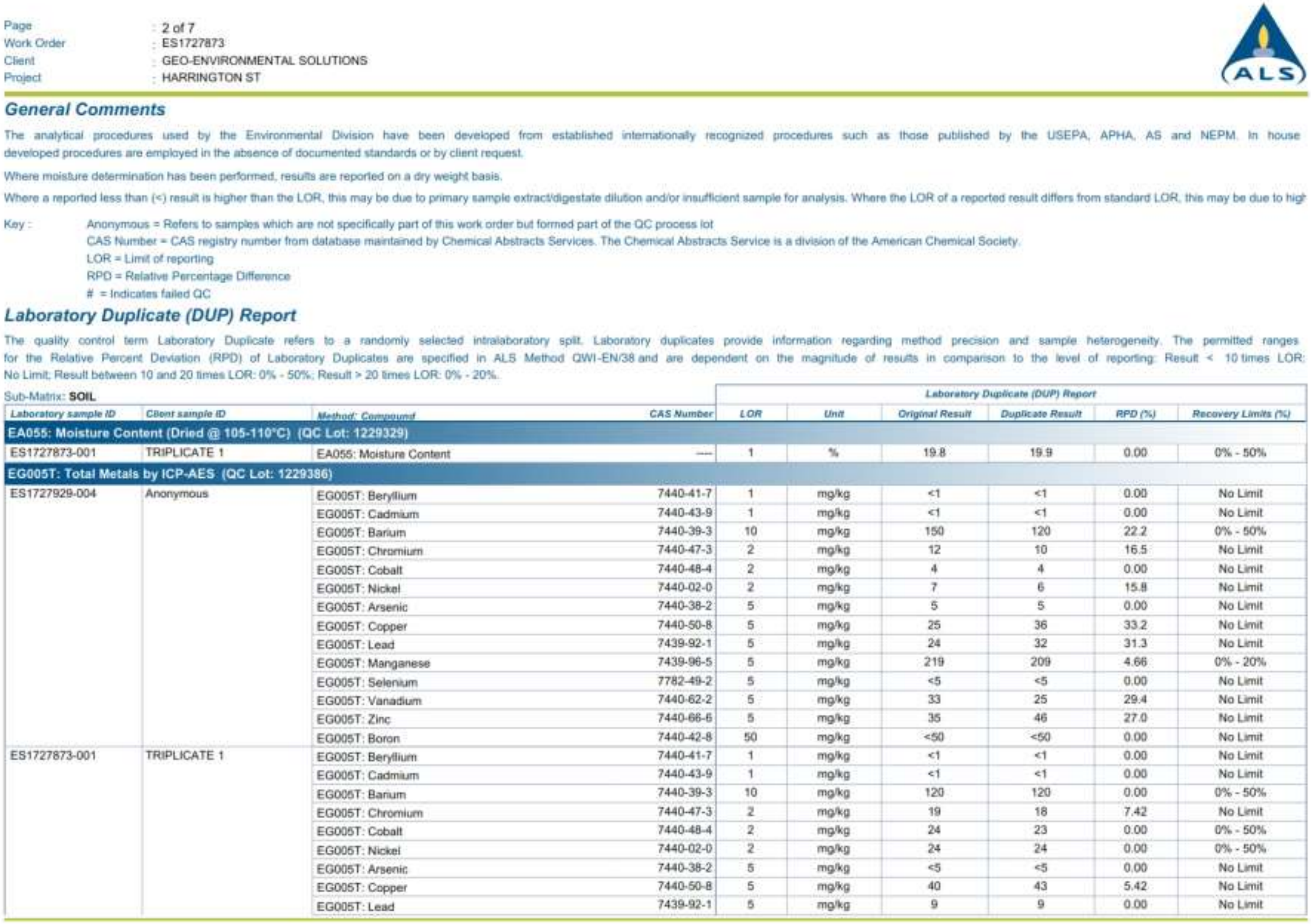
- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

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*
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Raymond Commodore	Instrument Chemist	Sydney Inorganics, Smithfield, NSW

RIGHT SOLUTIONS | RIGHT PARTNER



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Work Order	: ES1727873
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: HARRINGTON ST

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

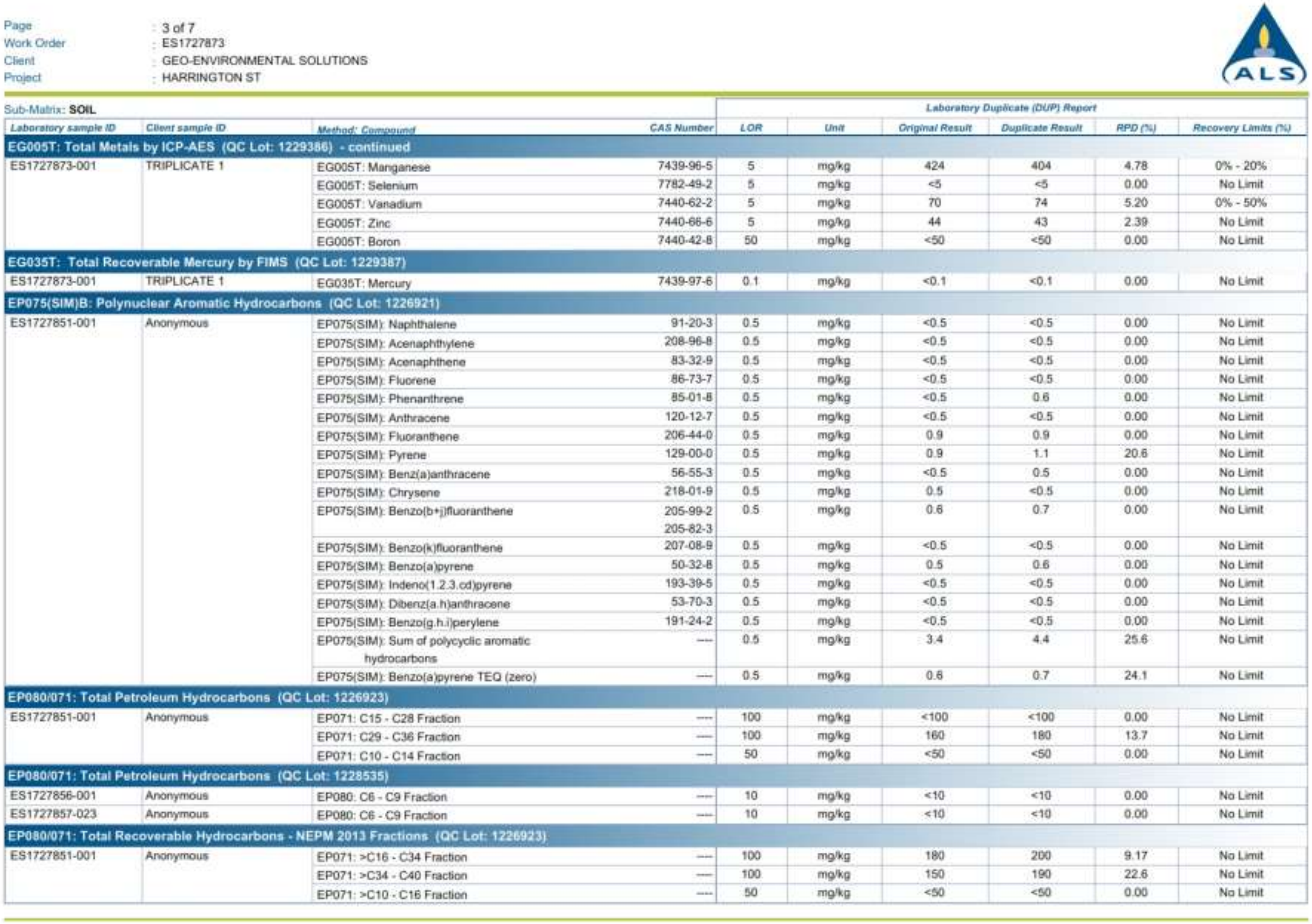
Key :
Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit 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: 1229329)									
ES1727873-001	TRIPLICATE 1	EA055: Moisture Content	----	1	%	19.8	19.9	0.00	0% - 50%
EG005T: Total Metals by ICP-AES (QC Lot: 1229386)									
ES1727929-004	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	150	120	22.2	0% - 50%
		EG005T: Chromium	7440-47-3	2	mg/kg	12	10	16.5	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	4	4	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	7	6	15.8	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	5	5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	25	36	33.2	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	24	32	31.3	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	219	209	4.66	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	33	25	29.4	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	35	46	27.0	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
ES1727873-001	TRIPLICATE 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	120	120	0.00	0% - 50%
		EG005T: Chromium	7440-47-3	2	mg/kg	19	18	7.42	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	24	23	0.00	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	24	24	0.00	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	43	5.42	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	9	9	0.00	No Limit



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Work Order : ES1727873
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : HARRINGTON ST

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: 1229386) - continued									
ES1727873-001	TRIPLICATE 1	EG005T: Manganese	7439-96-5	5	mg/kg	424	404	4.78	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	70	74	5.20	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	44	43	2.39	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1229387)									
ES1727873-001	TRIPLICATE 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: 1226921)									
ES1727851-001	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	0.6	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	0.9	0.9	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	0.9	1.1	20.6	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	0.6	0.7	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	0.6	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	3.4	4.4	25.6	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	0.6	0.7	24.1	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1226923)									
ES1727851-001	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	160	180	13.7	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1228535)									
ES1727856-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1727857-023	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1226923)									
ES1727851-001	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	180	200	9.17	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	150	190	22.6	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit

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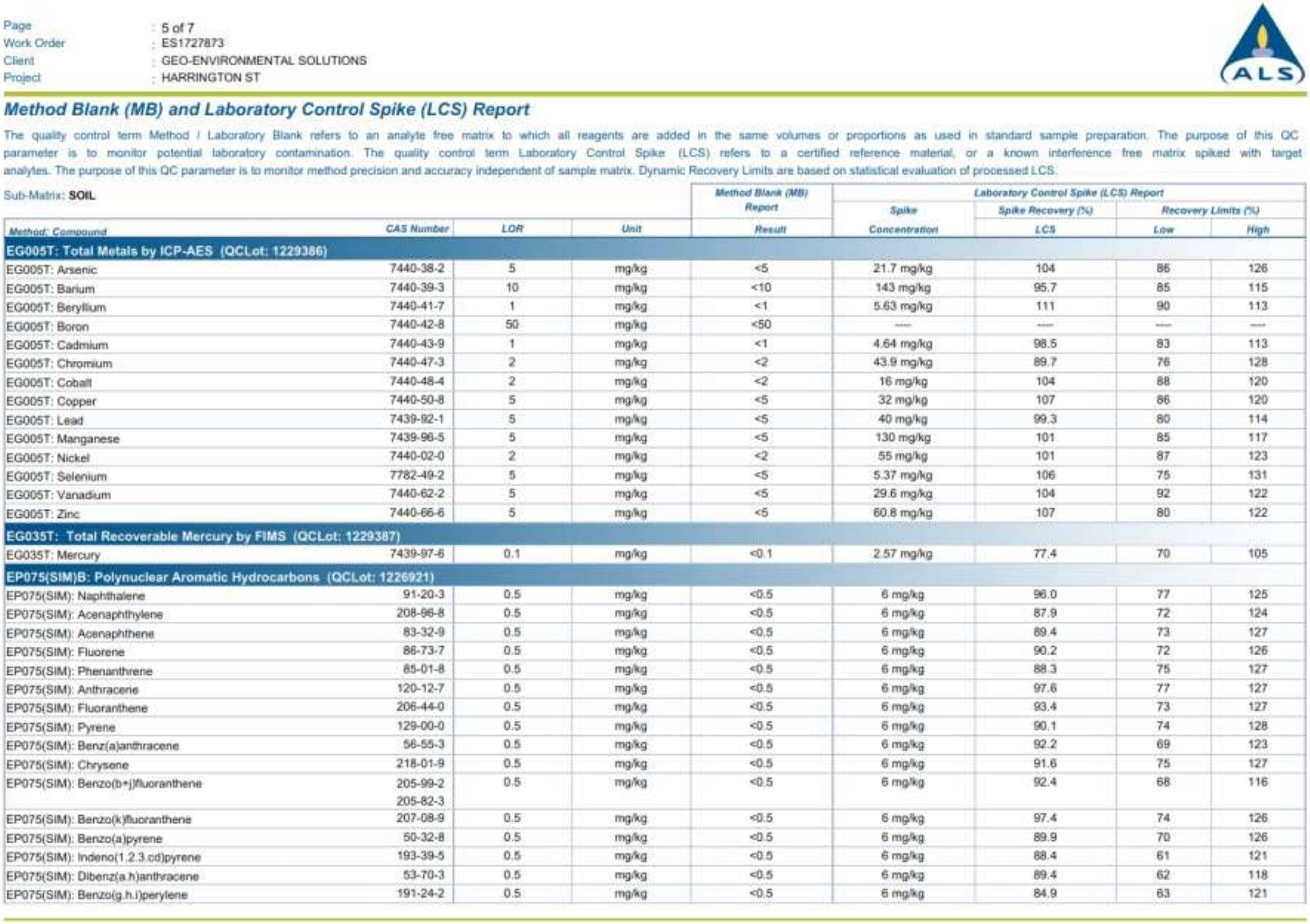
Work Order : ES1727873
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : HARRINGTON ST

Sub-Matrix: **SOIL**

Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
				Laboratory Duplicate (DUP) Report					
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1228535)									
ES1727856-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1727857-023	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080: BTEXN (QC Lot: 1228535)									
ES1727856-001	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
ES1727857-023	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



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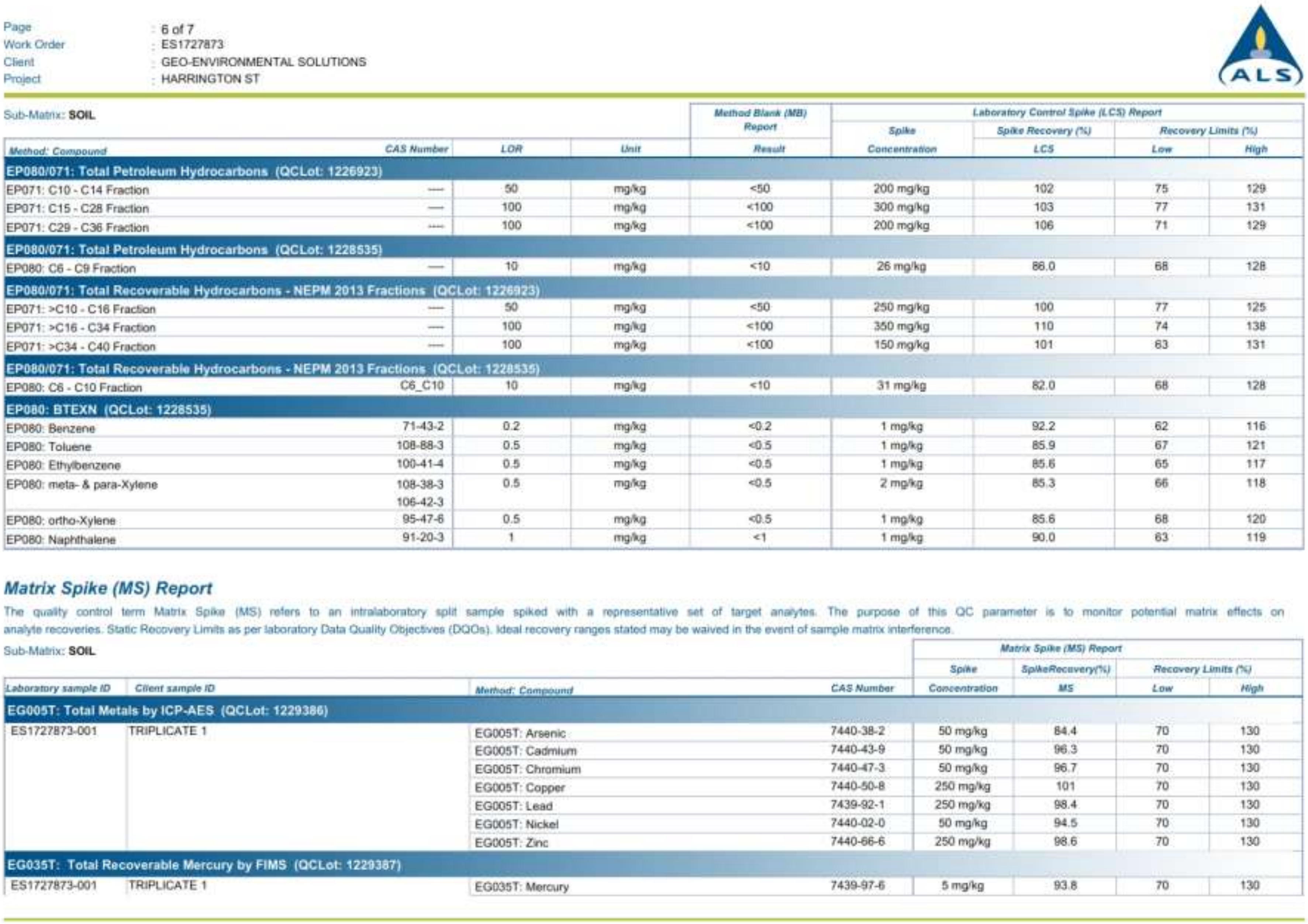
Method Blank (MB) and Laboratory Control Spike (LCS) Report

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: 1229386)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	104	86	126
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	95.7	85	115
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	111	90	113
EG005T: Boron	7440-42-8	50	mg/kg	<50	----	----	----	----
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	98.5	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	89.7	76	128
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	104	88	120
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	107	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	99.3	80	114
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	101	85	117
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	101	87	123
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	106	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	107	80	122
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1229387)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	77.4	70	105
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1226921)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	96.0	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	87.9	72	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	89.4	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	90.2	72	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	88.3	75	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	97.6	77	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	93.4	73	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	90.1	74	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	92.2	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	91.6	75	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	92.4	68	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	97.4	74	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	89.9	70	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	88.4	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	84.9	63	121



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Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : HARRINGTON ST

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*
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1226923)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	102	75	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	103	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	106	71	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1228535)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	86.0	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1226923)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	250 mg/kg	100	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	110	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	101	63	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1228535)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	82.0	68	128
EP080: BTEXN (QCLot: 1228535)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	92.2	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	85.9	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	85.6	65	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	85.3	66	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	85.6	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	90.0	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**

				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: 1229386)							
ES1727873-001	TRIPLICATE 1	EG005T: Arsenic	7440-38-2	50 mg/kg	84.4	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	96.3	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	96.7	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	101	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	98.4	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	94.5	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	98.6	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1229387)							
ES1727873-001	TRIPLICATE 1	EG035T: Mercury	7439-97-6	5 mg/kg	93.8	70	130

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Work Order : ES1727873
Client : GEO-ENVIRONMENTAL SOLUTIONS
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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: 1226921)							
ES1727851-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	90.5	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	89.2	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1226923)							
ES1727851-001	Anonymous	EP071: C10 - C14 Fraction	----	523 mg/kg	100	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	112	53	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	112	52	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1228535)							
ES1727856-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	93.7	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1226923)							
ES1727851-001	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	98.5	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	116	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	105	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1228535)							
ES1727856-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	95.7	70	130
EP080: BTEXN (QCLot: 1228535)							
ES1727856-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	95.6	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	91.5	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	94.6	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	92.0	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	91.8	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	92.0	70	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1727873**	Page	: 1 of 4
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Sydney
Contact	: SARAH JOYCE	Telephone	: +61-3-8549 9630
Project	: HARRINGTON ST	Date Samples Received	: 07-Nov-2017
Site	: ----	Issue Date	: 10-Nov-2017
Sampler	: GRANT M	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.

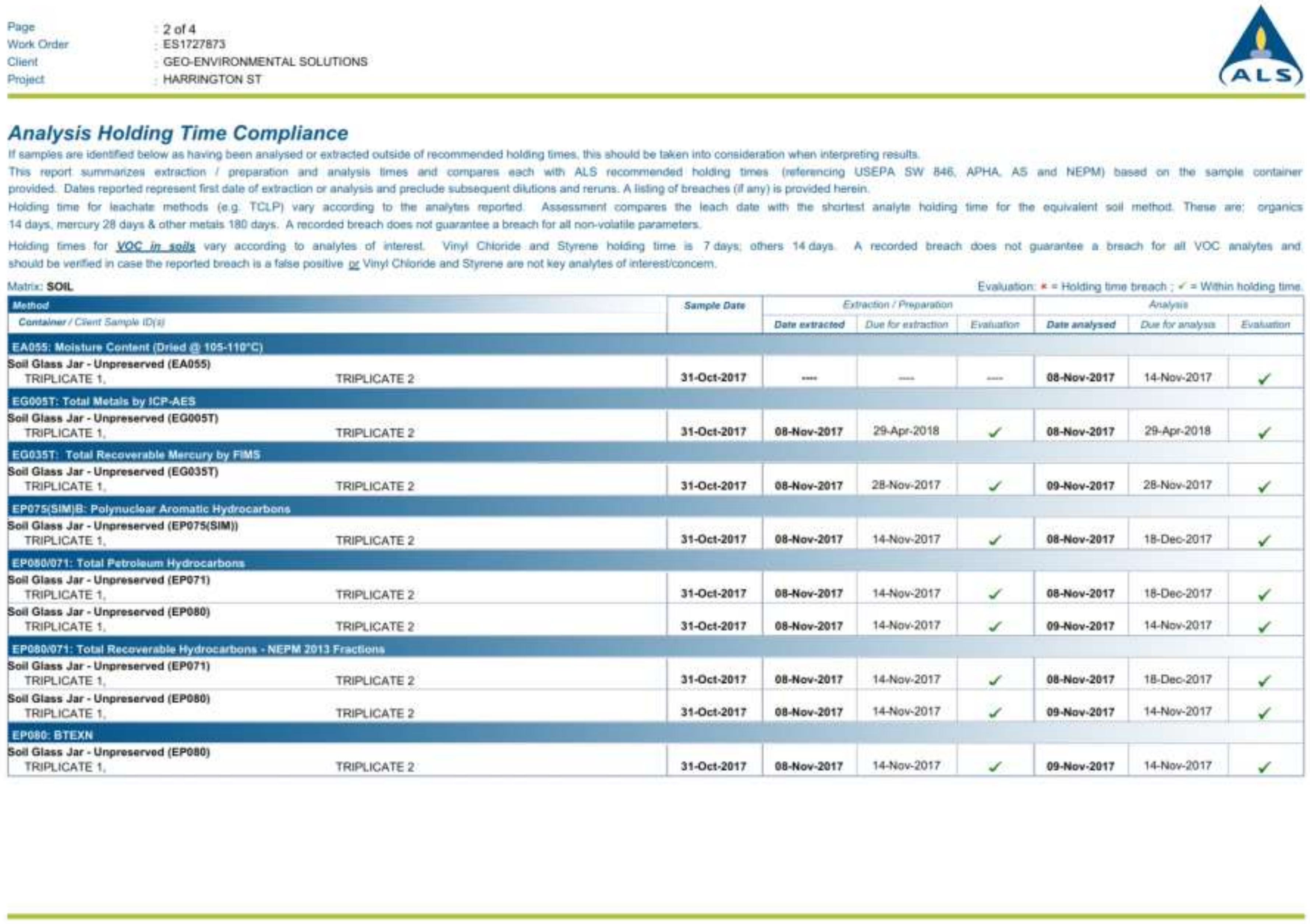
- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**



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.

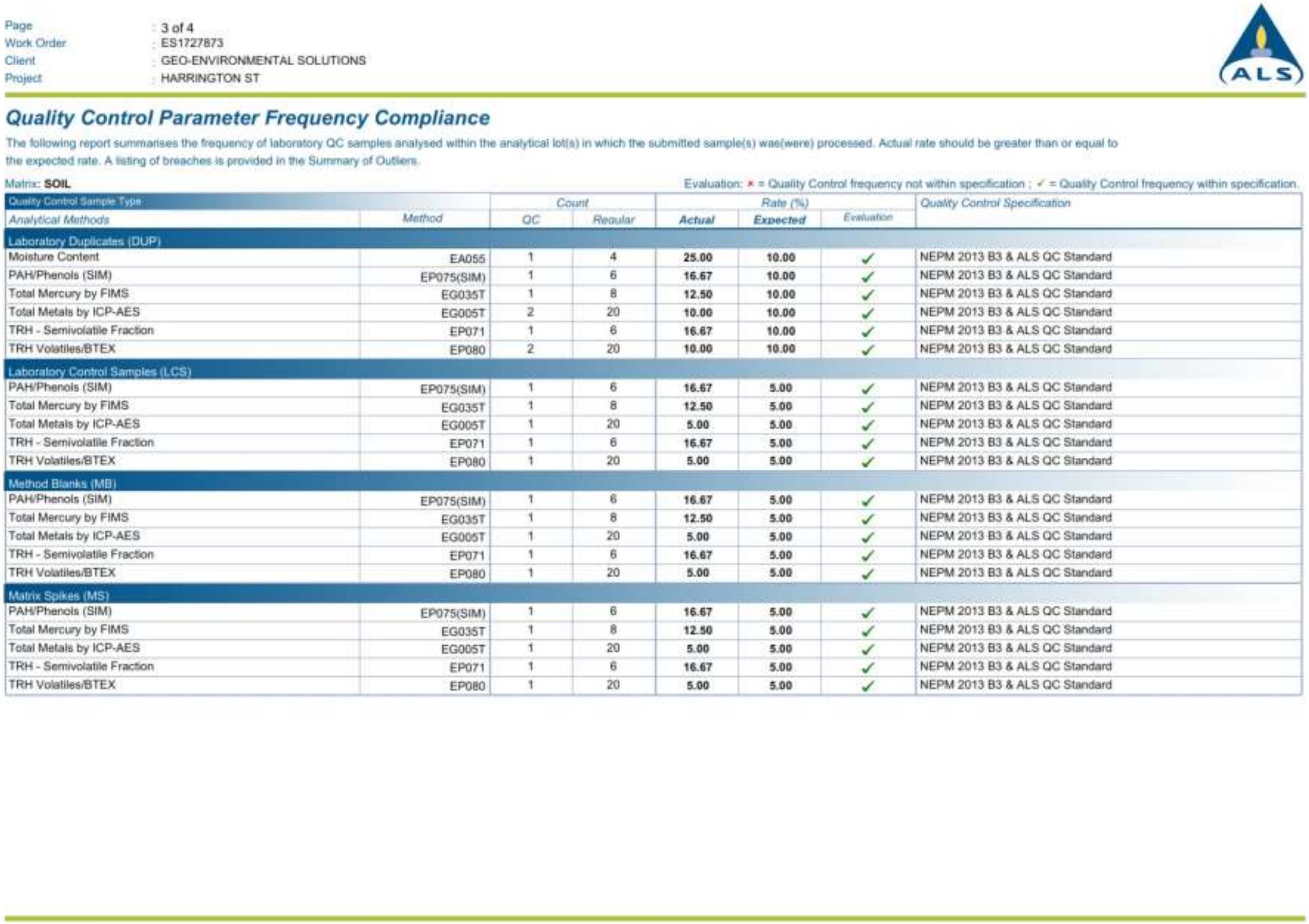
Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a 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) TRIPLICATE 1,	TRIPLICATE 2	**31-Oct-2017**	----	----	----	**08-Nov-2017**	14-Nov-2017	✓
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T) TRIPLICATE 1,	TRIPLICATE 2	**31-Oct-2017**	**08-Nov-2017**	29-Apr-2018	✓	**08-Nov-2017**	29-Apr-2018	✓
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T) TRIPLICATE 1,	TRIPLICATE 2	**31-Oct-2017**	**08-Nov-2017**	28-Nov-2017	✓	**09-Nov-2017**	28-Nov-2017	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM)) TRIPLICATE 1,	TRIPLICATE 2	**31-Oct-2017**	**08-Nov-2017**	14-Nov-2017	✓	**08-Nov-2017**	18-Dec-2017	✓
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP071) TRIPLICATE 1,	TRIPLICATE 2	**31-Oct-2017**	**08-Nov-2017**	14-Nov-2017	✓	**08-Nov-2017**	18-Dec-2017	✓
Soil Glass Jar - Unpreserved (EP080) TRIPLICATE 1,	TRIPLICATE 2	**31-Oct-2017**	**08-Nov-2017**	14-Nov-2017	✓	**09-Nov-2017**	14-Nov-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP071) TRIPLICATE 1,	TRIPLICATE 2	**31-Oct-2017**	**08-Nov-2017**	14-Nov-2017	✓	**08-Nov-2017**	18-Dec-2017	✓
Soil Glass Jar - Unpreserved (EP080) TRIPLICATE 1,	TRIPLICATE 2	**31-Oct-2017**	**08-Nov-2017**	14-Nov-2017	✓	**09-Nov-2017**	14-Nov-2017	✓
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080) TRIPLICATE 1,	TRIPLICATE 2	**31-Oct-2017**	**08-Nov-2017**	14-Nov-2017	✓	**09-Nov-2017**	14-Nov-2017	✓



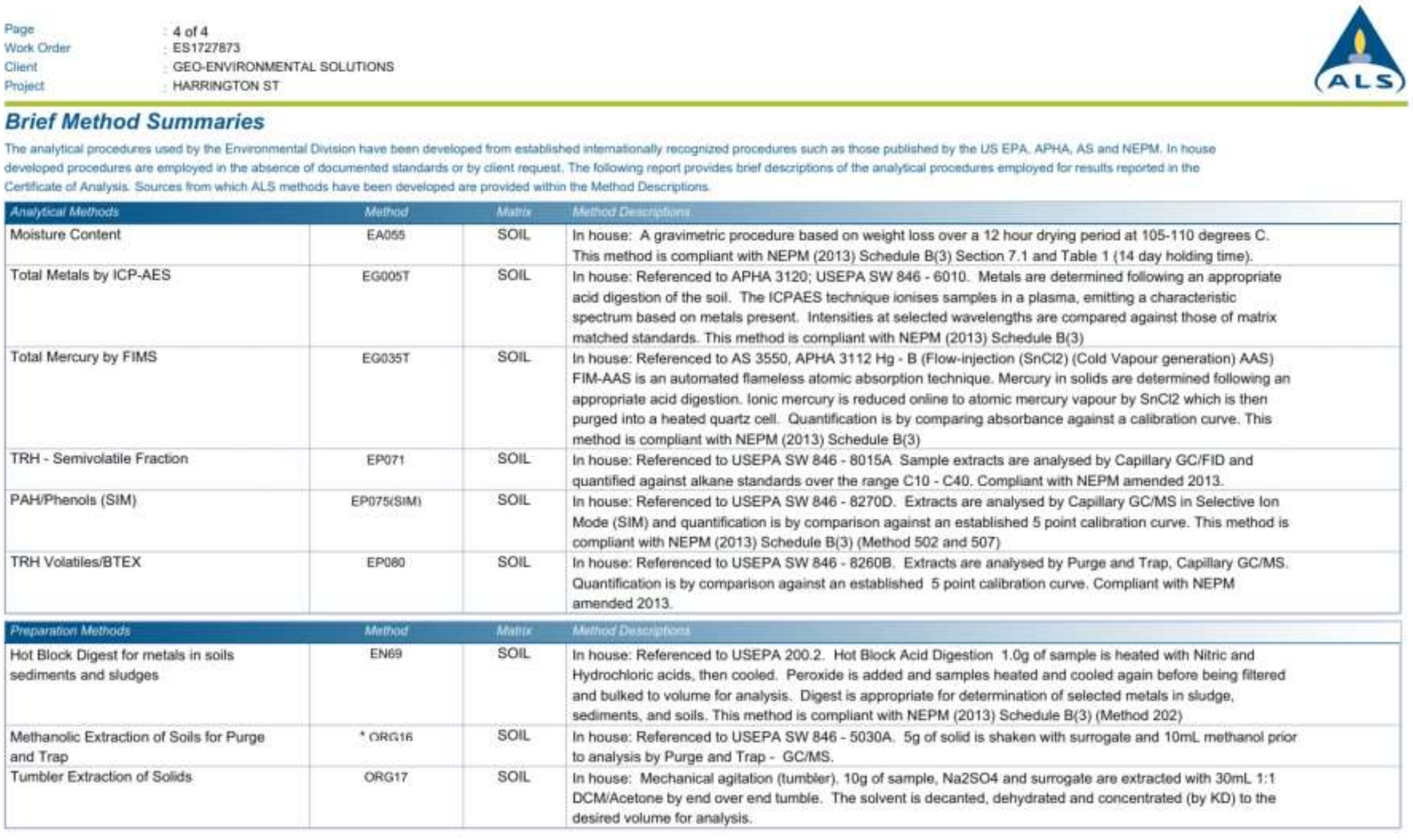
Quality Control Parameter Frequency Compliance

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)	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	8	**12.50**	**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	1	6	**16.67**	**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 (SIM)	EP075(SIM)	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	8	**12.50**	**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	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)							
PAH/Phenols (SIM)	EP075(SIM)	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	8	**12.50**	**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	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)							
PAH/Phenols (SIM)	EP075(SIM)	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	8	**12.50**	**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	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



Page	: 4 of 4
Work Order	: ES1727873
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: HARRINGTON ST

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 : **EM1713195**

Client : **GEO-ENVIRONMENTAL SOLUTIONS**
Contact : S JOYCE
Address : 86 QUEEN STREET
SANDY BAY TASMANIA, AUSTRALIA 7005
Telephone : +61 03 6223 1839
Project : 215-217 Harrington Street
Order number : ----
C-O-C number : ----
Sampler : SARAH JOYCE
Site : ----
Quote number : Blanket quote 2017
No. of samples received : 5
No. of samples analysed : 5

Page : 1 of 4
Laboratory : Environmental Division Melbourne
Contact : Shirley LeCornu
Address : 4 Westall Rd Springvale VIC Australia 3171
Telephone : +61-3-8549 9630
Date Samples Received : 26-Sep-2017
Date Analysis Commenced : 27-Sep-2017
Issue Date : 02-Oct-2017

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
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

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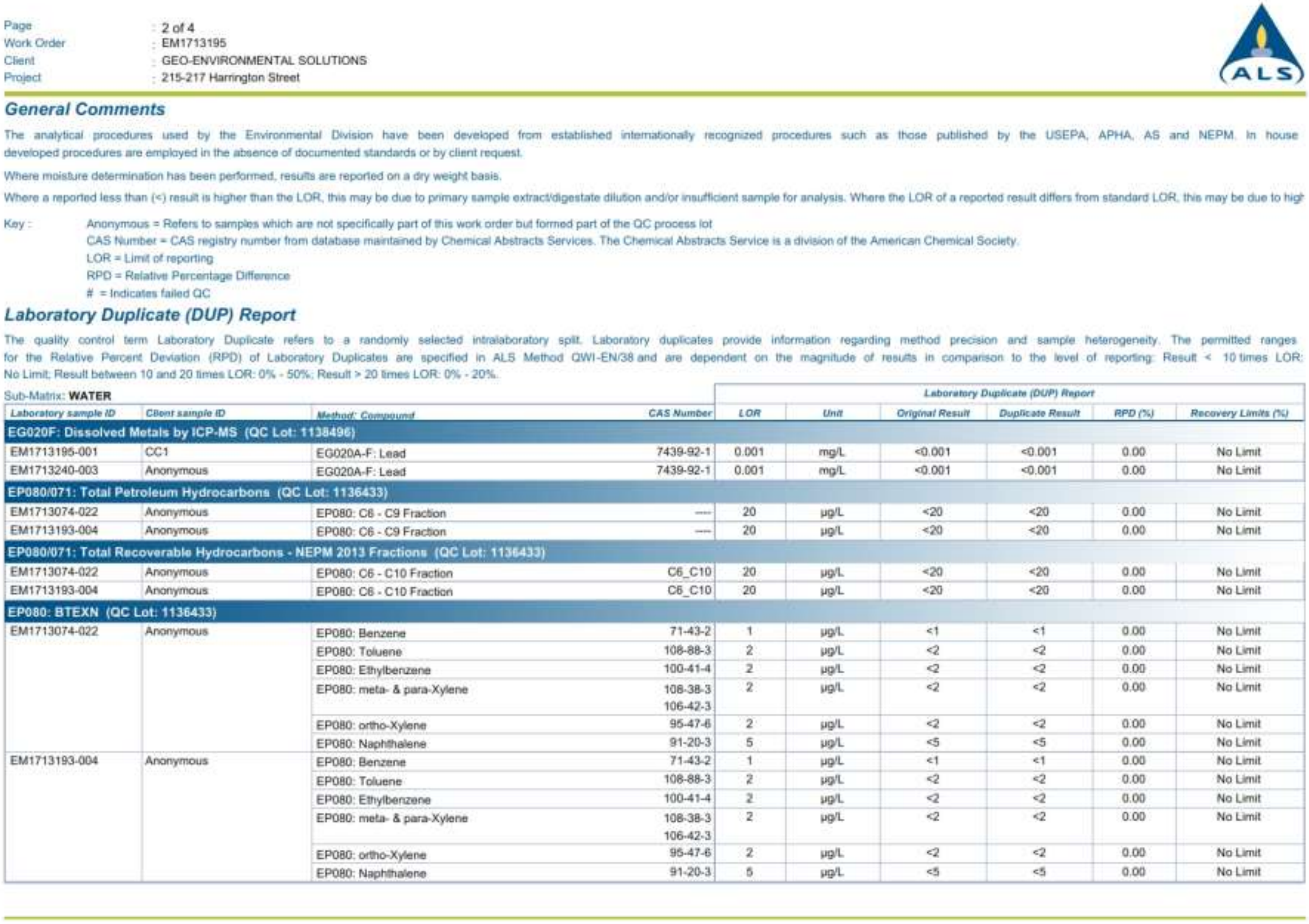

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Work Order : EM1713195
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 215-217 Harrington Street

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 hig

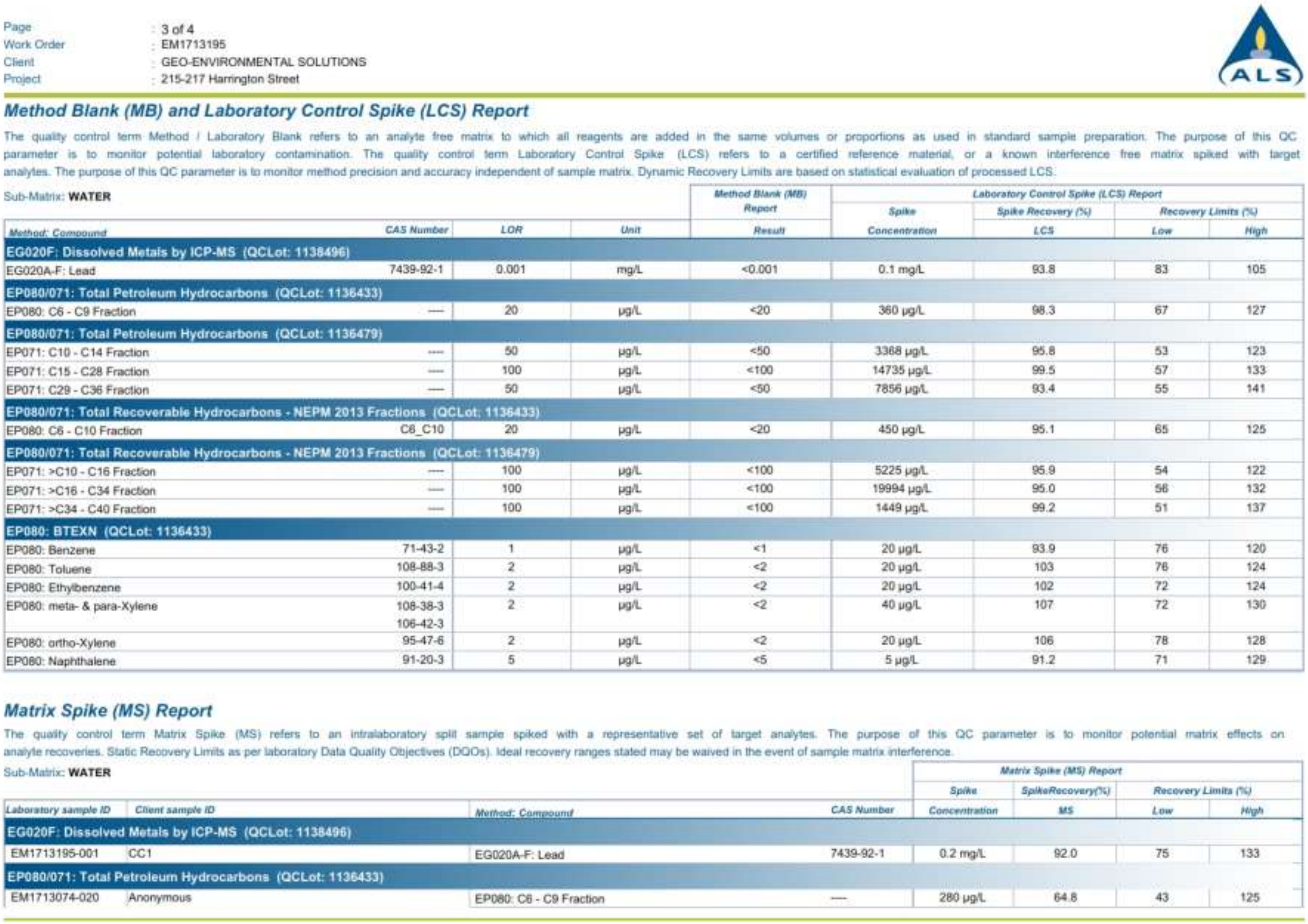
Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit 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: 1138496)									
EM1713195-001	CC1	EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
EM1713240-003	Anonymous	EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1136433)									
EM1713074-022	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EM1713193-004	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1136433)									
EM1713074-022	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EM1713193-004	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1136433)									
EM1713074-022	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
EM1713193-004	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
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit



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Work Order : EM1713195
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 215-217 Harrington Street

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**

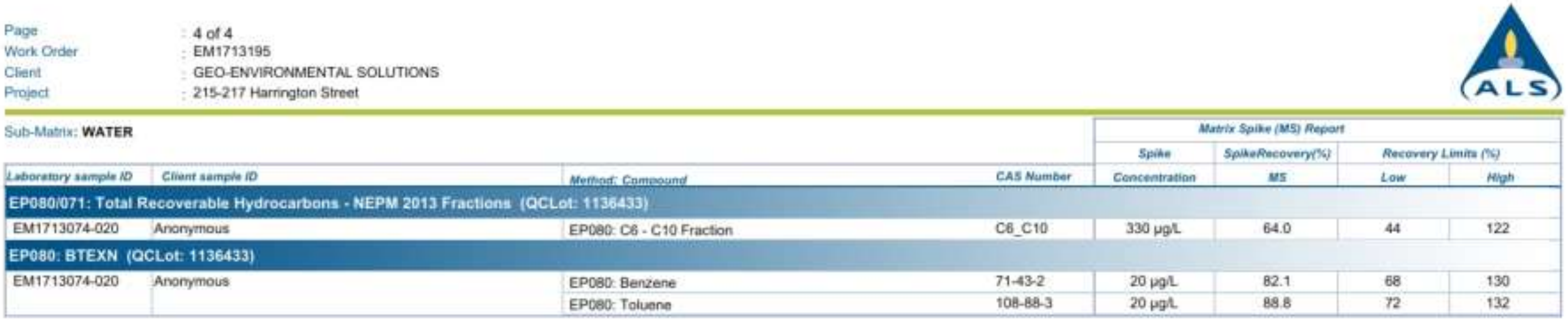
				Method Blank (MB) Report	*Laboratory Control Spike (LCS) Report*			
					Spike	*Spike Recovery (%)*	*Recovery Limits (%)*	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
EG020F: Dissolved Metals by ICP-MS (QCLot: 1138496)								
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.8	83	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1136433)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	98.3	67	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1136479)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	3368 µg/L	95.8	53	123
EP071: C15 - C28 Fraction	----	100	µg/L	<100	14735 µg/L	99.5	57	133
EP071: C29 - C36 Fraction	----	50	µg/L	<50	7856 µg/L	93.4	55	141
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1136433)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	95.1	65	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1136479)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	5225 µg/L	95.9	54	122
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	19994 µg/L	95.0	56	132
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1449 µg/L	99.2	51	137
EP080: BTEXN (QCLot: 1136433)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	93.9	76	120
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	103	76	124
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	102	72	124
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	107	72	130
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	106	78	128
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	91.2	71	129

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: 1138496)							
EM1713195-001	CC1	EG020A-F: Lead	7439-92-1	0.2 mg/L	92.0	75	133
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1136433)							
EM1713074-020	Anonymous	EP080: C6 - C9 Fraction	----	280 µg/L	64.8	43	125



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Work Order : EM1713195
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 215-217 Harrington Street

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1136433)							
EM1713074-020	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	64.0	44	122
EP080: BTEXN (QCLot: 1136433)							
EM1713074-020	Anonymous	EP080: Benzene	71-43-2	20 µg/L	82.1	68	130
		EP080: Toluene	108-88-3	20 µg/L	88.8	72	132

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order : **EM1713195**

Client : **GEO-ENVIRONMENTAL SOLUTIONS**
Contact : S JOYCE
Project : 215-217 Harrington Street
Site : ----
Sampler : SARAH JOYCE
Order number : ----

Page : 1 of 5

Laboratory : Environmental Division Melbourne
Telephone : +61-3-8549 9630
Date Samples Received : 26-Sep-2017
Issue Date : 02-Oct-2017
No. of samples received : 5
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.**

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Page : 2 of 5
Work Order : EM1713195
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 215-217 Harrington Street

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	0	7	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	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.

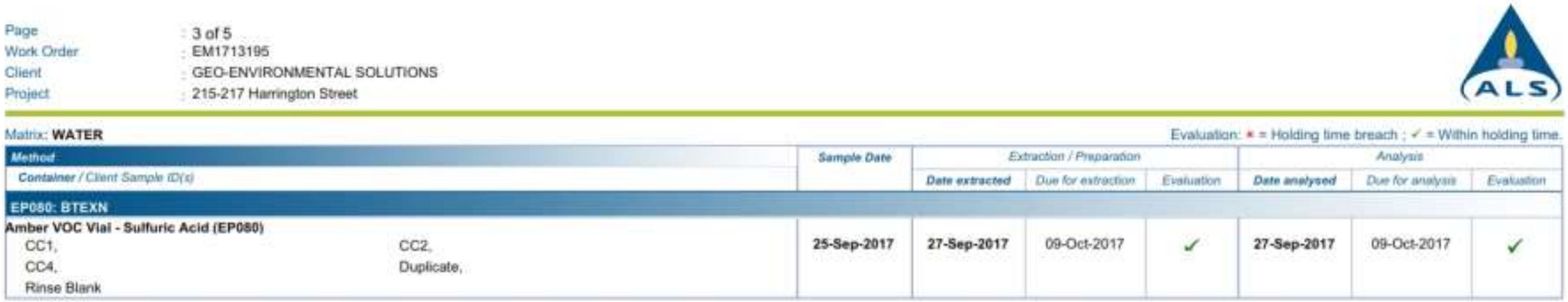
Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a 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: **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) CC1, CC2, CC4, Duplicate	**25-Sep-2017**	----	----	----	**27-Sep-2017**	24-Mar-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) CC1, CC2, CC4, Duplicate, Rinse Blank	**25-Sep-2017**	**27-Sep-2017**	02-Oct-2017	✓	**28-Sep-2017**	06-Nov-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) CC1, CC2, CC4, Duplicate, Rinse Blank	**25-Sep-2017**	**27-Sep-2017**	09-Oct-2017	✓	**27-Sep-2017**	09-Oct-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) CC1, CC2, CC4, Duplicate, Rinse Blank	**25-Sep-2017**	**27-Sep-2017**	02-Oct-2017	✓	**28-Sep-2017**	06-Nov-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) CC1, CC2, CC4, Duplicate, Rinse Blank	**25-Sep-2017**	**27-Sep-2017**	09-Oct-2017	✓	**27-Sep-2017**	09-Oct-2017	✓



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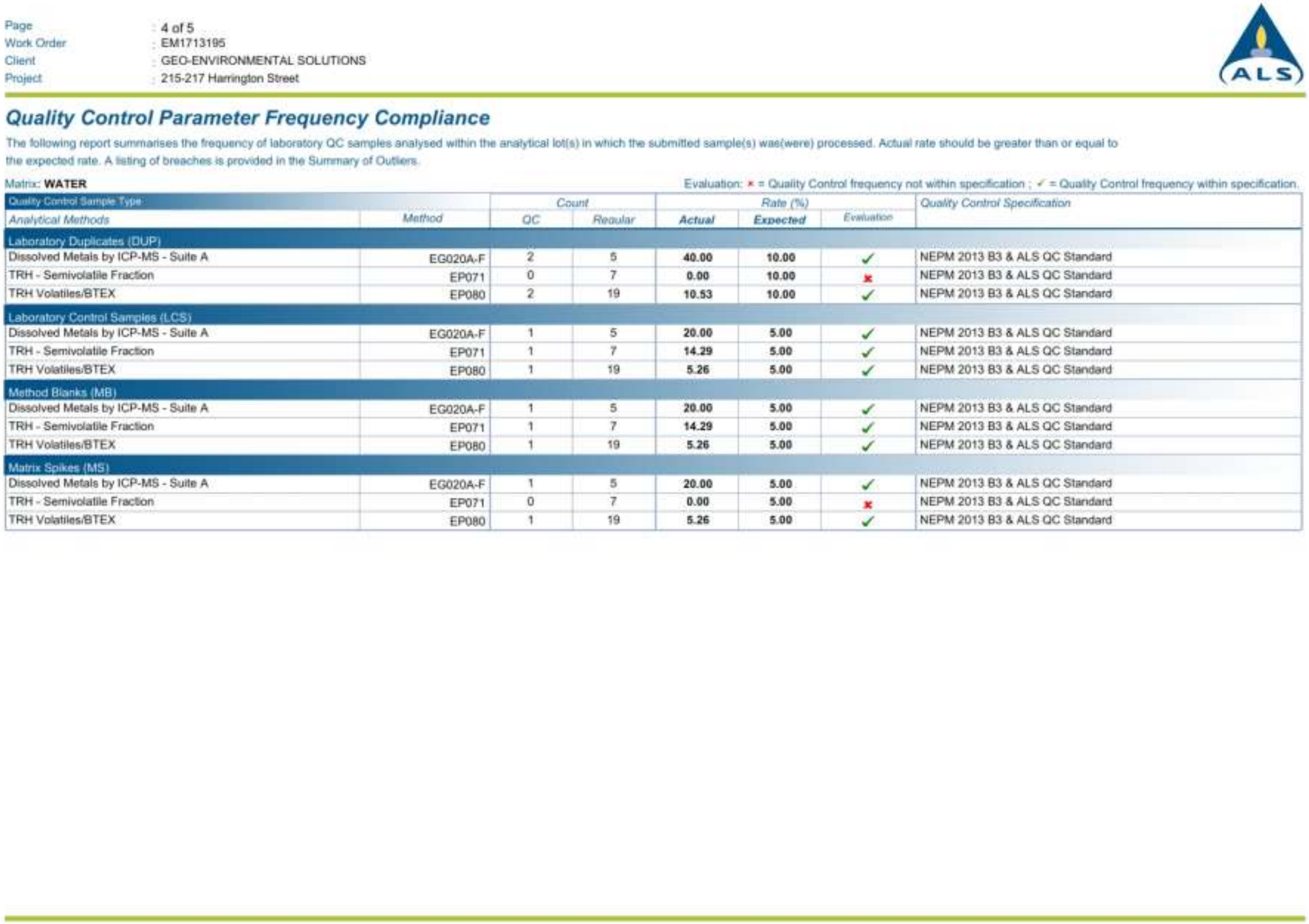
Work Order	: EM1713195
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 215-217 Harrington Street

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: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) CC1, CC2, CC4, Duplicate, Rinse Blank	**25-Sep-2017**	**27-Sep-2017**	09-Oct-2017	✓	**27-Sep-2017**	09-Oct-2017	✓



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Work Order : EM1713195
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 215-217 Harrington Street

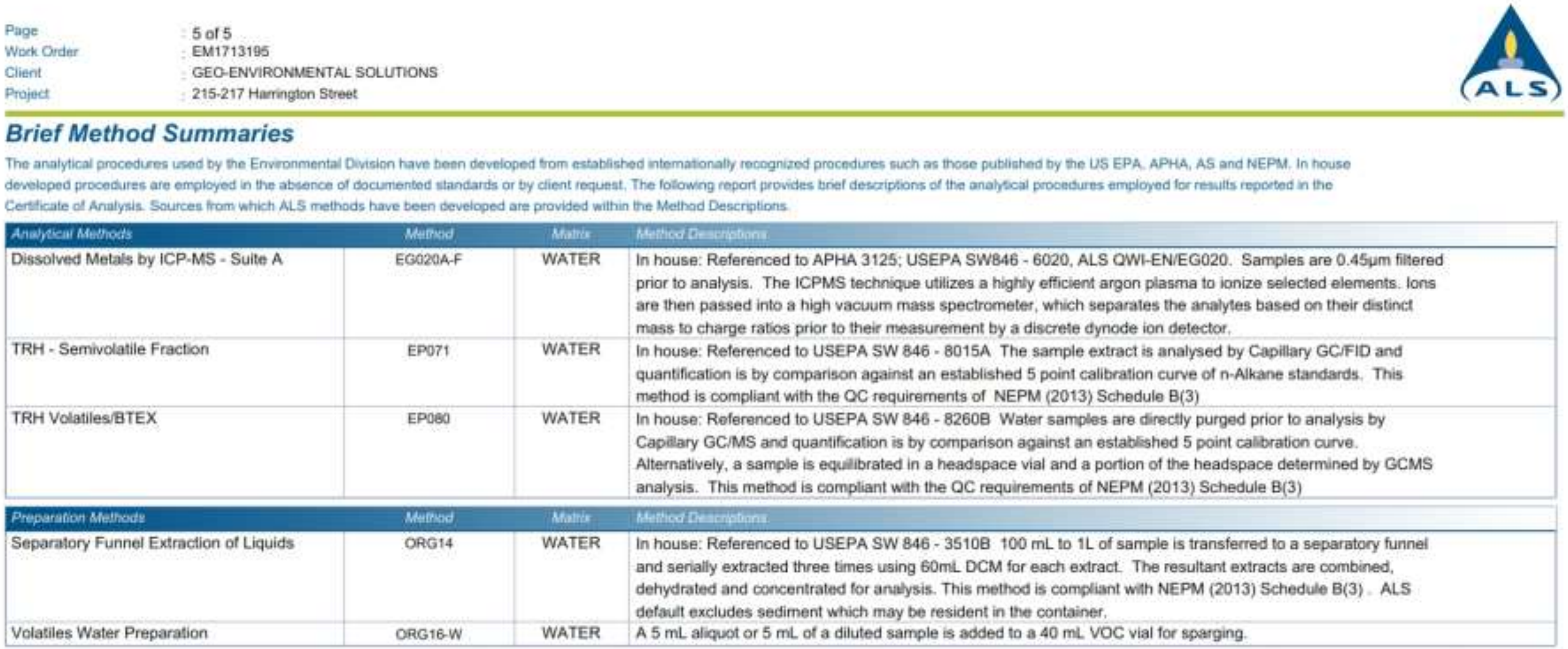
Quality Control Parameter Frequency Compliance

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 Metals by ICP-MS - Suite A	EG020A-F	2	5	**40.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	7	**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 Metals by ICP-MS - Suite A	EG020A-F	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	7	**14.29**	**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 Metals by ICP-MS - Suite A	EG020A-F	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	7	**14.29**	**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 Metals by ICP-MS - Suite A	EG020A-F	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	7	**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



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Work Order	: EM1713195
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 215-217 Harrington Street

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.
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)
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	: **EM1713260**	Page	: 1 of 6
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: S JOYCE	Contact	: Shirley LeCornu
Address	: 86 QUEEN STREET SANDY BAY TASMANIA, AUSTRALIA 7005	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Project	: 115 Harrington Street	Date Samples Received	: 27-Sep-2017
Order number	: ----	Date Analysis Commenced	: 27-Sep-2017
C-O-C number	: ----	Issue Date	: 03-Oct-2017
Sampler	: ----		
Site	: ----		
Quote number	: Blanket quote 2017		
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 Quality Control Report contains the following information:

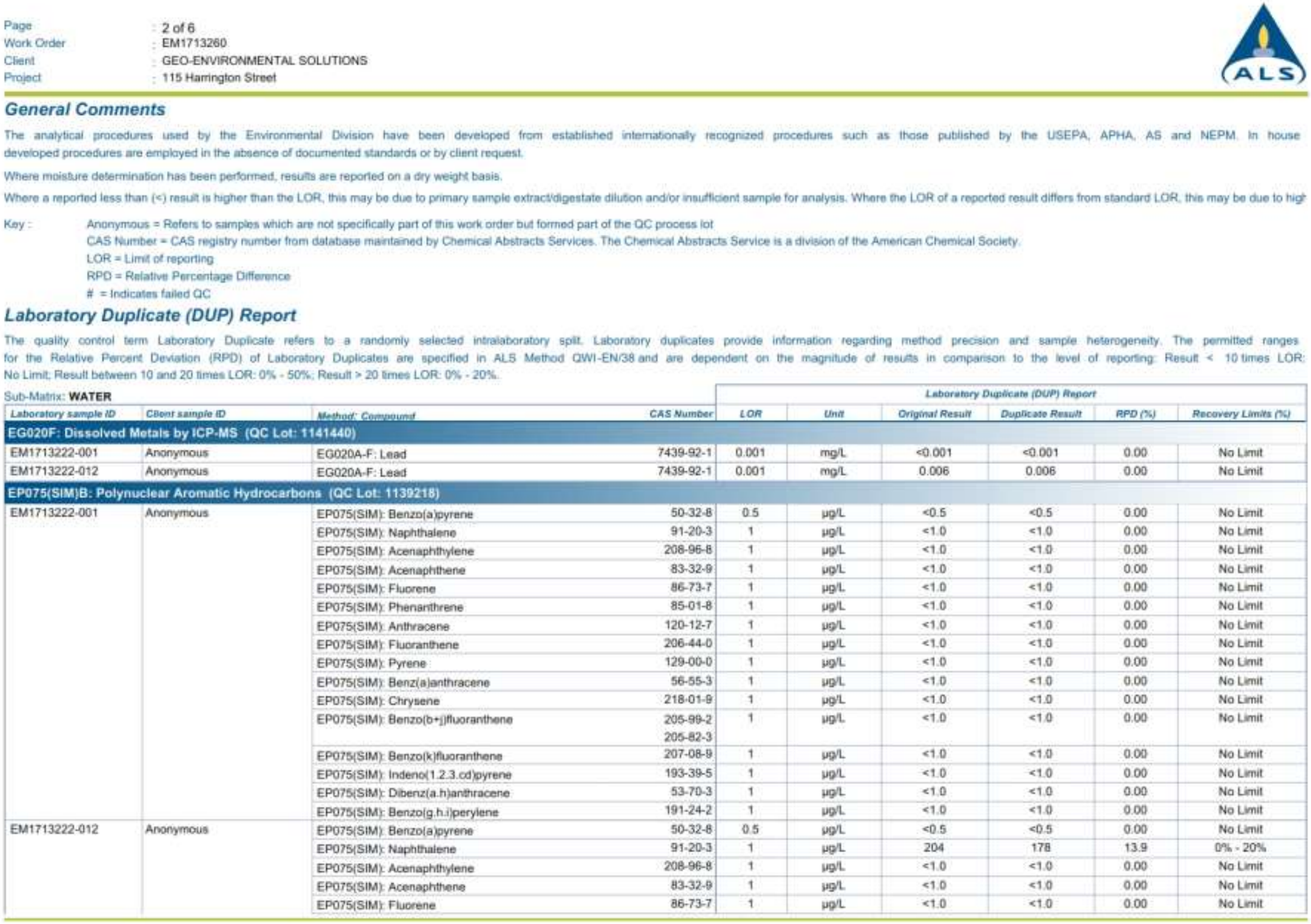
- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

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
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

RIGHT SOLUTIONS | RIGHT PARTNER



Page : 2 of 6
Work Order : EM1713260
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 115 Harrington Street

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 hig

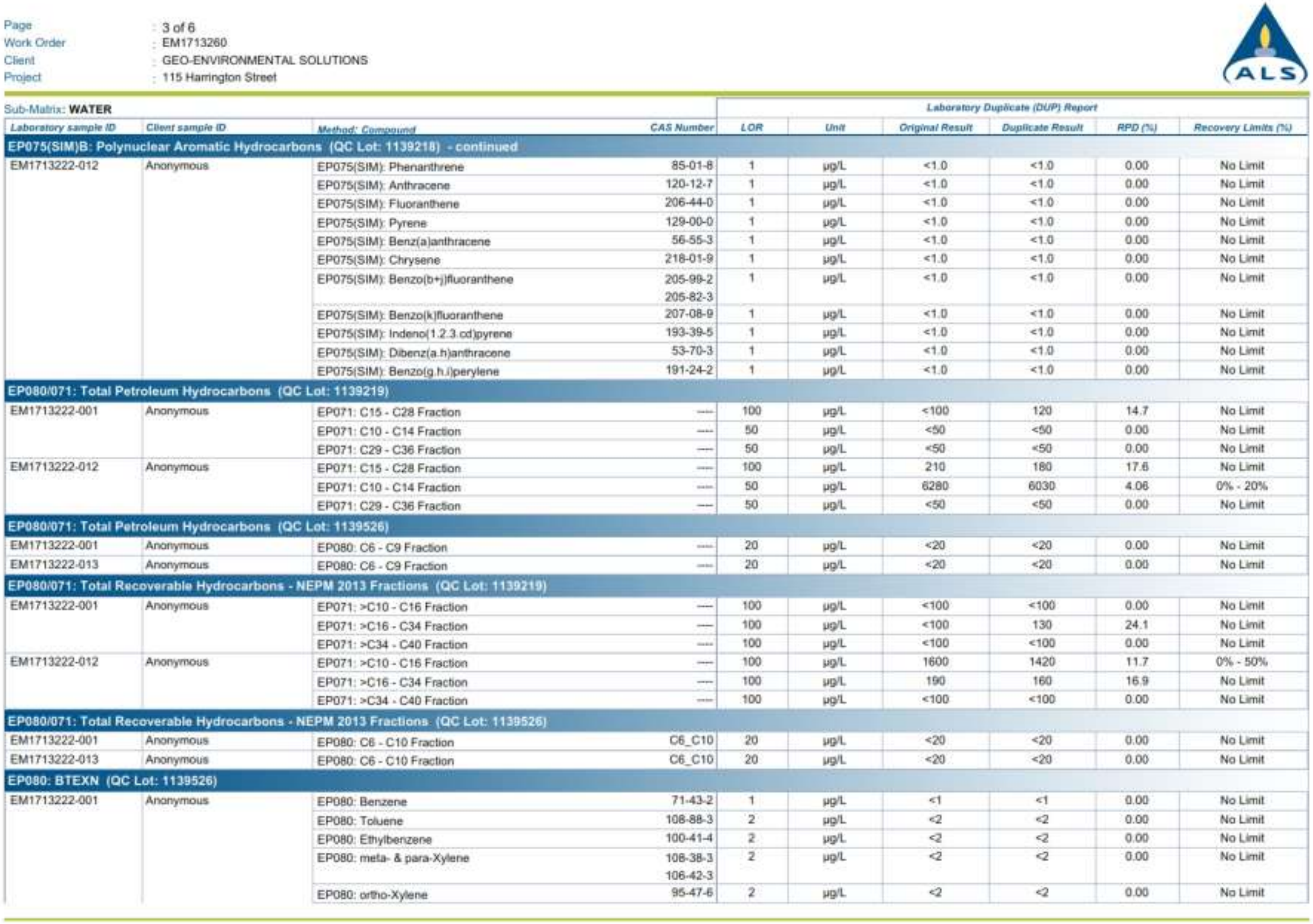
Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit 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: 1141440)									
EM1713222-001	Anonymous	EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
EM1713222-012	Anonymous	EG020A-F: Lead	7439-92-1	0.001	mg/L	0.006	0.006	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1139218)									
EM1713222-001	Anonymous	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	<1.0	0.00	No Limit
EM1713222-012	Anonymous	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Naphthalene	91-20-3	1	µg/L	204	178	13.9	0% - 20%
		EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	<1.0	0.00	No Limit



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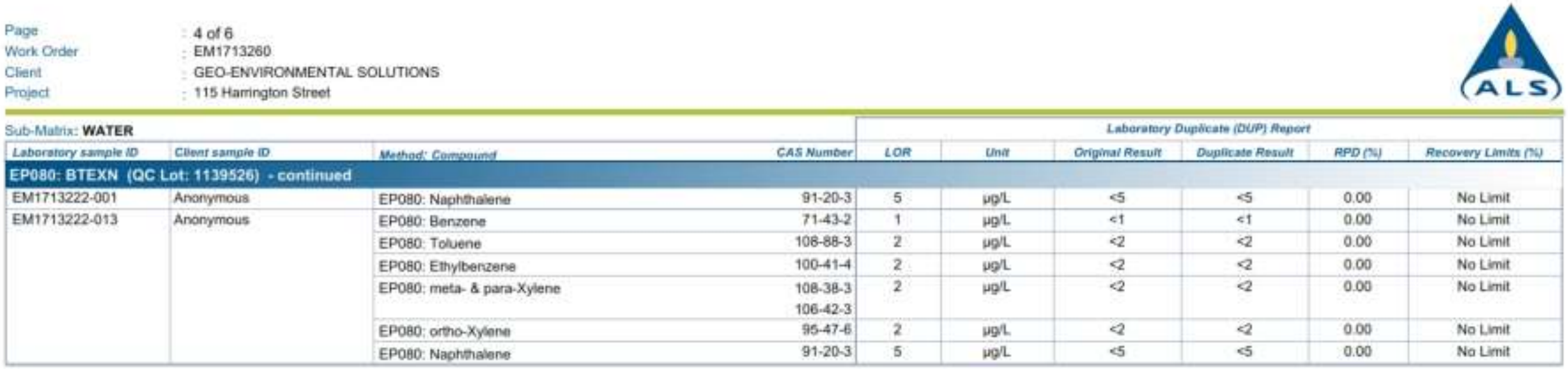
Work Order	: EM1713260
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 115 Harrington Street

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 (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1139218) - continued									
EM1713222-012	Anonymous	EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	<1.0	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1139219)									
EM1713222-001	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	<100	120	14.7	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EM1713222-012	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	210	180	17.6	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	6280	6030	4.06	0% - 20%
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1139526)									
EM1713222-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EM1713222-013	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1139219)									
EM1713222-001	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	130	24.1	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EM1713222-012	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	1600	1420	11.7	0% - 50%
		EP071: >C16 - C34 Fraction	----	100	µg/L	190	160	16.9	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1139526)									
EM1713222-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EM1713222-013	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1139526)									
EM1713222-001	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



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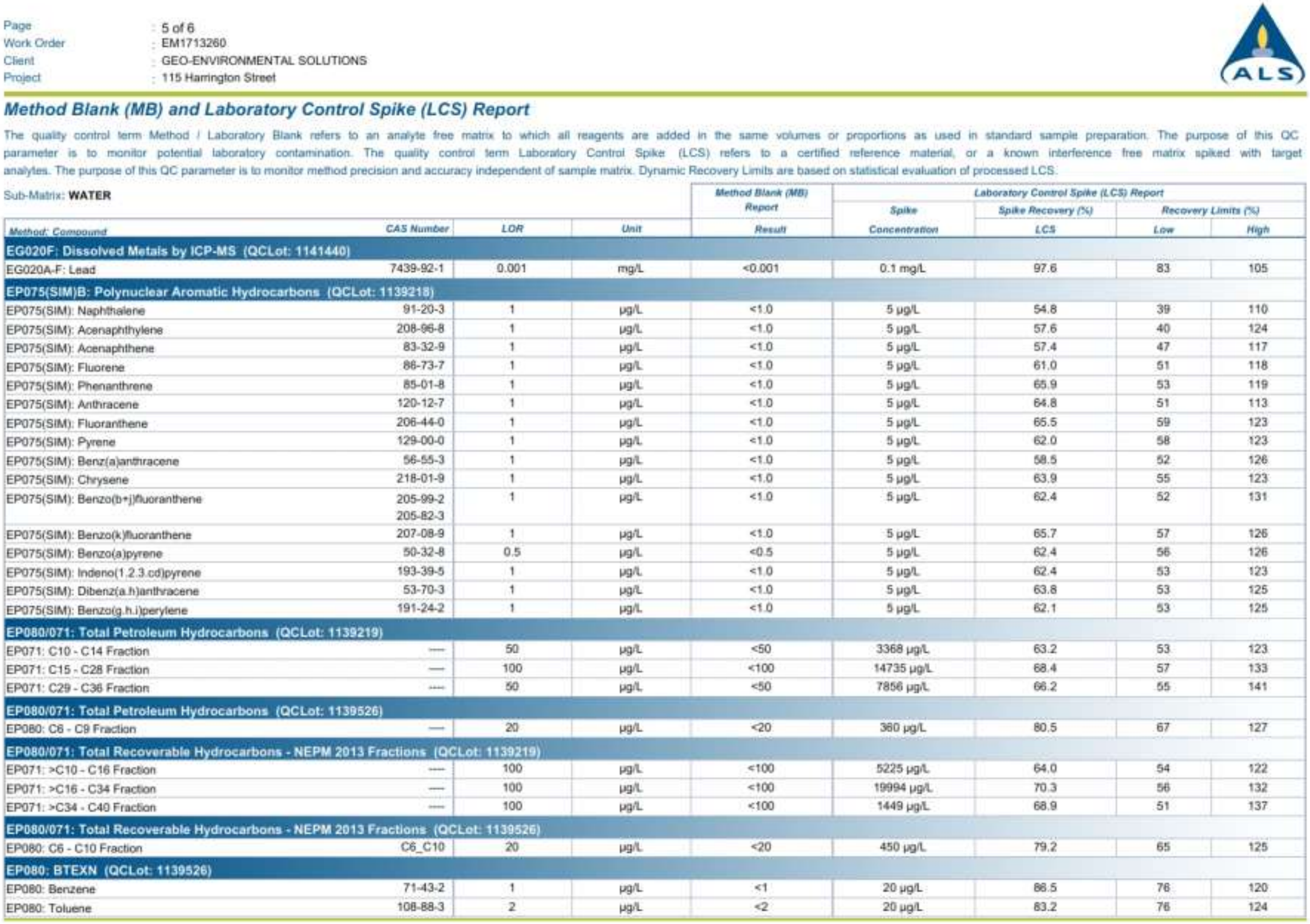
Work Order : EM1713260
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 115 Harrington Street

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: 1139526) - continued									
EM1713222-001	Anonymous	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EM1713222-013	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



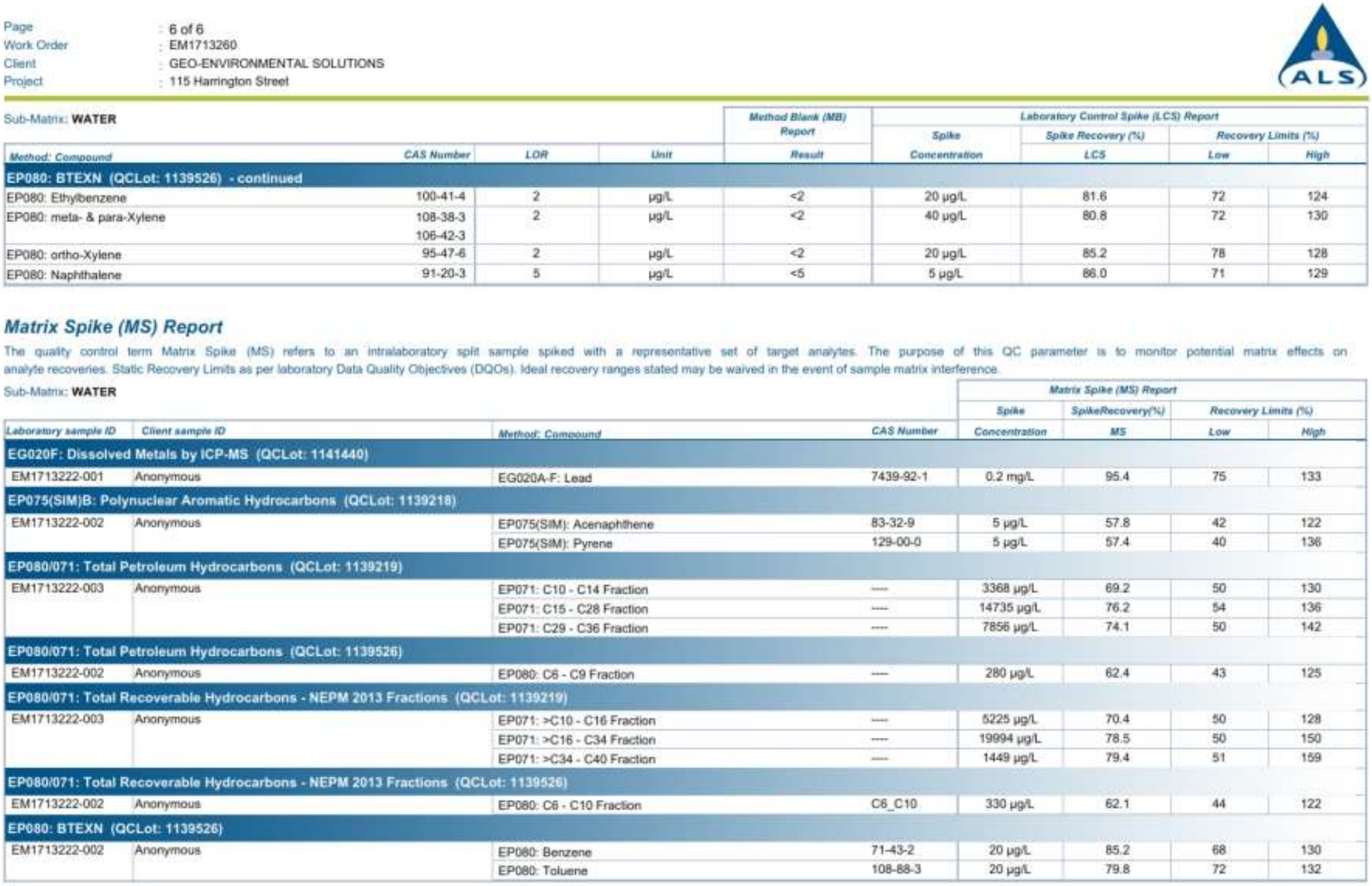
Page : 5 of 6
Work Order : EM1713260
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 115 Harrington Street

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: 1141440)								
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	97.6	83	105
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1139218)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	54.8	39	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	57.6	40	124
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	57.4	47	117
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	61.0	51	118
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	65.9	53	119
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	64.8	51	113
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	65.5	59	123
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	62.0	58	123
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	58.5	52	126
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	63.9	55	123
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	62.4	52	131
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	65.7	57	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	62.4	56	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	62.4	53	123
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	63.8	53	125
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	62.1	53	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1139219)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	3368 µg/L	63.2	53	123
EP071: C15 - C28 Fraction	----	100	µg/L	<100	14735 µg/L	68.4	57	133
EP071: C29 - C36 Fraction	----	50	µg/L	<50	7856 µg/L	66.2	55	141
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1139526)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	80.5	67	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1139219)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	5225 µg/L	64.0	54	122
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	19994 µg/L	70.3	56	132
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1449 µg/L	68.9	51	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1139526)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	79.2	65	125
EP080: BTEXN (QCLot: 1139526)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	86.5	76	120
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	83.2	76	124



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*	*High*
EP080: BTEXN (QCLot: 1139526) - continued								
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	81.6	72	124
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	80.8	72	130
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	85.2	78	128
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	86.0	71	129

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*	*High*
EG020F: Dissolved Metals by ICP-MS (QCLot: 1141440)							
EM1713222-001	Anonymous	EG020A-F: Lead	7439-92-1	0.2 mg/L	95.4	75	133
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1139218)							
EM1713222-002	Anonymous	EP075(SIM): Acenaphthene	83-32-9	5 µg/L	57.8	42	122
		EP075(SIM): Pyrene	129-00-0	5 µg/L	57.4	40	136
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1139219)							
EM1713222-003	Anonymous	EP071: C10 - C14 Fraction	----	3368 µg/L	69.2	50	130
		EP071: C15 - C28 Fraction	----	14735 µg/L	76.2	54	136
		EP071: C29 - C36 Fraction	----	7856 µg/L	74.1	50	142
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1139526)							
EM1713222-002	Anonymous	EP080: C6 - C9 Fraction	----	280 µg/L	62.4	43	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1139219)							
EM1713222-003	Anonymous	EP071: >C10 - C16 Fraction	----	5225 µg/L	70.4	50	128
		EP071: >C16 - C34 Fraction	----	19994 µg/L	78.5	50	150
		EP071: >C34 - C40 Fraction	----	1449 µg/L	79.4	51	159
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1139526)							
EM1713222-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	62.1	44	122
EP080: BTEXN (QCLot: 1139526)							
EM1713222-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	85.2	68	130
		EP080: Toluene	108-88-3	20 µg/L	79.8	72	132

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM1713260**	Page	: 1 of 4
Client	: **GEO-ENVIRONMENTAL SOLUTIONS**	Laboratory	: Environmental Division Melbourne
Contact	: S JOYCE	Telephone	: +61-3-8549 9630
Project	: 115 Harrington Street	Date Samples Received	: 27-Sep-2017
Site	: ----	Issue Date	: 03-Oct-2017
Sampler	: ----	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 : EM1713260
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : 115 Harrington Street

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*			*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) CC6	**26-Sep-2017**	----	----	----	**28-Sep-2017**	25-Mar-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) CC6	**26-Sep-2017**	**27-Sep-2017**	03-Oct-2017	✓	**02-Oct-2017**	06-Nov-2017	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) CC6	**26-Sep-2017**	**27-Sep-2017**	03-Oct-2017	✓	**02-Oct-2017**	06-Nov-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) CC6	**26-Sep-2017**	**27-Sep-2017**	10-Oct-2017	✓	**28-Sep-2017**	10-Oct-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) CC6	**26-Sep-2017**	**27-Sep-2017**	03-Oct-2017	✓	**02-Oct-2017**	06-Nov-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) CC6	**26-Sep-2017**	**27-Sep-2017**	10-Oct-2017	✓	**28-Sep-2017**	10-Oct-2017	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) CC6	**26-Sep-2017**	**27-Sep-2017**	10-Oct-2017	✓	**28-Sep-2017**	10-Oct-2017	✓

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Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: 115 Harrington Street

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 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)	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	20	**10.00**	**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 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	15	**6.67**	**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	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
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	15	**6.67**	**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	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
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	15	**6.67**	**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	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Appendix 7 Soil Bore Logs

GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 215-217 Harrington Street

CLIENT: Chau Nominees Pty Ltd

Log of BH01

EASTING: 526057.7 GDA94

NORTHING: 5252470.7 GDA94

LOCATION: Hobart

DATE: 31/10/2017

ELEVATION: 29.8 m AHD

CONTRACTOR: Geo-Environmental Solutions

TOTAL DEPTH (m): 3

EQUIPMENT/METHOD: Direct Push Core

SAMPLING: Core

LOGGED BY: G. McDonald

DEPTH (metres)	MATERIAL DESCRIPTION	USCS LITHOLOGY	UNIT	MOISTURE	SAMPLES:				Helath Screening Level Exceedances*							MONITORING WELL	ELEVATION (metres)
					Sample	Grain Class	HSL	Field PID (ppm)	Benzene	Toluene	Ethylbenz.	Xylene	Napthalene	F1	F2		
0.0	FILL - Bitumen			M													
0.1	FILL - Mixed CLAY/GRAVEL: brown/grey, slightly moist to moist, loose, fine to coarse angular gravel, some FCR,	GC	FILL														
0.9	SANDY CLAY: dark grey-brown/olive-brown, moist, firm to stiff, high plasticity	CH	Tcbd														
1.5					BH01 1.5-1.6	SAND*	D		<	<	<	<	<	<	<		
1.7	SANDY CLAY: green, slightly moist, very stiff, low plasticity	CL		SM													
2.5					BH01 2.5-2.6	SAND*	D		<	<	<	<	<	<	<		
2.7					BH01 2.7-2.8	SAND*	D		<	<	<	<	<	<	<		

Geo-Environmental Solutions

* PVI HSL EXCEEDANCE: X: EXCAVATION; < IL; - NL; A: 1-2; B: 2-5; C: 5-20; D: 20-50; E: 50-200; F: 200-500; G: >500

GES
GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 215-217 Harrington Street		**Log of BH02**
CLIENT: Chau Nominees Pty Ltd		EASTING: 526048.6 GDA94 NORTHING: 5252474.8 GDA94
LOCATION: Hobart	DATE: 31/10/2017	ELEVATION: 29.8 m AHD
CONTRACTOR: Geo-Environmental Solutions		TOTAL DEPTH (m): 3
EQUIPMENT/METHOD: Direct Push Core	SAMPLING: Core	LOGGED BY: G. McDonald

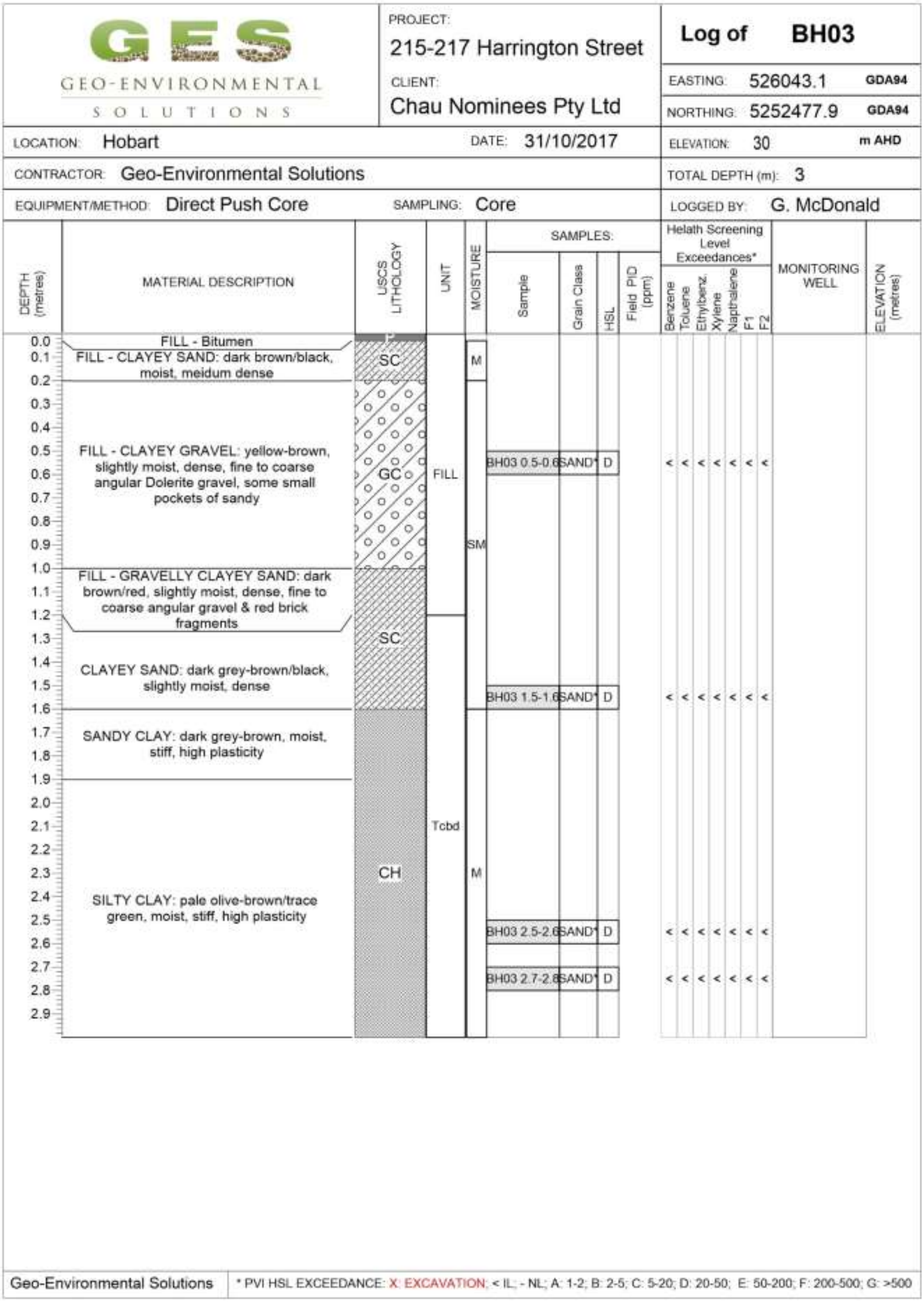
DEPTH (metres)	MATERIAL DESCRIPTION	USCS LITHOLOGY	UNIT	MOISTURE
0.0	FILL - Bitumen		FILL	M
	FILL - Mixed CLAYEY GRAVEL: brown/grey, slightly moist to moist, loose, fine to coarse angular gravel, some FCR,	GC		
1.0	SANDY CLAY: dark grey-brown/olive-brown, moist, firm to stiff, high plasticity	CH	Tcbd	
2.1	SILTY CLAY: pale olive-brown/trace grey, moist, stiff, high plasticity			

SAMPLES: Sample	Grain Class	HSL	Field PID (ppm)	Benzene	Toluene	Ethylbenz.	Xylene	Napthalene	F1	F2	MONITORING WELL	ELEVATION (metres)
BH02 0.7-0.8	SAND*	D		<	<	<	<	<	<	<		
BH02 1.5-1.6	SAND*	D		<	<	<	<	<	<	<		
BH02 2.5-2.6	SAND*	D		<	<	-	-	<	-	<		
BH02 2.7-2.8	SAND*	D		<	<	-	-	-	-	-		

Helath Screening Level Exceedances*

Geo-Environmental Solutions

* PVI HSL EXCEEDANCE: X: EXCAVATION; < IL; - NL; A: 1-2; B: 2-5; C: 5-20; D: 20-50; E: 50-200; F: 200-500; G: >500



GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 215-217 Harrington Street
CLIENT: Chau Nominees Pty Ltd

Log of BH03

EASTING: 526043.1 GDA94
NORTHING: 5252477.9 GDA94

LOCATION: Hobart
DATE: 31/10/2017
ELEVATION: 30 m AHD
CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 3
EQUIPMENT/METHOD: Direct Push Core
SAMPLING: Core
LOGGED BY: G. McDonald

DEPTH (metres)	MATERIAL DESCRIPTION	USCS LITHOLOGY	UNIT	MOISTURE	SAMPLES: Sample	SAMPLES: Grain Class	SAMPLES: HSL	SAMPLES: Field PID (ppm)	Benzene	Toluene	Ethylbenz.	Xylene	Napthalene	F1	F2	MONITORING WELL	ELEVATION (metres)
0.0	FILL - Bitumen		FILL														
0.1	FILL - CLAYEY SAND: dark brown/black, moist, meidum dense	SC		M													
0.2	FILL - CLAYEY GRAVEL: yellow-brown, slightly moist, dense, fine to coarse angular Dolerite gravel, some small pockets of sandy	GC		SM													
0.5					BH03 0.5-0.6	SAND*	D		<	<	<	<	<	<	<		
1.0	FILL - GRAVELLY CLAYEY SAND: dark brown/red, slightly moist, dense, fine to coarse angular gravel & red brick fragments																
1.2			Tcbd														
1.3	CLAYEY SAND: dark grey-brown/black, slightly moist, dense	SC															
1.5					BH03 1.5-1.6	SAND*	D		<	<	<	<	<	<	<		
1.6	SANDY CLAY: dark grey-brown, moist, stiff, high plasticity			M													
1.9	SILTY CLAY: pale olive-brown/trace green, moist, stiff, high plasticity	CH															
2.5					BH03 2.5-2.6	SAND*	D		<	<	<	<	<	<	<		
2.7					BH03 2.7-2.8	SAND*	D		<	<	<	<	<	<	<		

Helath Screening Level Exceedances*

Geo-Environmental Solutions

* PVI HSL EXCEEDANCE: X: EXCAVATION; < IL; - NL; A: 1-2; B: 2-5; C: 5-20; D: 20-50; E: 50-200; F: 200-500; G: >500

GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 215-217 Harrington Street
CLIENT: Chau Nominees Pty Ltd

Log of BH04

EASTING: 526038 GDA94
NORTHING: 5252472.5 GDA94
LOCATION: Hobart
DATE: 31/10/2017
ELEVATION: 30.3 m AHD
CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 3
EQUIPMENT/METHOD: Direct Push Core
SAMPLING: Core
LOGGED BY: G. McDonald

DEPTH (metres): 0.0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 2.0, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9

MATERIAL DESCRIPTION	USCS LITHOLOGY	UNIT	MOISTURE
FILL - Bitumen		FILL	
FILL - Mixed CLAY/GRAVEL: brown/grey, slightly moist to moist, loose, fine to coarse angular Dolerite gravel	GC		SM
FILL - SANDY GRAVEL: grey, dry, very dense, fine to coarse angular Dolerite gravel	GW		D
FILL - GRAVELLY CLAY: brown/grey, moist, stiff, medium plasticity, fine to coarse angular Dolerite gravel	CI		M
CLAYEY SAND: dark grey-brown/black, slightly moist, dense	SC	Tcbd	SM
SANDY CLAY: dark grey-brown, moist, stiff, high plasticity	CH		M
SILTY CLAY: pale olive-brown/trace green, moist, stiff, high plasticity			

SAMPLES: Sample	Grain Class	HSL	Field PID (ppm)	Benzene	Toluene	Ethylbenz.	Xylene	Napthalene	F1	F2	MONITORING WELL	ELEVATION (metres)
BH04 0.5-0.6	SAND*	D		<	<	<	<	<	<	<		
BH04 1.5-1.6	SAND*	D		<	<	<	<	<	<	<		
BH04 2.5-2.6	SAND*	D		<	<	<	<	<	<	<		
BH04 2.9-3.0	SAND*	D		<	<	<	<	<	<	–		

Helath Screening Level Exceedances*

Geo-Environmental Solutions

* PVI HSL EXCEEDANCE: X: EXCAVATION; < IL; - NL; A: 1-2; B: 2-5; C: 5-20; D: 20-50; E: 50-200; F: 200-500; G: >500

GES
GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 215-217 Harrington Street

CLIENT: Chau Nominees Pty Ltd

Log of BH05

EASTING: 526023.8 GDA94
NORTHING: 5252460.9 GDA94

LOCATION: Hobart
DATE: 31/10/2017
ELEVATION: 31.5 m AHD
CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 4
EQUIPMENT/METHOD: Direct Push Core
SAMPLING: Core
LOGGED BY: G. McDonald

DEPTH (metres)	MATERIAL DESCRIPTION	USCS LITHOLOGY	UNIT	MOISTURE	SAMPLES:				Helath Screening Level Exceedances*							MONITORING WELL	ELEVATION (metres)
					Sample	Grain Class	HSL	Field PID (ppm)	Benzene	Toluene	Ethylbenz.	Xylene	Napthalene	F1	F2		
0.0	FILL - Bitumen	P															
0.1																	
0.2																	
0.3	FILL - GRAVELLY CLAYEY SAND: dark brown/black, slightly moist, dense																
0.4																	
0.5			FILL		BH05 0.5-0.6	SAND*	D		<	<	<	<	<	<	<		
0.6																	
0.7		SC		SM													
0.8	FILL - CLAYEY SAND: dark brown/black, slightly moist, dense, some red brick fragments																
0.9																	
1.0																	
1.1																	
1.2	CLAYEY SAND: dark grey-brown/black, slightly moist, dense																
1.3																	
1.4																	
1.5					BH05 1.5-1.6	SAND*	D		<	<	<	<	<	<	<		
1.6																	
1.7																	
1.8																	
1.9	SANDY CLAY: dark grey-brown, moist, stiff, high plasticity																
2.0																	
2.1																	
2.2																	
2.3																	
2.4																	
2.5			Tcbd		BH05 2.5-2.6	SAND*	D		<	<	<	<	<	<	<		
2.6		CH		M													
2.7																	
2.8																	
2.9																	
3.0																	
3.1																	
3.2	SILTY CLAY: pale olive-brown/trace green, moist, stiff, high plasticity																
3.3																	
3.4																	
3.5																	
3.6					BH05 3.6-3.7	CLAY*	D		<	<	<	<	<	<	<		
3.7																	
3.8																	
3.9																	

Geo-Environmental Solutions

* PVI HSL EXCEEDANCE: X: EXCAVATION; < IL; - NL; A: 1-2; B: 2-5; C: 5-20; D: 20-50; E: 50-200; F: 200-500; G: >500

GES
GEO-ENVIRONMENTAL
SOLUTIONS

PROJECT: 215-217 Harrington Street

CLIENT: Chau Nominees Pty Ltd

Log of BH05

EASTING: 526023.8 GDA94

NORTHING: 5252460.9 GDA94

LOCATION: Hobart

DATE: 31/10/2017

ELEVATION: 31.5 m AHD

CONTRACTOR: Geo-Environmental Solutions

TOTAL DEPTH (m): 4

EQUIPMENT/METHOD: Direct Push Core

SAMPLING: Core

LOGGED BY: G. McDonald

DEPTH (metres)	MATERIAL DESCRIPTION	USCS LITHOLOGY	UNIT	MOISTURE	SAMPLES:				Helath Screening Level Exceedances*	MONITORING WELL	ELEVATION (metres)
					Sample	Grain Class	HSL	Field PID (ppm)	Benzene Toluene Ethylbenz. Xylene Napthalene F1 F2		

Geo-Environmental Solutions

* PVI HSL EXCEEDANCE: X: EXCAVATION; < IL; - NL; A: 1-2; B: 2-5; C: 5-20; D: 20-50; E: 50-200; F: 200-500; G: >500

GES
GEO-ENVIRONMENTAL
SOLUTIONS

PROJECT: 215-217 Harrington Street
CLIENT: Chau Nominees Pty Ltd

Log of BH06

EASTING: 526050 GDA94
NORTHING: 5252462.5 GDA94
LOCATION: Hobart
DATE: 31/10/2017
ELEVATION: 30.3 m AHD
CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 2.5
EQUIPMENT/METHOD: Direct Push Core
SAMPLING: Core
LOGGED BY: G. McDonald

DEPTH (metres)	MATERIAL DESCRIPTION	USCS LITHOLOGY	UNIT	MOISTURE
0.0	FILL - Bitumen	P		
0.1–0.5	FILL - GRAVELLY CLAYEY SAND: dark brown/black, slightly moist, dense	SC	FILL	SM
0.5–0.8	SANDY CLAY: pale olive-brown, slightly moist, very stiff, high plasticity	CH	Tcbd	
0.8–1.2	SILTY SANDY CLAY: pale brown, slightly moist, very stiff, high plasticity			
1.2–2.5	SILTY SANDY CLAY: pale brown, slightly moist, very stiff, medium plasticity. Refusal	CI		

Sample	Grain Class	HSL	Field PID (ppm)	Benzene	Toluene	Ethylbenz.	Xylene	Napthalene	F1	F2	MONITORING WELL	ELEVATION (metres)
BH06 0.5-0.6	SAND*	D		<	<	<	<	<	<	<		
BH06 1.5-1.6	SAND*	D		<	<	<	<	<	<	<		
BH06 2.4-2.5	SAND*	D		<	<	<	<	<	<	<		

SAMPLES: Helath Screening Level Exceedances*

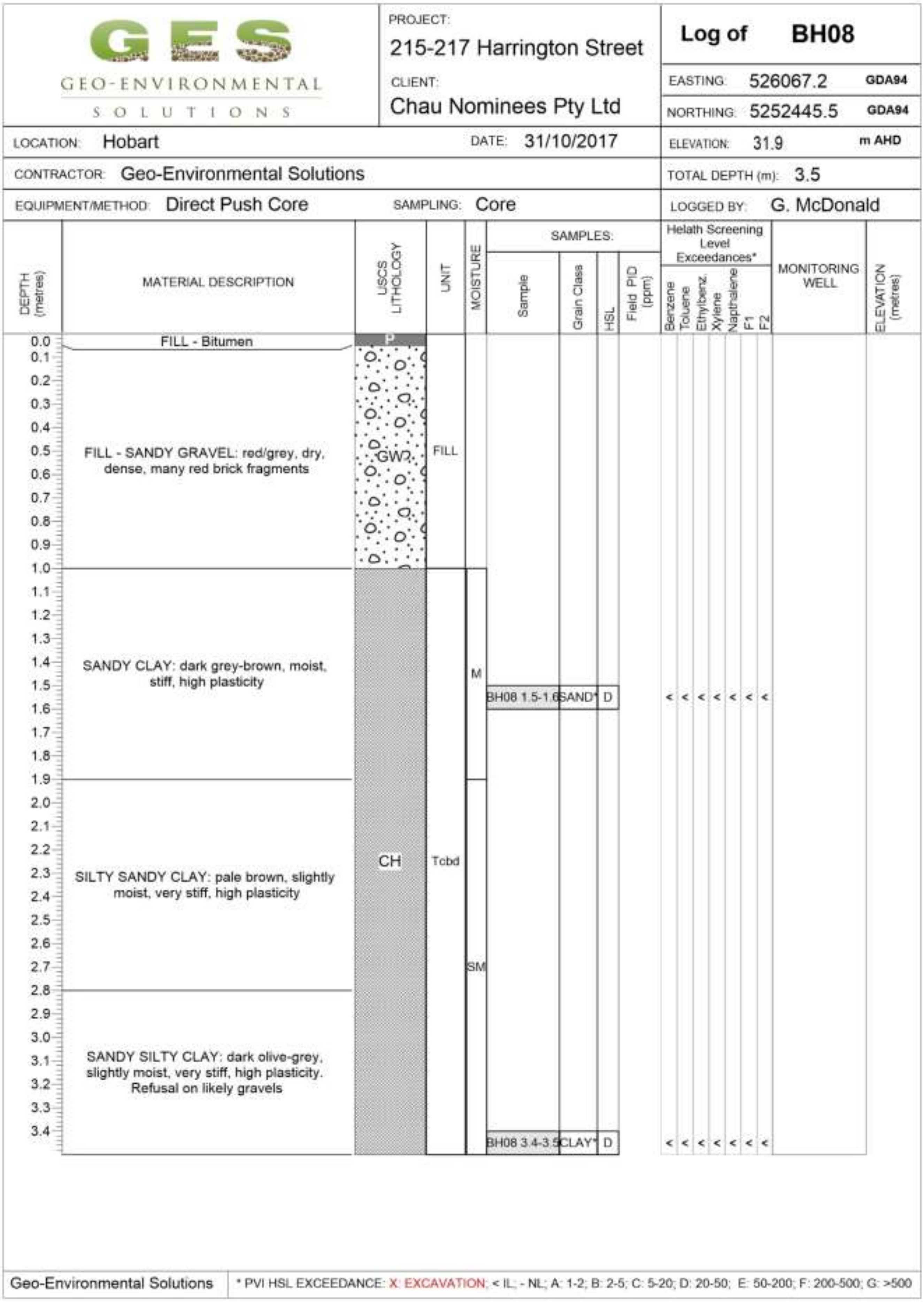
Geo-Environmental Solutions | * PVI HSL EXCEEDANCE: X: EXCAVATION; < IL; - NL; A: 1-2; B: 2-5; C: 5-20; D: 20-50; E: 50-200; F: 200-500; G: >500

GES
GEO-ENVIRONMENTAL SOLUTIONS

PROJECT:	215-217 Harrington Street	**Log of**	**BH07**
CLIENT:	Chau Nominees Pty Ltd	EASTING:	526034.5 **GDA94**
		NORTHING:	5252453.1 **GDA94**
LOCATION:	Hobart DATE: 31/10/2017	ELEVATION:	31.5 **m AHD**
CONTRACTOR:	Geo-Environmental Solutions	TOTAL DEPTH (m):	2.8
EQUIPMENT/METHOD:	Direct Push Core SAMPLING: Core	LOGGED BY:	G. McDonald

DEPTH (metres)	MATERIAL DESCRIPTION	USCS LITHOLOGY	UNIT	MOISTURE	SAMPLES: Sample	SAMPLES: Grain Class	SAMPLES: HSL	SAMPLES: Field PID (ppm)	Helath Screening Level Exceedances*: Benzene	Toluene	Ethylbenz.	Xylene	Napthalene	F1	F2	MONITORING WELL	ELEVATION (metres)
0.0	FILL - Bitumen	P															
0.1	FILL - GRAVELLY CLAYEY SAND: olive-brown, slightly moist, dense	SC	FILL														
0.3	FILL - SAND: pale yellow-brown, slightly moist to dry, loose	SW															
0.5					BH07 0.5-0.6	SAND*	D		<	<	<	<	<	<	<		
0.7	SANDY CLAY: pale olive-brown, slightly moist, very stiff, high plasticity	CH	Tcbd	SM													
1.4	SILTY SANDY CLAY: pale brown, slightly moist, very stiff, high plasticity																
1.5					BH07 1.5-1.6	SAND*	D		<	<	<	<	<	<	<		
2.0	SANDY SILTY CLAY: dark olive-grey, slightly moist, very stiff, high plasticity. Refusal on likely gravels																
2.5					BH07 2.5-2.6	CLAY*	D		<	<	<	<	<	<	<		
2.7																	

Geo-Environmental Solutions | * PVI HSL EXCEEDANCE: X: EXCAVATION; < IL; - NL; A: 1-2; B: 2-5; C: 5-20; D: 20-50; E: 50-200; F: 200-500; G: >500



GEO-ENVIRONMENTAL SOLUTIONS

PROJECT: 215-217 Harrington Street

CLIENT: Chau Nominees Pty Ltd

Log of BH08

EASTING: 526067.2 GDA94

NORTHING: 5252445.5 GDA94

LOCATION: Hobart

DATE: 31/10/2017

ELEVATION: 31.9 m AHD

CONTRACTOR: Geo-Environmental Solutions

TOTAL DEPTH (m): 3.5

EQUIPMENT/METHOD: Direct Push Core

SAMPLING: Core

LOGGED BY: G. McDonald

DEPTH (metres)	MATERIAL DESCRIPTION	USCS LITHOLOGY	UNIT	MOISTURE	SAMPLES: Sample	SAMPLES: Grain Class	SAMPLES: HSL	SAMPLES: Field PID (ppm)	Helath Screening Level Exceedances*: Benzene	Toluene	Ethylbenz.	Xylene	Napthalene	F1	F2	MONITORING WELL	ELEVATION (metres)
0.0	FILL - Bitumen	P															
0.1–1.0	FILL - SANDY GRAVEL: red/grey, dry, dense, many red brick fragments	GW?	FILL														
1.0–1.9	SANDY CLAY: dark grey-brown, moist, stiff, high plasticity	CH	Tcbd	M	BH08 1.5-1.6	SAND*	D		<	<	<	<	<	<	<		
1.9–2.8	SILTY SANDY CLAY: pale brown, slightly moist, very stiff, high plasticity			SM													
2.8–3.5	SANDY SILTY CLAY: dark olive-grey, slightly moist, very stiff, high plasticity. Refusal on likely gravels				BH08 3.4-3.5	CLAY*	D		<	<	<	<	<	<	<		

Geo-Environmental Solutions

* PVI HSL EXCEEDANCE: X: EXCAVATION; < IL; - NL; A: 1-2; B: 2-5; C: 5-20; D: 20-50; E: 50-200; F: 200-500; G: >500

GES
GEO-ENVIRONMENTAL
SOLUTIONS

PROJECT: 215-217 Harrington Street
CLIENT: Chau Nominees Pty Ltd

Log of BH09

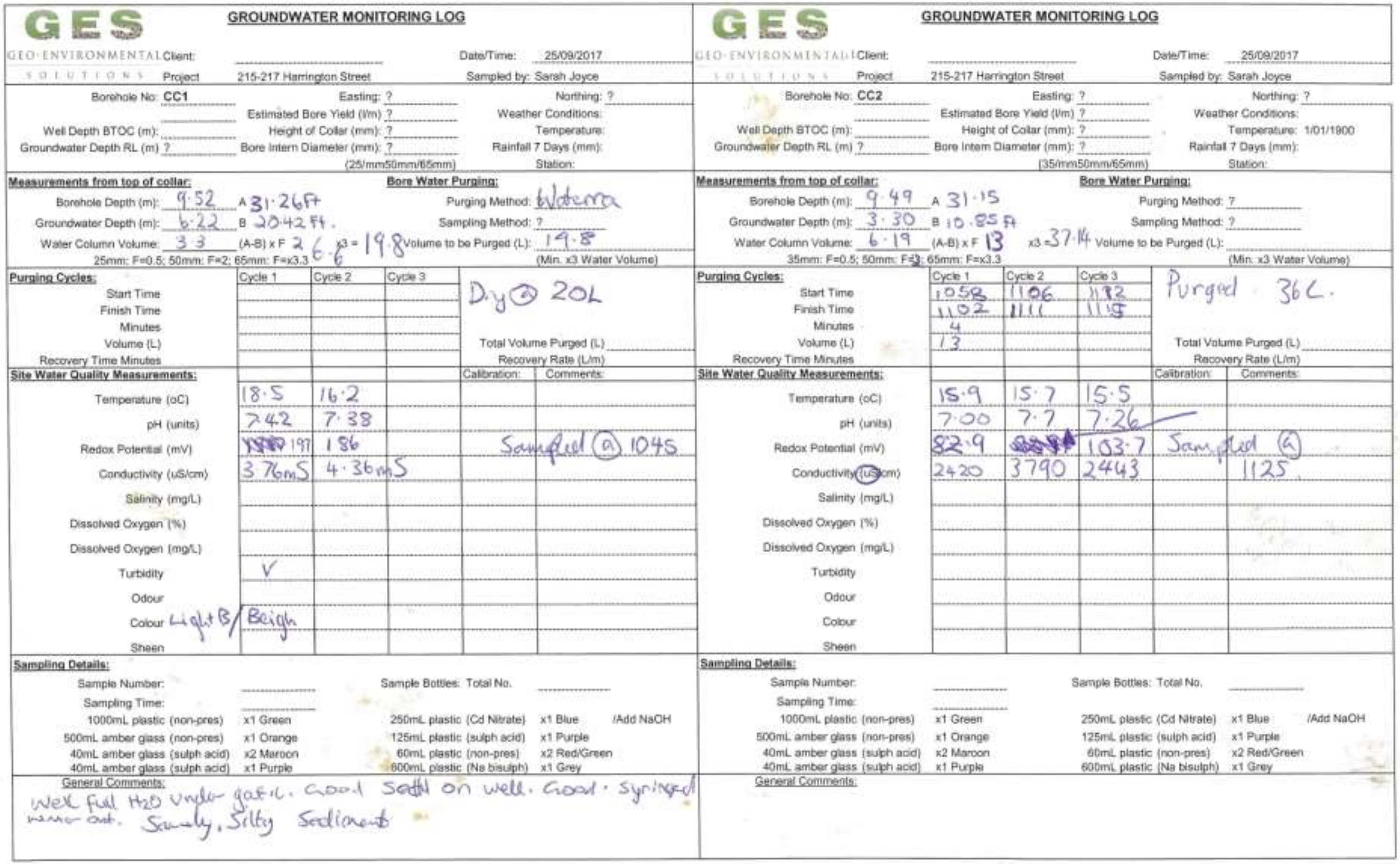
EASTING: 526044 GDA94
NORTHING: 5252469.1 GDA94
LOCATION: Hobart
DATE: 31/10/2017
ELEVATION: 30.3 m AHD
CONTRACTOR: Geo-Environmental Solutions
TOTAL DEPTH (m): 3
EQUIPMENT/METHOD: Direct Push Core
SAMPLING: Core
LOGGED BY: G. McDonald

DEPTH (metres)	MATERIAL DESCRIPTION	USCS LITHOLOGY	UNIT	MOISTURE	SAMPLES: Sample	Grain Class	HSL	Field PID (ppm)	Helath Screening Level Exceedances*: Benzene	Toluene	Ethylbenz.	Xylene	Napthalene	F1	F2	MONITORING WELL	ELEVATION (metres)
0.0	FILL - Bitumen	P	FILL														
0.1 0.2	FILL - GRAVEL: grey/yellow-brown, slighty moist to dry, dense	GW															
0.3 0.4 0.5 0.6	FILL - SAND: pale yellow-brown, slightly moist to dry, loose	SW		SM	BH09 0.5-0.6	SAND	D		<	<	<	<	<	<	<		
0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5	FILL - SANDY CLAY: dark grey, moist, stiff, high plasticity	CH		M	BH09 1.5-1.6	SAND	D		<	<	<	<	<	<	<		
1.6 1.7 1.8 1.9	SANDY SILTY CLAY: dark olive-grey, slightly moist, very stiff, high plasticity		Tcbd	SM													
2.0 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9	SANDY SILTY CLAY: pale olive-grey, slightly moist, very stiff, low to medium plasticity. Refusal on likely gravels	CI			BH09 2.5-2.6 BH09 2.9-3.0	SAND SAND	D D		< <	< <	< <	< <	< <	< <	– <		

Geo-Environmental Solutions

* PVI HSL EXCEEDANCE: X: EXCAVATION; < IL; - NL; A: 1-2; B: 2-5; C: 5-20; D: 20-50; E: 50-200; F: 200-500; G: >500

Appendix 8 Groundwater Purge Records



GROUNDWATER MONITORING LOG

GES GEO-ENVIRONMENTAL SOLUTIONS

Client:
Date/Time: 25/09/2017
Project 215-217 Harrington Street
Sampled by: Sarah Joyce

Borehole No: CC1
Easting: ?
Northing: ?
Estimated Bore Yield (l/m) ?
Weather Conditions:
Well Depth BTOC (m):
Height of Collar (mm): ?
Temperature:
Groundwater Depth RL (m) ?
Bore Intern Diameter (mm): ? (25/mm50mm/65mm)
Rainfall 7 Days (mm):
Station:

Measurements from top of collar:

Borehole Depth (m): 9.52 A 31.26Ft
Groundwater Depth (m): 6.22 B 20.42 Ft.
Water Column Volume: 3.3 (A-B) x F 2 6.6 x3 = 19.8
25mm: F=0.5; 50mm: F=2; 65mm: F=x3.3

Bore Water Purging:

Purging Method: Waterra
Sampling Method: ?
Volume to be Purged (L): 19.8 (Min. x3 Water Volume)

Purging Cycles:

	Cycle 1	Cycle 2	Cycle 3
Start Time			
Finish Time			
Minutes			
Volume (L)			
Recovery Time Minutes			

Dry @ 20L

Total Volume Purged (L)
Recovery Rate (L/m)

Site Water Quality Measurements:

				Calibration:	Comments:
Temperature (oC)	18.5	16.2			
pH (units)	7.42	7.38			
Redox Potential (mV)	197	186			Sampled @ 1045
Conductivity (uS/cm)	3.76mS	4.36mS			
Salinity (mg/L)					
Dissolved Oxygen (%)					
Dissolved Oxygen (mg/L)					
Turbidity	V				
Odour					
Colour Light B/	Beigh				
Sheen					

Sampling Details:

Sample Number:
Sampling Time:
Sample Bottles: Total No.

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:
Well full H2O under gatic. Good Seal on well. Good. Syringed water out. Sandy, Silty Sediment

---

GROUNDWATER MONITORING LOG

GES GEO-ENVIRONMENTAL SOLUTIONS

Client:
Date/Time: 25/09/2017
Project 215-217 Harrington Street
Sampled by: Sarah Joyce

Borehole No: CC2
Easting: ?
Northing: ?
Estimated Bore Yield (l/m) ?
Weather Conditions:
Well Depth BTOC (m):
Height of Collar (mm): ?
Temperature: 1/01/1900
Groundwater Depth RL (m) ?
Bore Intern Diameter (mm): ? (35/mm50mm/65mm)
Rainfall 7 Days (mm):
Station:

Measurements from top of collar:

Borehole Depth (m): 9.49 A 31.15
Groundwater Depth (m): 3.30 B 10.85 ft
Water Column Volume: 6.19 (A-B) x F 13 x3 = 37.14
35mm: F=0.5; 50mm: F=3; 65mm: F=x3.3

Bore Water Purging:

Purging Method: ?
Sampling Method: ?
Volume to be Purged (L): (Min. x3 Water Volume)

Purging Cycles:

	Cycle 1	Cycle 2	Cycle 3
Start Time	1058	1106	1112
Finish Time	1102	1111	1115
Minutes	4		
Volume (L)	13		
Recovery Time Minutes			

Purged 36L.

Total Volume Purged (L)
Recovery Rate (L/m)

Site Water Quality Measurements:

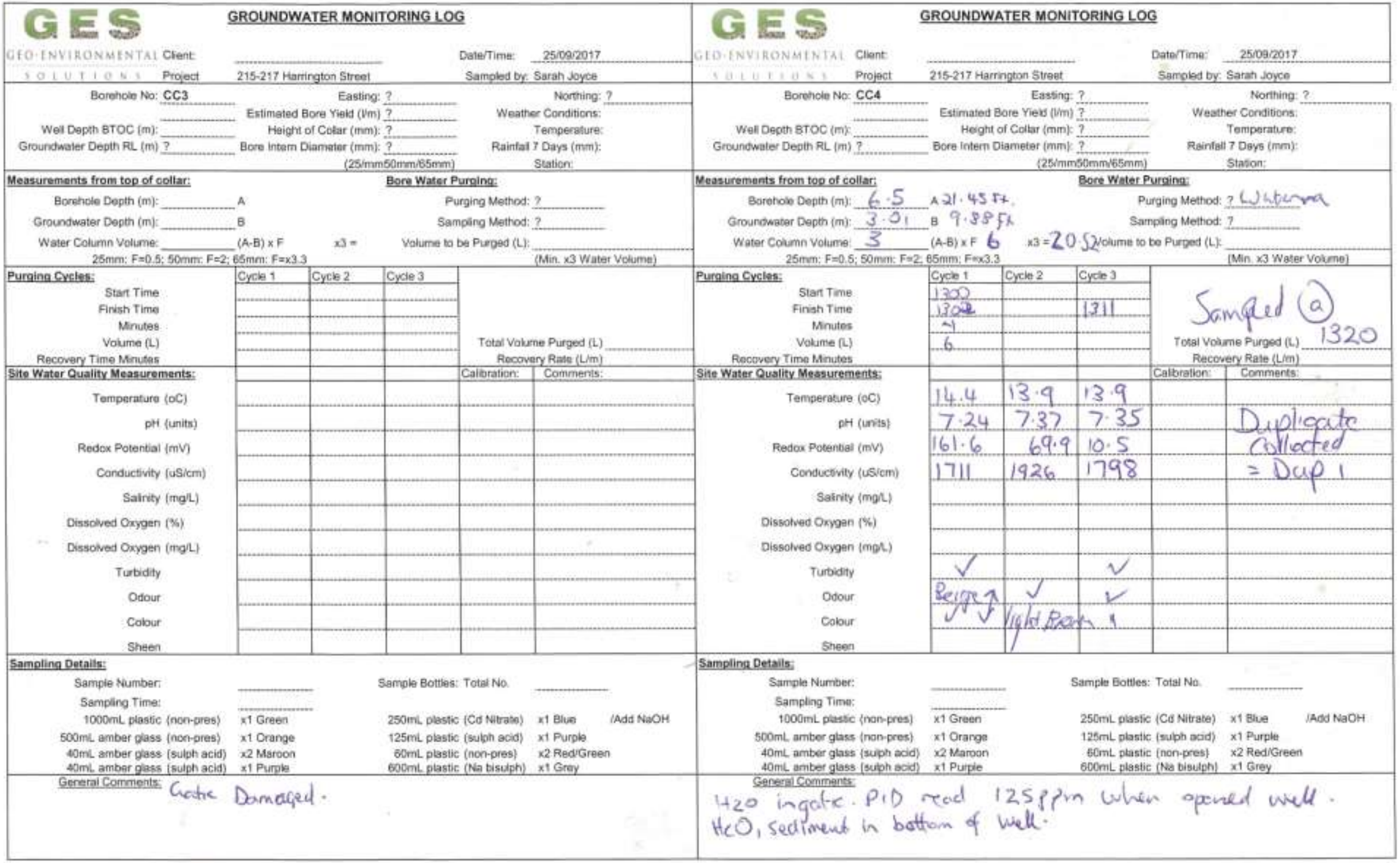
				Calibration:	Comments:
Temperature (oC)	15.9	15.7	15.5		
pH (units)	7.00	7.7	7.26		
Redox Potential (mV)	82.9	[illegible]	103.7		Sampled @
Conductivity [✓ (uS/cm)]	2420	3790	2443		1125.
Salinity (mg/L)					
Dissolved Oxygen (%)					
Dissolved Oxygen (mg/L)					
Turbidity					
Odour					
Colour					
Sheen					

Sampling Details:

Sample Number:
Sampling Time:
Sample Bottles: Total No.

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:



GES GEO-ENVIRONMENTAL SOLUTIONS

GROUNDWATER MONITORING LOG

Client:
Date/Time: 25/09/2017
Project: 215-217 Harrington Street
Sampled by: Sarah Joyce

Borehole No: CC3
Easting: ?
Northing: ?
Estimated Bore Yield (l/m) ?
Weather Conditions:
Well Depth BTOC (m):
Height of Collar (mm): ?
Temperature:
Groundwater Depth RL (m) ?
Bore Intern Diameter (mm): ? (25/mm50mm/65mm)
Rainfall 7 Days (mm):
Station:

Measurements from top of collar:

Borehole Depth (m): A
Groundwater Depth (m): B
Water Column Volume: (A-B) x F x3 =
25mm: F=0.5; 50mm: F=2; 65mm: F=x3.3

Bore Water Purging:

Purging Method: ?
Sampling Method: ?
Volume to be Purged (L): (Min. x3 Water Volume)

Purging Cycles:	Cycle 1	Cycle 2	Cycle 3
Start Time			
Finish Time			
Minutes			
Volume (L)			
Recovery Time Minutes			

Total Volume Purged (L)
Recovery Rate (L/m)

Site Water Quality Measurements:				Calibration:	Comments:
Temperature (oC)					
pH (units)					
Redox Potential (mV)					
Conductivity (uS/cm)					
Salinity (mg/L)					
Dissolved Oxygen (%)					
Dissolved Oxygen (mg/L)					
Turbidity					
Odour					
Colour					
Sheen					

Sampling Details:

Sample Number:
Sampling Time:
Sample Bottles: Total No.

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: Gatic Damaged.

GES GEO-ENVIRONMENTAL SOLUTIONS

GROUNDWATER MONITORING LOG

Client:
Date/Time: 25/09/2017
Project: 215-217 Harrington Street
Sampled by: Sarah Joyce

Borehole No: CC4
Easting: ?
Northing: ?
Estimated Bore Yield (l/m) ?
Weather Conditions:
Well Depth BTOC (m):
Height of Collar (mm): ?
Temperature:
Groundwater Depth RL (m) ?
Bore Intern Diameter (mm): ? (25/mm50mm/65mm)
Rainfall 7 Days (mm):
Station:

Measurements from top of collar:

Borehole Depth (m): 6.5 A 21.45 Ft.
Groundwater Depth (m): 3.01 B 9.88 Ft
Water Column Volume: 3 (A-B) x F 6 x3 = 20.52
25mm: F=0.5; 50mm: F=2; 65mm: F=x3.3

Bore Water Purging:

Purging Method: ? Waterra
Sampling Method: ?
Volume to be Purged (L): (Min. x3 Water Volume)

Purging Cycles:	Cycle 1	Cycle 2	Cycle 3
Start Time	1300		
Finish Time	1304		1311
Minutes	4		
Volume (L)	6		
Recovery Time Minutes			

Sampled @ 1320
Total Volume Purged (L)
Recovery Rate (L/m)

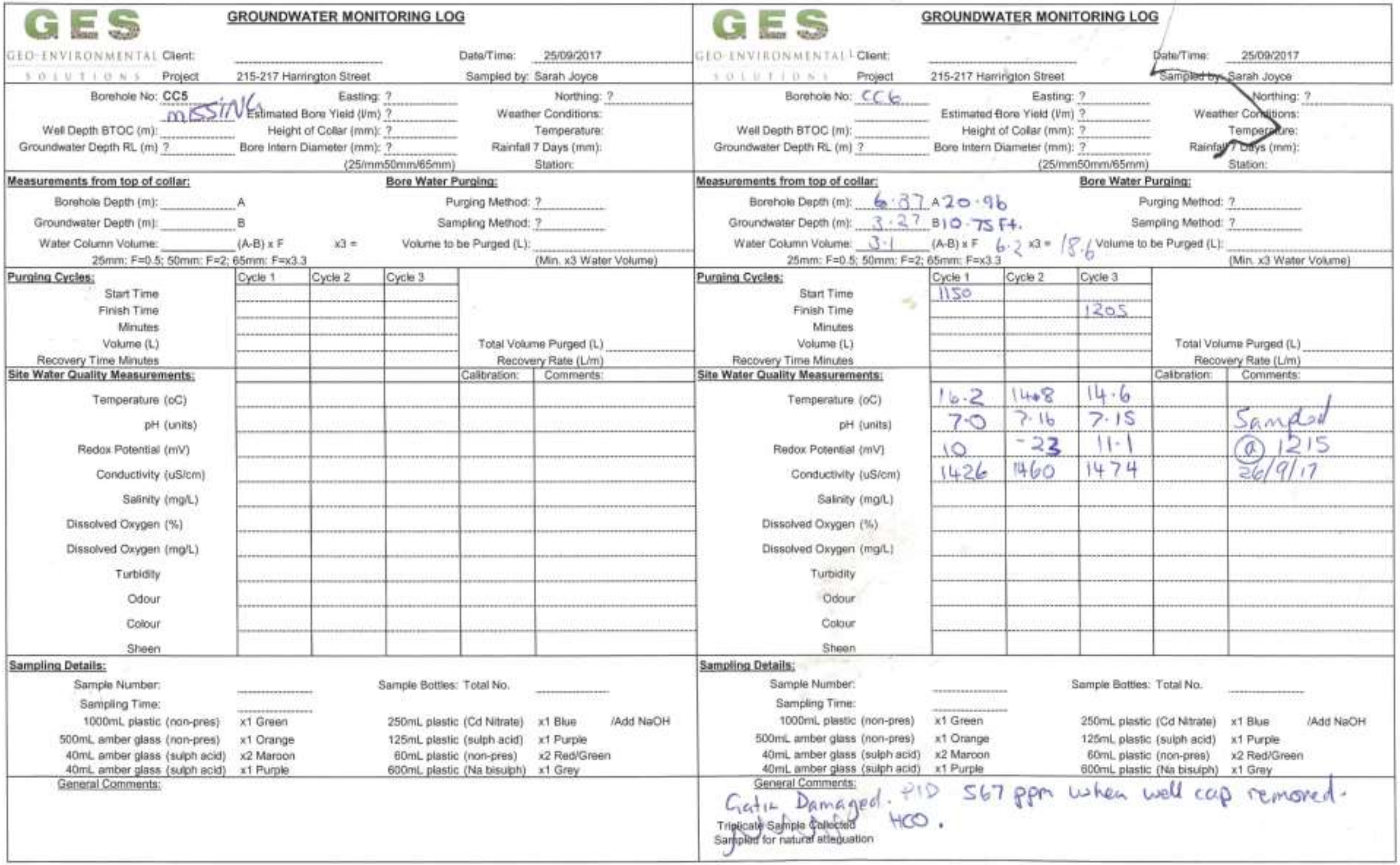
Site Water Quality Measurements:				Calibration:	Comments:
Temperature (oC)	14.4	13.9	13.9		
pH (units)	7.24	7.37	7.35		Duplicate
Redox Potential (mV)	161.6	69.9	10.5		Collected
Conductivity (uS/cm)	1711	1926	1798		= Dup 1
Salinity (mg/L)					
Dissolved Oxygen (%)					
Dissolved Oxygen (mg/L)					
Turbidity	✓		✓		
Odour	Beige	✓	✓		
Colour	✓ ✓	light Brown			
Sheen					

Sampling Details:

Sample Number:
Sampling Time:
Sample Bottles: Total No.

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: H2O in gatic. PID read 125ppm when opened well. H2O, sediment in bottom of well.



GROUNDWATER MONITORING LOG

GES GEO-ENVIRONMENTAL SOLUTIONS

Client:
Date/Time: 25/09/2017
Project: 215-217 Harrington Street
Sampled by: Sarah Joyce

Borehole No: CC5 missing
Easting: ?
Northing: ?
Estimated Bore Yield (l/m): ?
Weather Conditions:
Well Depth BTOC (m):
Height of Collar (mm): ?
Temperature:
Groundwater Depth RL (m): ?
Bore Intern Diameter (mm): ? (25/mm50mm/65mm)
Rainfall 7 Days (mm):
Station:

Measurements from top of collar:

Borehole Depth (m): A
Groundwater Depth (m): B
Water Column Volume: (A-B) x F x3 =
25mm: F=0.5; 50mm: F=2; 65mm: F=x3.3

Bore Water Purging:

Purging Method: ?
Sampling Method: ?
Volume to be Purged (L): (Min. x3 Water Volume)

Purging Cycles:	Cycle 1	Cycle 2	Cycle 3
Start Time			
Finish Time			
Minutes			
Volume (L)			
Recovery Time Minutes			

Total Volume Purged (L)
Recovery Rate (L/m)

Site Water Quality Measurements:				Calibration:	Comments:
Temperature (oC)					
pH (units)					
Redox Potential (mV)					
Conductivity (uS/cm)					
Salinity (mg/L)					
Dissolved Oxygen (%)					
Dissolved Oxygen (mg/L)					
Turbidity					
Odour					
Colour					
Sheen					

Sampling Details:

Sample Number:
Sampling Time:
Sample Bottles: Total No.

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:

GROUNDWATER MONITORING LOG

GES GEO-ENVIRONMENTAL SOLUTIONS

Client:
Date/Time: 25/09/2017
Project: 215-217 Harrington Street
Sampled by: Sarah Joyce

Borehole No: CC6
Easting: ?
Northing: ?
Estimated Bore Yield (l/m): ?
Weather Conditions:
Well Depth BTOC (m):
Height of Collar (mm): ?
Temperature:
Groundwater Depth RL (m): ?
Bore Intern Diameter (mm): ? (25/mm50mm/65mm)
Rainfall 7 Days (mm):
Station:

Measurements from top of collar:

Borehole Depth (m): 6.37 A 20.96
Groundwater Depth (m): 3.27 B 10.75 Ft.
Water Column Volume: 3.1 (A-B) x F 6.2 x3 = 18.6
25mm: F=0.5; 50mm: F=2; 65mm: F=x3.3

Bore Water Purging:

Purging Method: ?
Sampling Method: ?
Volume to be Purged (L): (Min. x3 Water Volume)

Purging Cycles:	Cycle 1	Cycle 2	Cycle 3
Start Time	1150		
Finish Time			1205
Minutes			
Volume (L)			
Recovery Time Minutes			

Total Volume Purged (L)
Recovery Rate (L/m)

Site Water Quality Measurements:				Calibration:	Comments:
Temperature (oC)	16.2	14.8	14.6		
pH (units)	7.0	7.16	7.15		Sampled
Redox Potential (mV)	10	-23	11.1		@ 1215
Conductivity (uS/cm)	1426	1460	1474		26/9/17
Salinity (mg/L)					
Dissolved Oxygen (%)					
Dissolved Oxygen (mg/L)					
Turbidity					
Odour					
Colour					
Sheen					

Sampling Details:

Sample Number:
Sampling Time:
Sample Bottles: Total No.

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:

Gatic Damaged. PID 567 ppm when well cap removed. HCO.

~~Triplicate Sample Collected~~
~~Sampled for natural attenuation~~

Appendix 9 Soil & Groundwater Certificate of Analysis

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM1715132**	Page	: 1 of 27
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	: Harrington Street	Date Samples Received	: 03-Nov-2017 09:50
Order number	: ----	Date Analysis Commenced	: 03-Nov-2017
C-O-C number	: ----	Issue Date	: 09-Nov-2017 12:57
Sampler	: Grant		
Site	: ----		
Quote number	: Blanket quote 2017		
No. of samples received	: 37		
No. of samples analysed	: 32		

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*
Chris Lemaitre	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Eric Chau	Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nancy Wang	Senior Semivolatile Instrument Chemist	Melbourne Organics, Springvale, VIC
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

RIGHT SOLUTIONS | RIGHT PARTNER

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.

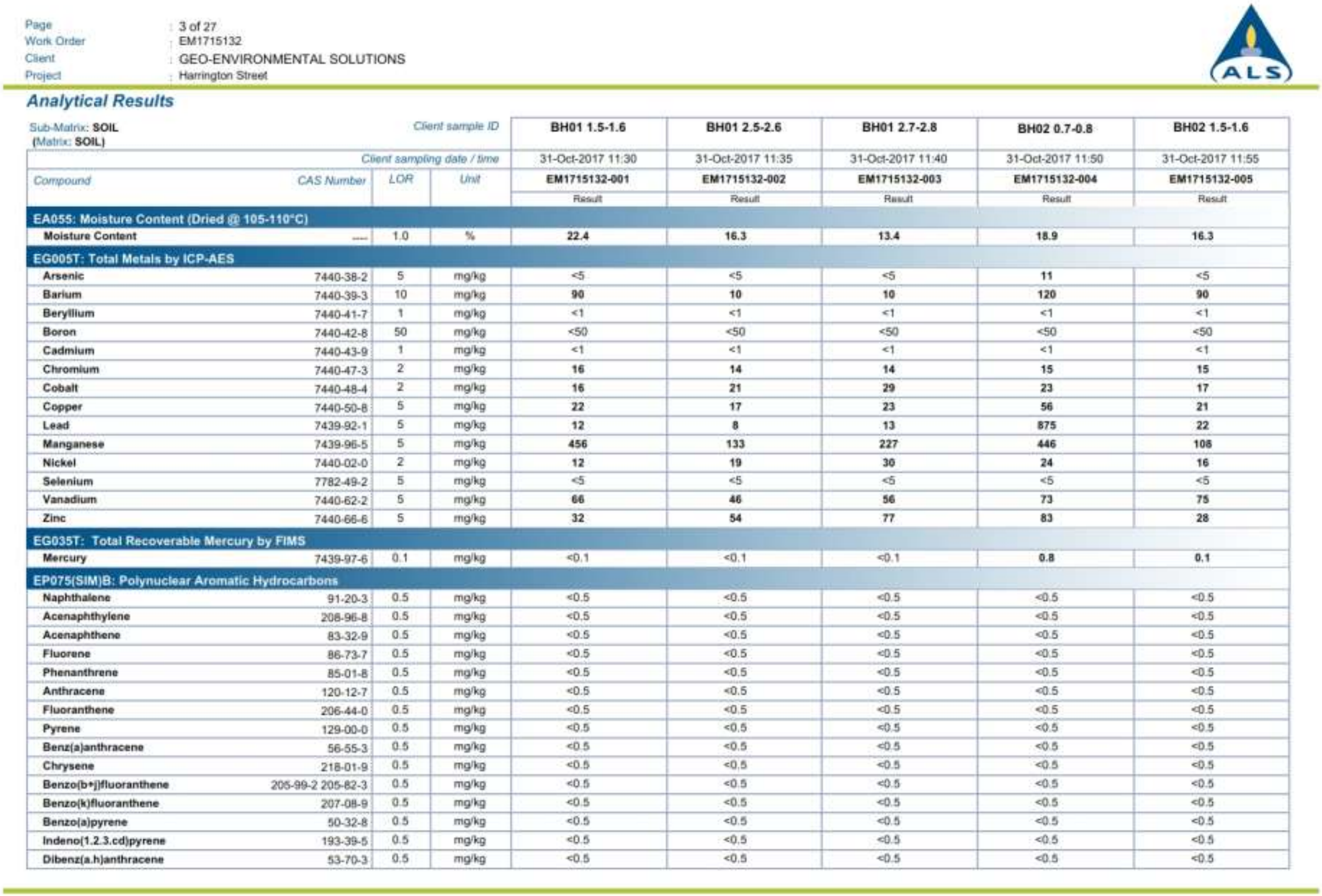
Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

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: EM1715132 #4; Poor duplicate precision for lead due to sample heterogeneity. Confirmed by re-digestion and re-analysis. It's been noticed that repeated results vary greatly. Results obtained were 147mg/kg, 286 mg/kg, 386mg/kg and 875mg/kg.
- EG005T: EM1715132 #4; Poor duplicate precision for lead due to sample heterogeneity. Confirmed by re-digestion and re-analysis. It's been noticed that repeated results vary greatly. Results obtained were 147mg/kg,286 mg/kg, 386mg/kg and 875mg/kg.
- 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.

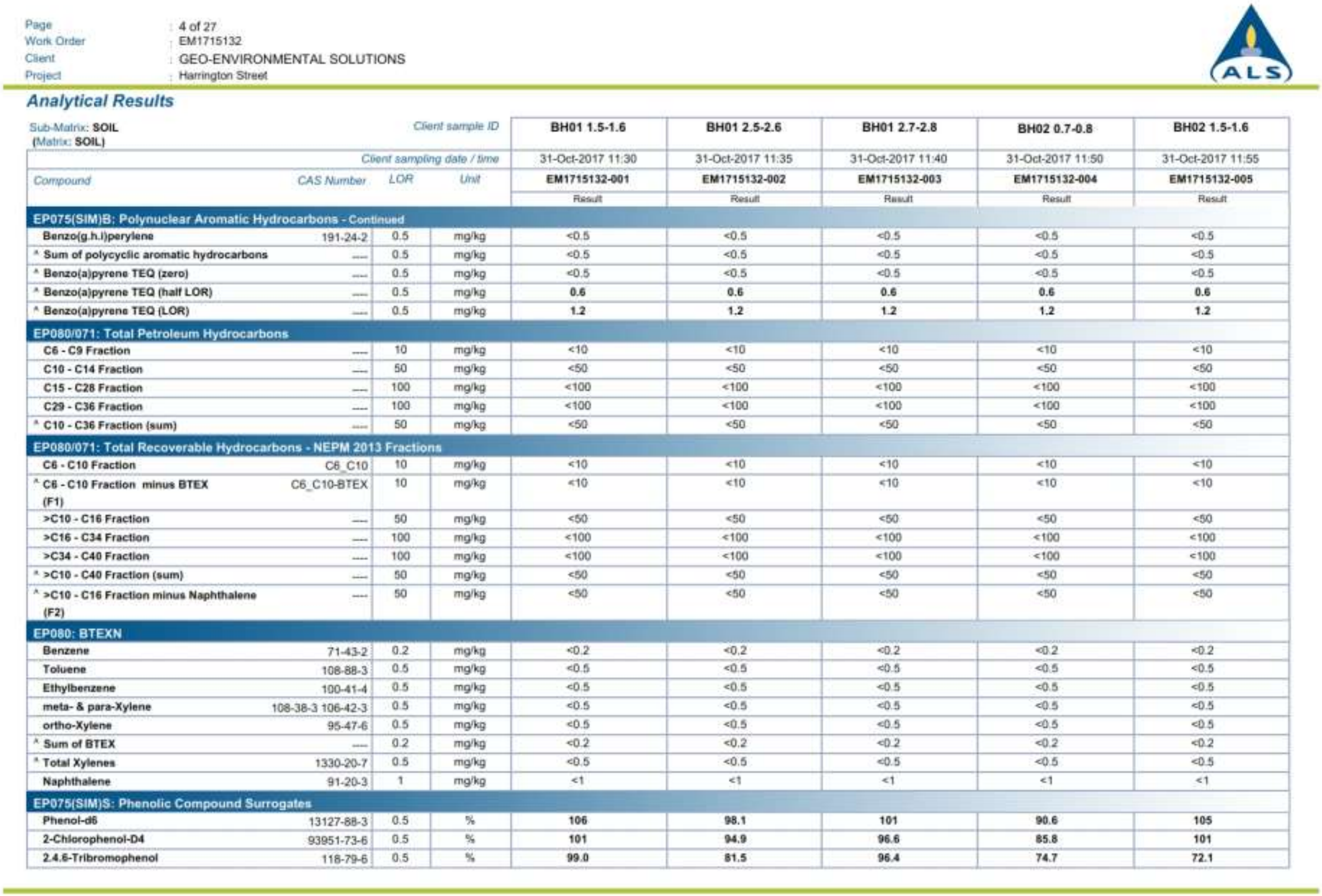


Page : 3 of 27
Work Order : EM1715132
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Harrington Street

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

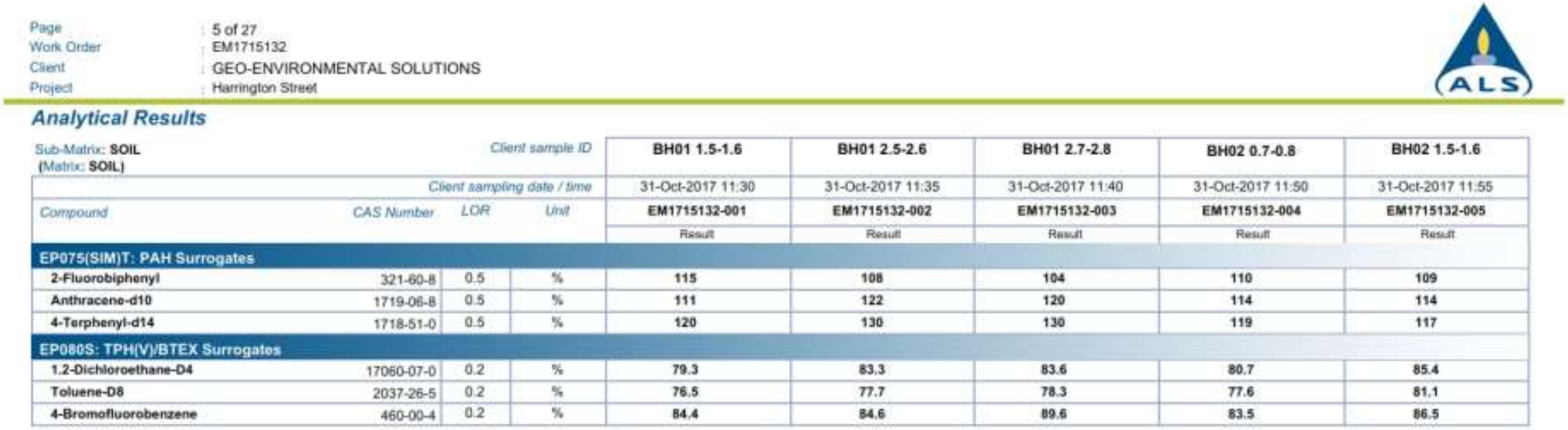
Compound	CAS Number	LOR	Unit	BH01 1.5-1.6	BH01 2.5-2.6	BH01 2.7-2.8	BH02 0.7-0.8	BH02 1.5-1.6
			Client sampling date / time	31-Oct-2017 11:30	31-Oct-2017 11:35	31-Oct-2017 11:40	31-Oct-2017 11:50	31-Oct-2017 11:55
				EM1715132-001	**EM1715132-002**	**EM1715132-003**	**EM1715132-004**	**EM1715132-005**
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**22.4**	**16.3**	**13.4**	**18.9**	**16.3**
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	**11**	<5
Barium	7440-39-3	10	mg/kg	**90**	**10**	**10**	**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	**16**	**14**	**14**	**15**	**15**
Cobalt	7440-48-4	2	mg/kg	**16**	**21**	**29**	**23**	**17**
Copper	7440-50-8	5	mg/kg	**22**	**17**	**23**	**56**	**21**
Lead	7439-92-1	5	mg/kg	**12**	**8**	**13**	**875**	**22**
Manganese	7439-96-5	5	mg/kg	**456**	**133**	**227**	**446**	**108**
Nickel	7440-02-0	2	mg/kg	**12**	**19**	**30**	**24**	**16**
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg	**66**	**46**	**56**	**73**	**75**
Zinc	7440-66-6	5	mg/kg	**32**	**54**	**77**	**83**	**28**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	**0.8**	**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	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<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	<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	<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	<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



Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

			Client sample ID	**BH01 1.5-1.6**	**BH01 2.5-2.6**	**BH01 2.7-2.8**	**BH02 0.7-0.8**	**BH02 1.5-1.6**
			Client sampling date / time	31-Oct-2017 11:30	31-Oct-2017 11:35	31-Oct-2017 11:40	31-Oct-2017 11:50	31-Oct-2017 11:55
Compound	CAS Number	LOR	Unit	**EM1715132-001**	**EM1715132-002**	**EM1715132-003**	**EM1715132-004**	**EM1715132-005**
				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	<0.5	<0.5	<0.5
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**1.2**	**1.2**	**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	<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**	1330-20-7	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	%	**106**	**98.1**	**101**	**90.6**	**105**
2-Chlorophenol-D4	93951-73-6	0.5	%	**101**	**94.9**	**96.6**	**85.8**	**101**
2.4.6-Tribromophenol	118-79-6	0.5	%	**99.0**	**81.5**	**96.4**	**74.7**	**72.1**



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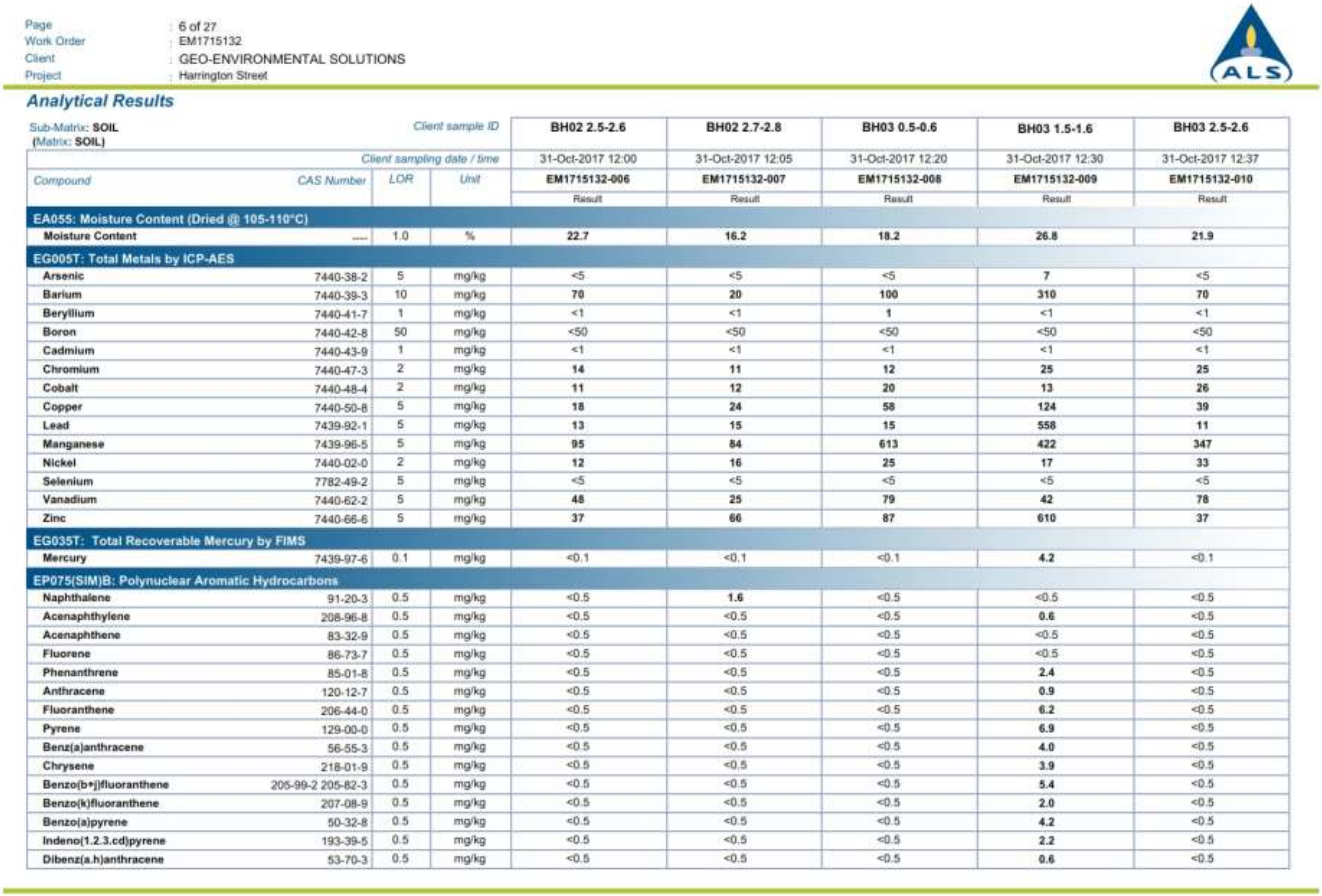
Work Order : EM1715132
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Harrington Street

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**BH01 1.5-1.6**	**BH01 2.5-2.6**	**BH01 2.7-2.8**	**BH02 0.7-0.8**	**BH02 1.5-1.6**
			Client sampling date / time	31-Oct-2017 11:30	31-Oct-2017 11:35	31-Oct-2017 11:40	31-Oct-2017 11:50	31-Oct-2017 11:55
Compound	*CAS Number*	*LOR*	*Unit*	**EM1715132-001**	**EM1715132-002**	**EM1715132-003**	**EM1715132-004**	**EM1715132-005**
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**115**	**108**	**104**	**110**	**109**
Anthracene-d10	1719-06-8	0.5	%	**111**	**122**	**120**	**114**	**114**
4-Terphenyl-d14	1718-51-0	0.5	%	**120**	**130**	**130**	**119**	**117**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**79.3**	**83.3**	**83.6**	**80.7**	**85.4**
Toluene-D8	2037-26-5	0.2	%	**76.5**	**77.7**	**78.3**	**77.6**	**81.1**
4-Bromofluorobenzene	460-00-4	0.2	%	**84.4**	**84.6**	**89.6**	**83.5**	**86.5**



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Work Order : EM1715132
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Harrington Street

Analytical Results

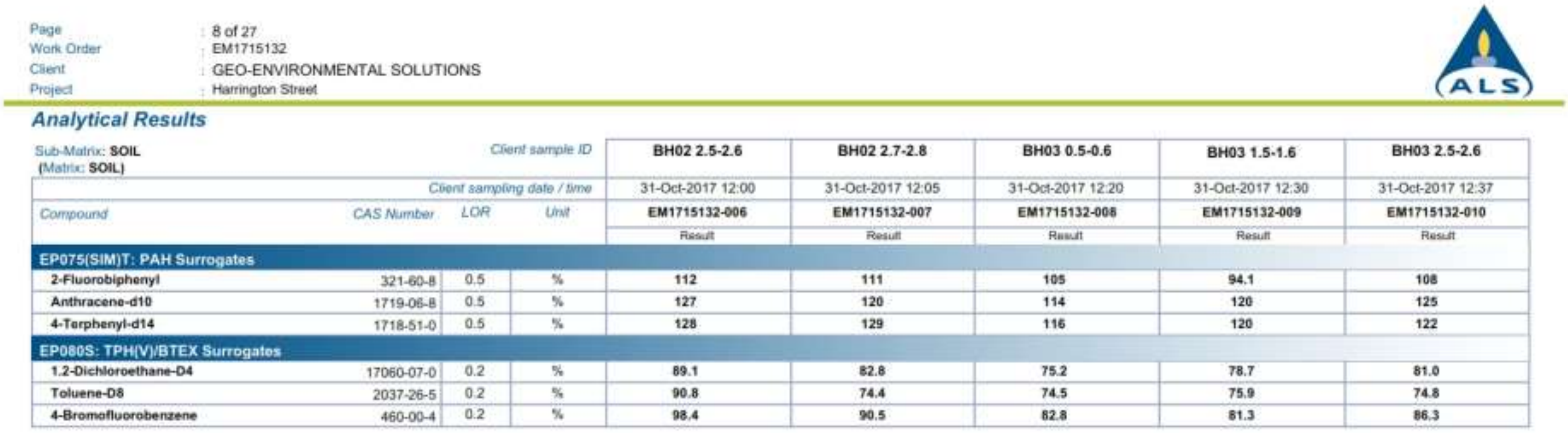
Sub-Matrix: SOIL (Matrix: SOIL)	Client sample ID			BH02 2.5-2.6	BH02 2.7-2.8	BH03 0.5-0.6	BH03 1.5-1.6	BH03 2.5-2.6
	Client sampling date / time			31-Oct-2017 12:00	31-Oct-2017 12:05	31-Oct-2017 12:20	31-Oct-2017 12:30	31-Oct-2017 12:37
Compound	CAS Number	LOR	Unit	EM1715132-006	EM1715132-007	EM1715132-008	EM1715132-009	EM1715132-010
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**22.7**	**16.2**	**18.2**	**26.8**	**21.9**
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	**70**	**20**	**100**	**310**	**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	**14**	**11**	**12**	**25**	**25**
Cobalt	7440-48-4	2	mg/kg	**11**	**12**	**20**	**13**	**26**
Copper	7440-50-8	5	mg/kg	**18**	**24**	**58**	**124**	**39**
Lead	7439-92-1	5	mg/kg	**13**	**15**	**15**	**558**	**11**
Manganese	7439-96-5	5	mg/kg	**95**	**84**	**613**	**422**	**347**
Nickel	7440-02-0	2	mg/kg	**12**	**16**	**25**	**17**	**33**
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg	**48**	**25**	**79**	**42**	**78**
Zinc	7440-66-6	5	mg/kg	**37**	**66**	**87**	**610**	**37**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	**4.2**	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	**1.6**	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	**0.6**	<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	**2.4**	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	**0.9**	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	**6.2**	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	**6.9**	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	**4.0**	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	**3.9**	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	**5.4**	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	**2.0**	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	**4.2**	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	**2.2**	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	**0.6**	<0.5

Work Order : EM1715132
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Harrington Street

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

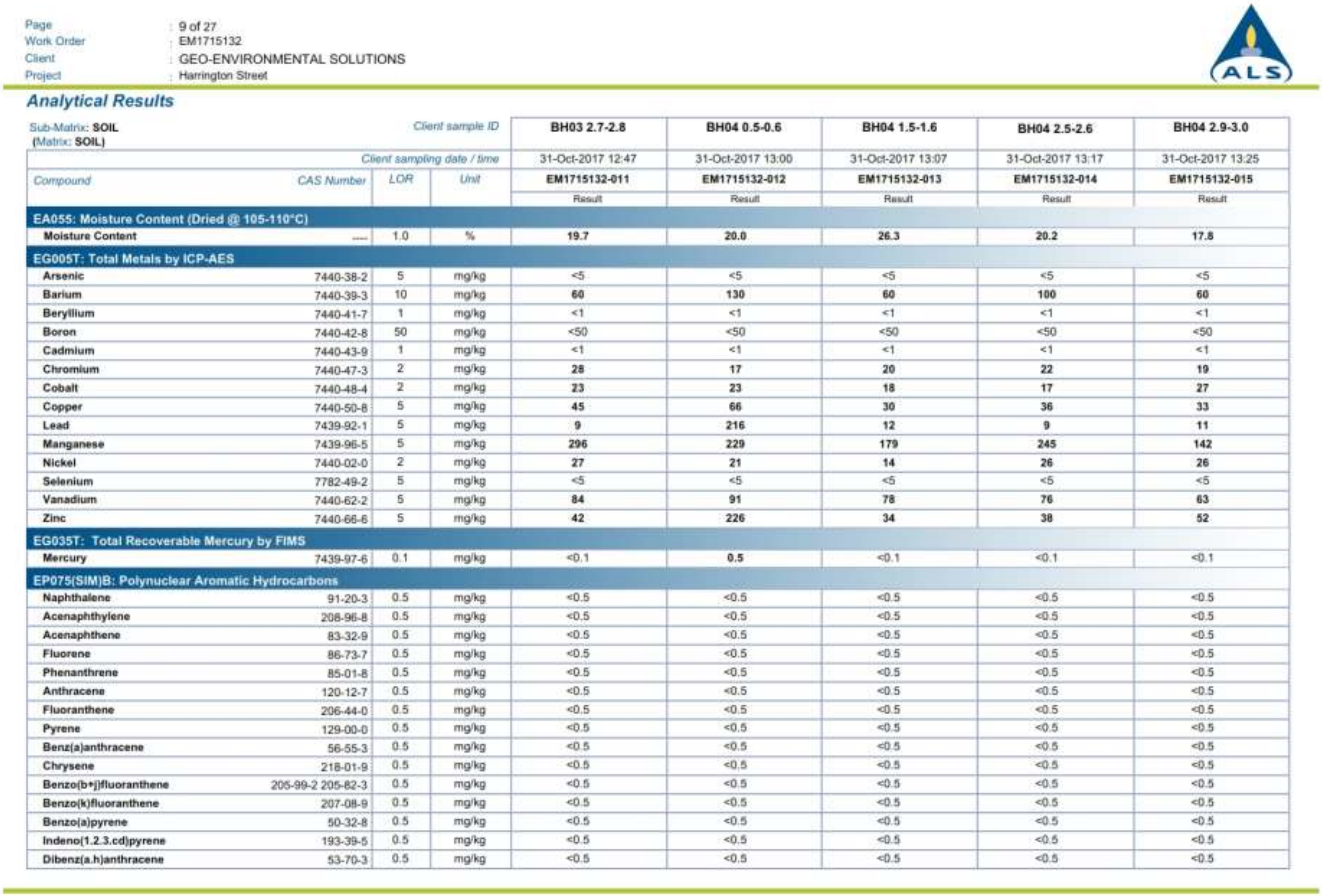
			Client sample ID	BH02 2.5-2.6	BH02 2.7-2.8	BH03 0.5-0.6	BH03 1.5-1.6	BH03 2.5-2.6
			Client sampling date / time	31-Oct-2017 12:00	31-Oct-2017 12:05	31-Oct-2017 12:20	31-Oct-2017 12:30	31-Oct-2017 12:37
Compound	CAS Number	LOR	Unit	EM1715132-006	EM1715132-007	EM1715132-008	EM1715132-009	EM1715132-010
				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	2.8	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	1.6	<0.5	42.1	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	6.2	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	6.2	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	6.2	1.2
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	15	62	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	110	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	220	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	180	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	110	<50	400	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	18	81	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	16	74	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	120	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	350	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	120	<50	350	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	120	<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	1.0	3.1	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	1.4	4.6	<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	2.4	7.7	<0.2	<0.2	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg	1.4	4.6	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	2	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	92.1	106	101	103	104
2-Chlorophenol-D4	93951-73-6	0.5	%	89.1	101	96.7	98.6	99.0
2.4.6-Tribromophenol	118-79-6	0.5	%	76.4	80.5	62.2	81.6	68.8



Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

			Client sample ID	**BH02 2.5-2.6**	**BH02 2.7-2.8**	**BH03 0.5-0.6**	**BH03 1.5-1.6**	**BH03 2.5-2.6**
			Client sampling date / time	31-Oct-2017 12:00	31-Oct-2017 12:05	31-Oct-2017 12:20	31-Oct-2017 12:30	31-Oct-2017 12:37
Compound	CAS Number	LOR	Unit	**EM1715132-006**	**EM1715132-007**	**EM1715132-008**	**EM1715132-009**	**EM1715132-010**
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**112**	**111**	**105**	**94.1**	**108**
Anthracene-d10	1719-06-8	0.5	%	**127**	**120**	**114**	**120**	**125**
4-Terphenyl-d14	1718-51-0	0.5	%	**128**	**129**	**116**	**120**	**122**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**89.1**	**82.8**	**75.2**	**78.7**	**81.0**
Toluene-D8	2037-26-5	0.2	%	**90.8**	**74.4**	**74.5**	**75.9**	**74.8**
4-Bromofluorobenzene	460-00-4	0.2	%	**98.4**	**90.5**	**82.8**	**81.3**	**86.3**



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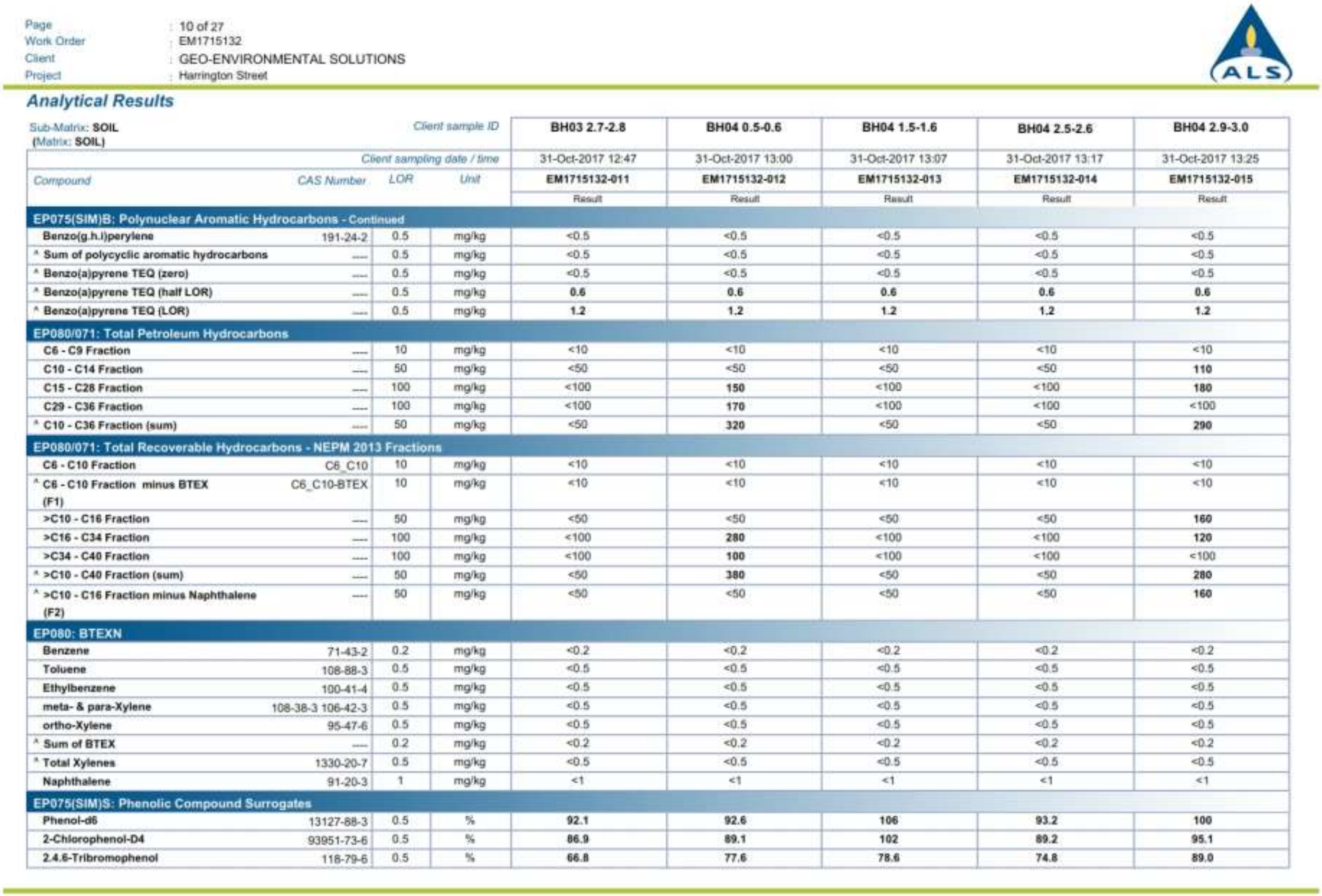
Work Order : EM1715132
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Harrington Street

Analytical Results

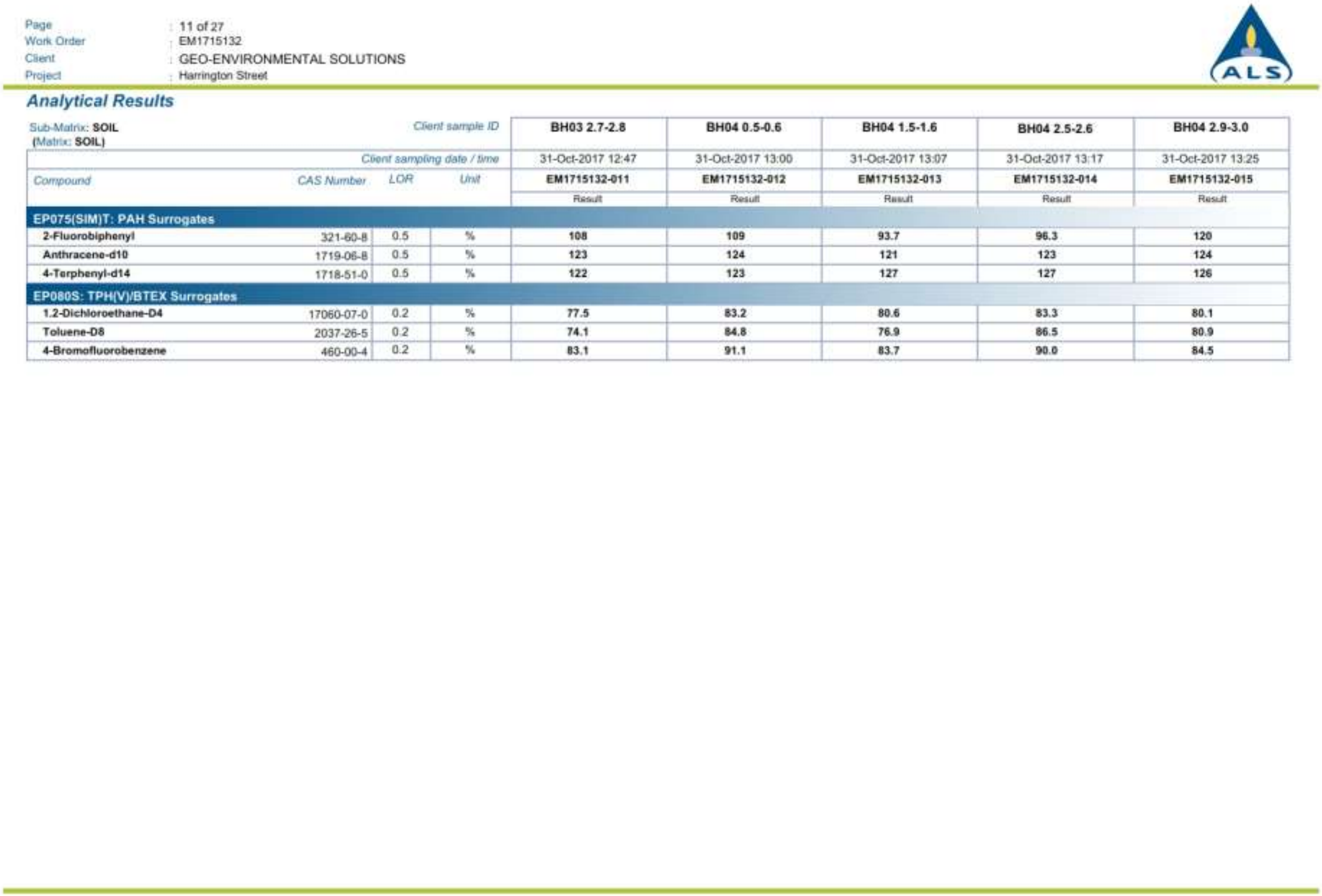
Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	BH03 2.7-2.8	BH04 0.5-0.6	BH04 1.5-1.6	BH04 2.5-2.6	BH04 2.9-3.0
			Client sampling date / time	31-Oct-2017 12:47	31-Oct-2017 13:00	31-Oct-2017 13:07	31-Oct-2017 13:17	31-Oct-2017 13:25
				EM1715132-011	EM1715132-012	EM1715132-013	EM1715132-014	EM1715132-015
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	19.7	20.0	26.3	20.2	17.8
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	60	130	60	100	60
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	28	17	20	22	19
Cobalt	7440-48-4	2	mg/kg	23	23	18	17	27
Copper	7440-50-8	5	mg/kg	45	66	30	36	33
Lead	7439-92-1	5	mg/kg	9	216	12	9	11
Manganese	7439-96-5	5	mg/kg	296	229	179	245	142
Nickel	7440-02-0	2	mg/kg	27	21	14	26	26
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg	84	91	78	76	63
Zinc	7440-66-6	5	mg/kg	42	226	34	38	52
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	0.5	<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	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<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	<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	<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	<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



Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**BH03 2.7-2.8**	**BH04 0.5-0.6**	**BH04 1.5-1.6**	**BH04 2.5-2.6**	**BH04 2.9-3.0**
			Client sampling date / time	31-Oct-2017 12:47	31-Oct-2017 13:00	31-Oct-2017 13:07	31-Oct-2017 13:17	31-Oct-2017 13:25
Compound	CAS Number	LOR	Unit	**EM1715132-011**	**EM1715132-012**	**EM1715132-013**	**EM1715132-014**	**EM1715132-015**
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**1.2**	**1.2**	**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	**110**
C15 - C28 Fraction	----	100	mg/kg	<100	**150**	<100	<100	**180**
C29 - C36 Fraction	----	100	mg/kg	<100	**170**	<100	<100	<100
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	<50	**320**	<50	<50	**290**
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	**160**
>C16 - C34 Fraction	----	100	mg/kg	<100	**280**	<100	<100	**120**
>C34 - C40 Fraction	----	100	mg/kg	<100	**100**	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	<50	**380**	<50	<50	**280**
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	<50	<50	<50	<50	**160**
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**	1330-20-7	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	%	**92.1**	**92.6**	**106**	**93.2**	**100**
2-Chlorophenol-D4	93951-73-6	0.5	%	**86.9**	**89.1**	**102**	**89.2**	**95.1**
2.4.6-Tribromophenol	118-79-6	0.5	%	**66.8**	**77.6**	**78.6**	**74.8**	**89.0**



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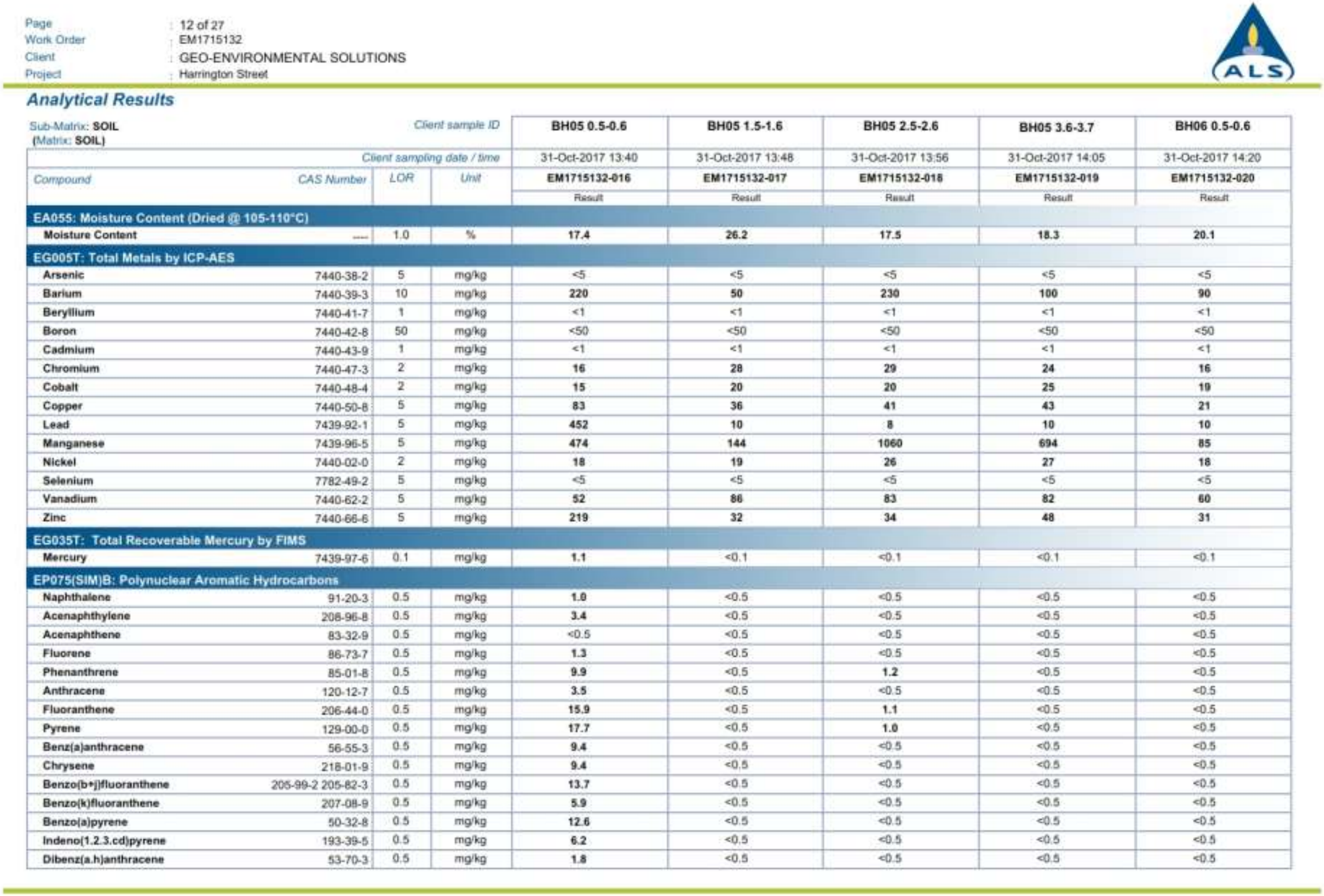
Work Order : EM1715132
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Harrington Street

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**BH03 2.7-2.8**	**BH04 0.5-0.6**	**BH04 1.5-1.6**	**BH04 2.5-2.6**	**BH04 2.9-3.0**
			Client sampling date / time	31-Oct-2017 12:47	31-Oct-2017 13:00	31-Oct-2017 13:07	31-Oct-2017 13:17	31-Oct-2017 13:25
Compound	CAS Number	LOR	Unit	**EM1715132-011**	**EM1715132-012**	**EM1715132-013**	**EM1715132-014**	**EM1715132-015**
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**108**	**109**	**93.7**	**96.3**	**120**
Anthracene-d10	1719-06-8	0.5	%	**123**	**124**	**121**	**123**	**124**
4-Terphenyl-d14	1718-51-0	0.5	%	**122**	**123**	**127**	**127**	**126**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**77.5**	**83.2**	**80.6**	**83.3**	**80.1**
Toluene-D8	2037-26-5	0.2	%	**74.1**	**84.8**	**76.9**	**86.5**	**80.9**
4-Bromofluorobenzene	460-00-4	0.2	%	**83.1**	**91.1**	**83.7**	**90.0**	**84.5**



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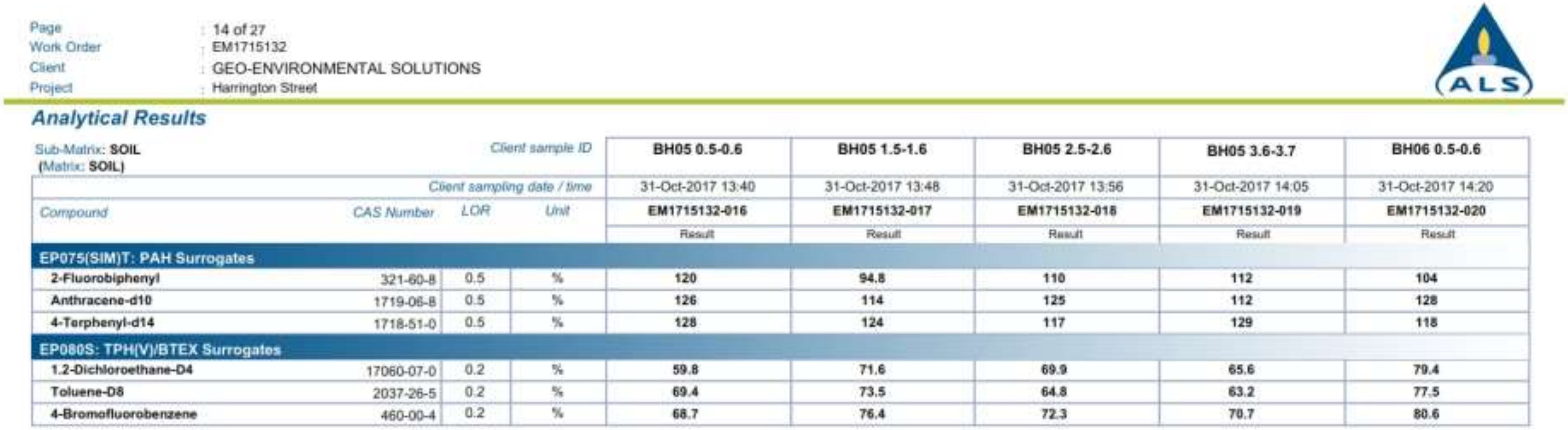
Work Order : EM1715132
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Harrington Street

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**BH05 0.5-0.6**	**BH05 1.5-1.6**	**BH05 2.5-2.6**	**BH05 3.6-3.7**	**BH06 0.5-0.6**
			Client sampling date / time	31-Oct-2017 13:40	31-Oct-2017 13:48	31-Oct-2017 13:56	31-Oct-2017 14:05	31-Oct-2017 14:20
Compound	CAS Number	LOR	Unit	**EM1715132-016**	**EM1715132-017**	**EM1715132-018**	**EM1715132-019**	**EM1715132-020**
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**17.4**	**26.2**	**17.5**	**18.3**	**20.1**
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**	**50**	**230**	**100**	**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	**16**	**28**	**29**	**24**	**16**
Cobalt	7440-48-4	2	mg/kg	**15**	**20**	**20**	**25**	**19**
Copper	7440-50-8	5	mg/kg	**83**	**36**	**41**	**43**	**21**
Lead	7439-92-1	5	mg/kg	**452**	**10**	**8**	**10**	**10**
Manganese	7439-96-5	5	mg/kg	**474**	**144**	**1060**	**694**	**85**
Nickel	7440-02-0	2	mg/kg	**18**	**19**	**26**	**27**	**18**
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg	**52**	**86**	**83**	**82**	**60**
Zinc	7440-66-6	5	mg/kg	**219**	**32**	**34**	**48**	**31**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	**1.1**	<0.1	<0.1	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	**1.0**	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	**3.4**	<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	**1.3**	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	**9.9**	<0.5	**1.2**	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	**3.5**	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	**15.9**	<0.5	**1.1**	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	**17.7**	<0.5	**1.0**	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	**9.4**	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	**9.4**	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	**13.7**	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	**5.9**	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	**12.6**	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	**6.2**	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	**1.8**	<0.5	<0.5	<0.5	<0.5

Analytical Results

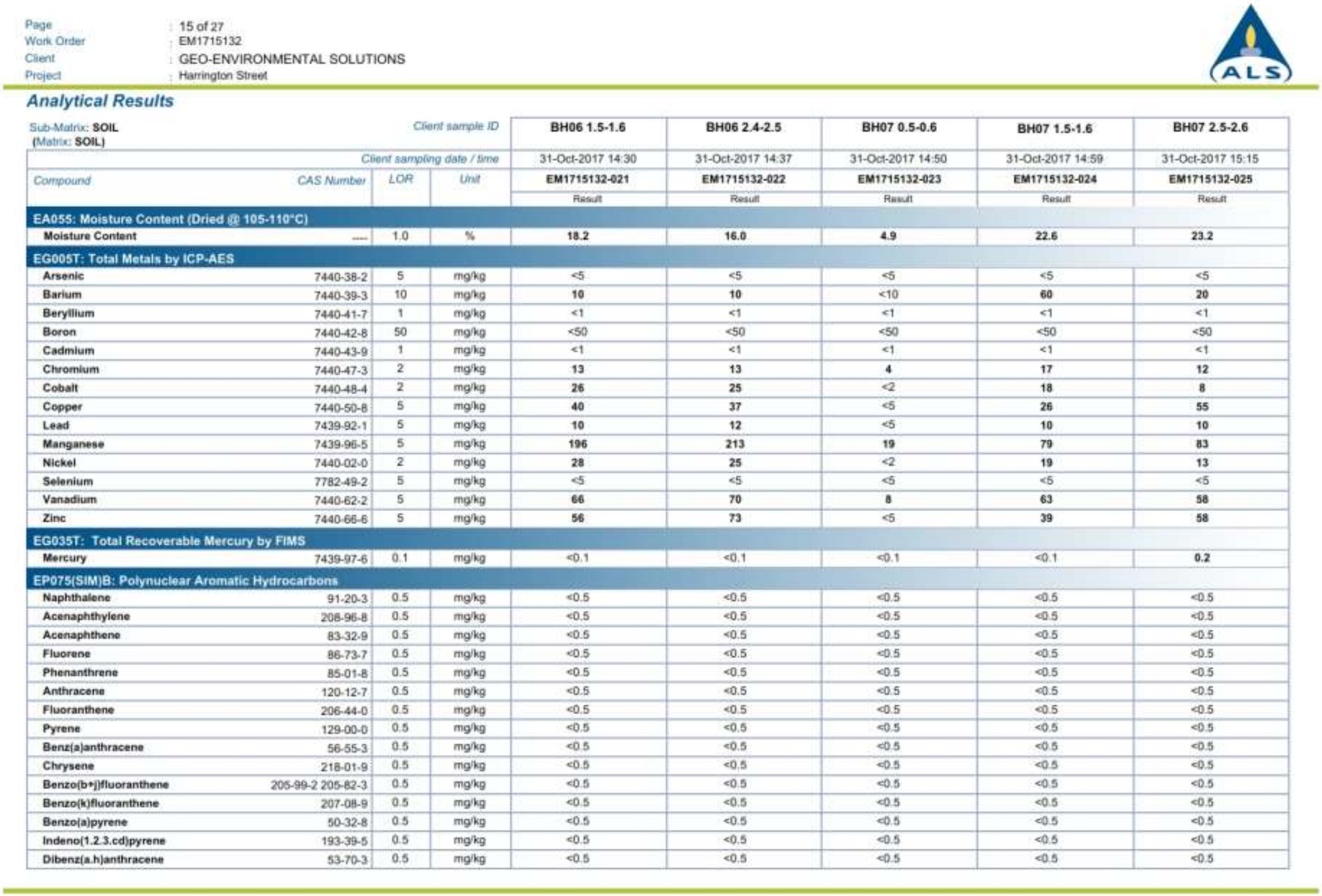
Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**BH05 0.5-0.6**	**BH05 1.5-1.6**	**BH05 2.5-2.6**	**BH05 3.6-3.7**	**BH06 0.5-0.6**
			Client sampling date / time	31-Oct-2017 13:40	31-Oct-2017 13:48	31-Oct-2017 13:56	31-Oct-2017 14:05	31-Oct-2017 14:20
Compound	*CAS Number*	*LOR*	*Unit*	**EM1715132-016**	**EM1715132-017**	**EM1715132-018**	**EM1715132-019**	**EM1715132-020**
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	**7.7**	<0.5	<0.5	<0.5	<0.5
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	**119**	<0.5	**3.3**	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	**18.1**	<0.5	<0.5	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**18.1**	**0.6**	**0.6**	**0.6**	**0.6**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**18.1**	**1.2**	**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	**530**	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	**400**	<100	<100	<100	<100
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	**930**	<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	**820**	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	**220**	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	**1040**	<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**	1330-20-7	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	%	**100**	**104**	**103**	**92.4**	**87.5**
2-Chlorophenol-D4	93951-73-6	0.5	%	**95.0**	**101**	**96.7**	**88.6**	**83.8**
2.4.6-Tribromophenol	118-79-6	0.5	%	**100**	**76.5**	**72.4**	**66.1**	**62.2**



Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

			Client sample ID	**BH05 0.5-0.6**	**BH05 1.5-1.6**	**BH05 2.5-2.6**	**BH05 3.6-3.7**	**BH06 0.5-0.6**
			Client sampling date / time	31-Oct-2017 13:40	31-Oct-2017 13:48	31-Oct-2017 13:56	31-Oct-2017 14:05	31-Oct-2017 14:20
Compound	CAS Number	LOR	Unit	**EM1715132-016**	**EM1715132-017**	**EM1715132-018**	**EM1715132-019**	**EM1715132-020**
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**120**	**94.8**	**110**	**112**	**104**
Anthracene-d10	1719-06-8	0.5	%	**126**	**114**	**125**	**112**	**128**
4-Terphenyl-d14	1718-51-0	0.5	%	**128**	**124**	**117**	**129**	**118**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**59.8**	**71.6**	**69.9**	**65.6**	**79.4**
Toluene-D8	2037-26-5	0.2	%	**69.4**	**73.5**	**64.8**	**63.2**	**77.5**
4-Bromofluorobenzene	460-00-4	0.2	%	**68.7**	**76.4**	**72.3**	**70.7**	**80.6**



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Work Order	: EM1715132
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Harrington Street

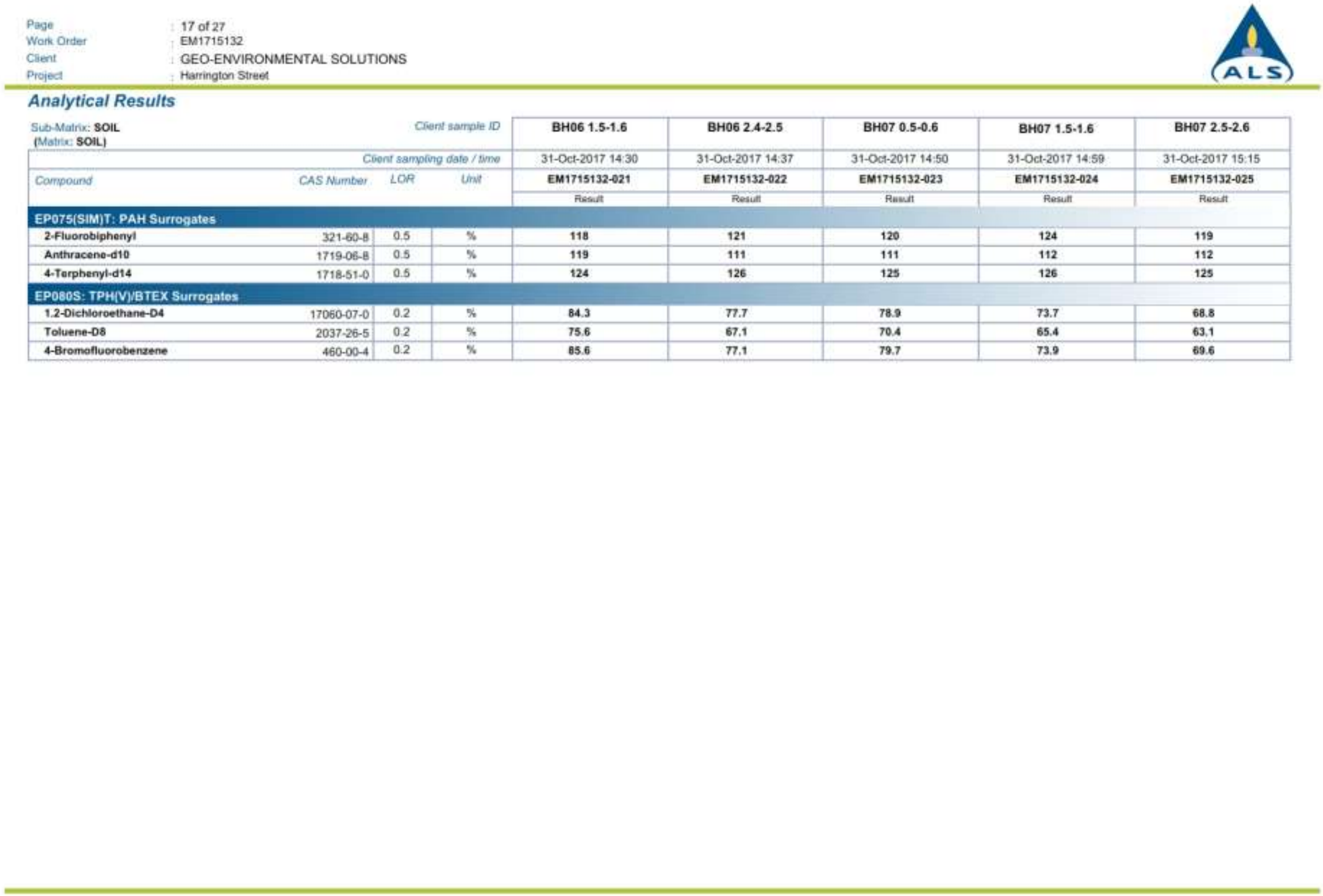
Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

			Client sample ID	**BH06 1.5-1.6**	**BH06 2.4-2.5**	**BH07 0.5-0.6**	**BH07 1.5-1.6**	**BH07 2.5-2.6**
			Client sampling date / time	31-Oct-2017 14:30	31-Oct-2017 14:37	31-Oct-2017 14:50	31-Oct-2017 14:59	31-Oct-2017 15:15
Compound	CAS Number	LOR	Unit	**EM1715132-021**	**EM1715132-022**	**EM1715132-023**	**EM1715132-024**	**EM1715132-025**
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**18.2**	**16.0**	**4.9**	**22.6**	**23.2**
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	**10**	**10**	<10	**60**	**20**
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	**13**	**13**	**4**	**17**	**12**
Cobalt	7440-48-4	2	mg/kg	**26**	**25**	<2	**18**	**8**
Copper	7440-50-8	5	mg/kg	**40**	**37**	<5	**26**	**55**
Lead	7439-92-1	5	mg/kg	**10**	**12**	<5	**10**	**10**
Manganese	7439-96-5	5	mg/kg	**196**	**213**	**19**	**79**	**83**
Nickel	7440-02-0	2	mg/kg	**28**	**25**	<2	**19**	**13**
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg	**66**	**70**	**8**	**63**	**58**
Zinc	7440-66-6	5	mg/kg	**56**	**73**	<5	**39**	**58**
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	<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	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<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	<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	<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	<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

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**BH06 1.5-1.6**	**BH06 2.4-2.5**	**BH07 0.5-0.6**	**BH07 1.5-1.6**	**BH07 2.5-2.6**
			Client sampling date / time	31-Oct-2017 14:30	31-Oct-2017 14:37	31-Oct-2017 14:50	31-Oct-2017 14:59	31-Oct-2017 15:15
Compound	CAS Number	LOR	Unit	**EM1715132-021**	**EM1715132-022**	**EM1715132-023**	**EM1715132-024**	**EM1715132-025**
				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	<0.5	<0.5	<0.5
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**1.2**	**1.2**	**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	<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**	1330-20-7	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	%	**111**	**100**	**100**	**102**	**96.8**
2-Chlorophenol-D4	93951-73-6	0.5	%	**109**	**98.5**	**99.0**	**100.0**	**95.8**
2.4.6-Tribromophenol	118-79-6	0.5	%	**73.3**	**67.0**	**65.9**	**66.6**	**64.1**



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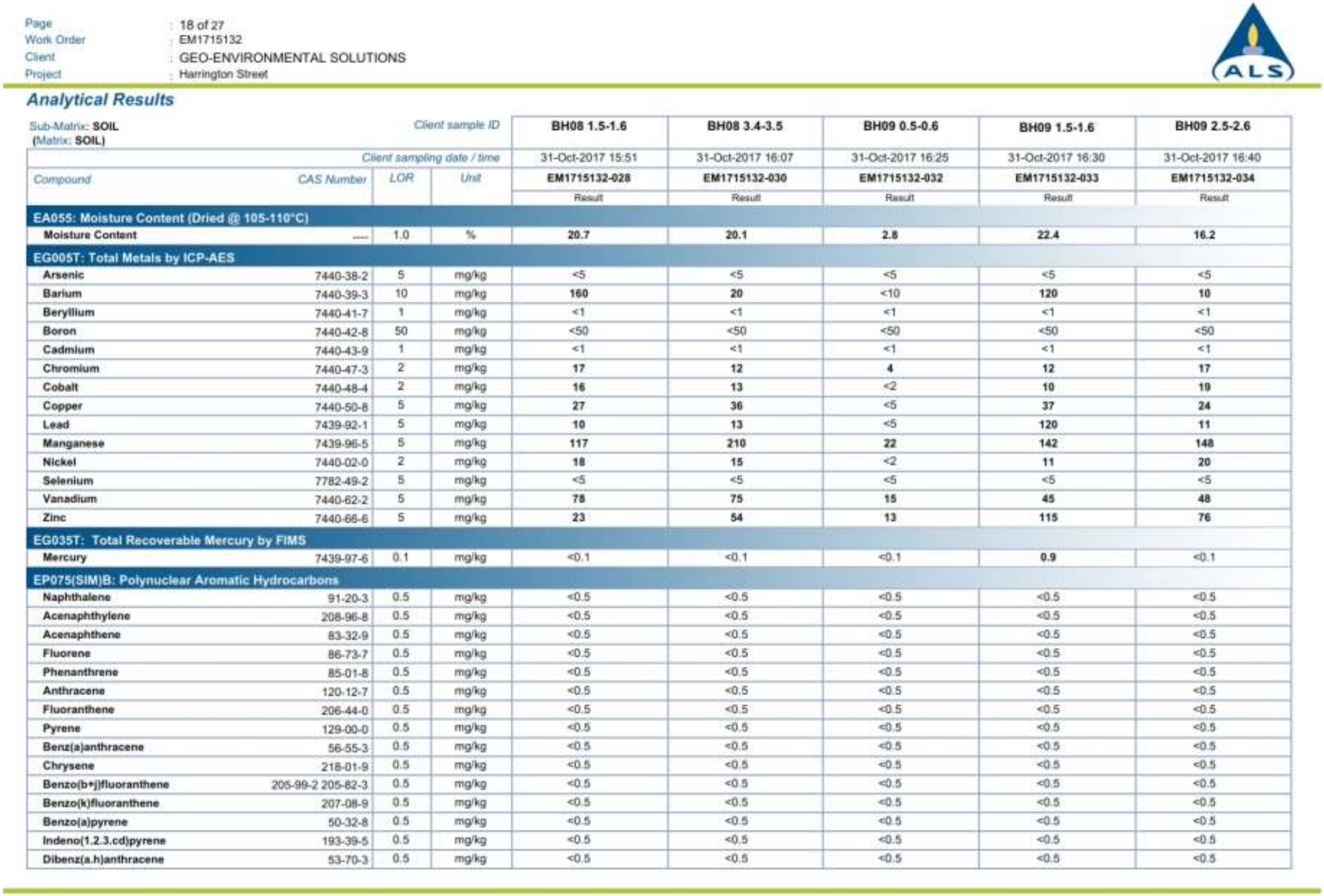
Work Order : EM1715132
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Harrington Street

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

			Client sample ID	BH06 1.5-1.6	BH06 2.4-2.5	BH07 0.5-0.6	BH07 1.5-1.6	BH07 2.5-2.6
			Client sampling date / time	31-Oct-2017 14:30	31-Oct-2017 14:37	31-Oct-2017 14:50	31-Oct-2017 14:59	31-Oct-2017 15:15
Compound	CAS Number	LOR	Unit	EM1715132-021	EM1715132-022	EM1715132-023	EM1715132-024	EM1715132-025
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	118	121	120	124	119
Anthracene-d10	1719-06-8	0.5	%	119	111	111	112	112
4-Terphenyl-d14	1718-51-0	0.5	%	124	126	125	126	125
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	84.3	77.7	78.9	73.7	68.8
Toluene-D8	2037-26-5	0.2	%	75.6	67.1	70.4	65.4	63.1
4-Bromofluorobenzene	460-00-4	0.2	%	85.6	77.1	79.7	73.9	69.6



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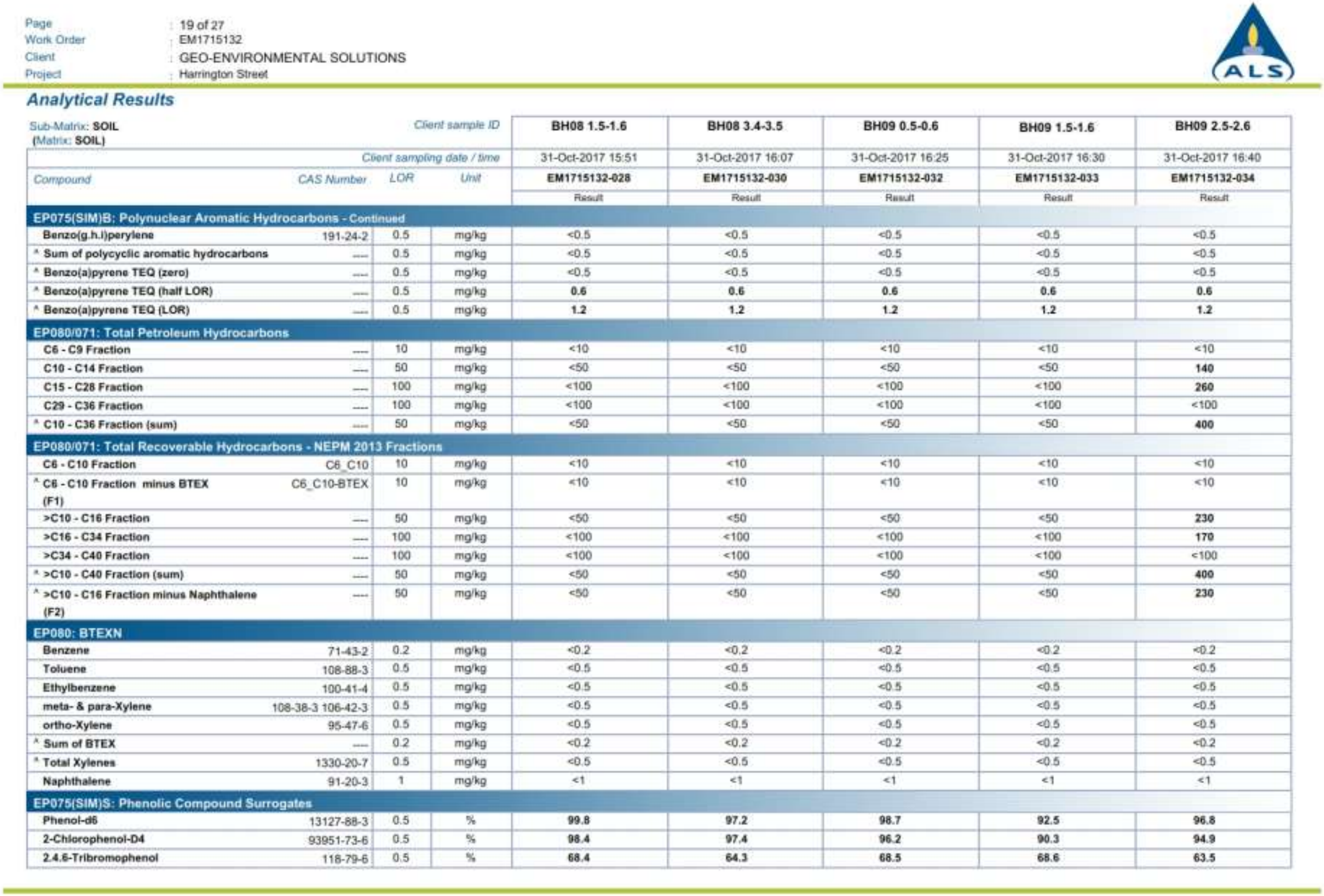
Work Order : EM1715132
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Harrington Street

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	BH08 1.5-1.6	BH08 3.4-3.5	BH09 0.5-0.6	BH09 1.5-1.6	BH09 2.5-2.6
			Client sampling date / time	31-Oct-2017 15:51	31-Oct-2017 16:07	31-Oct-2017 16:25	31-Oct-2017 16:30	31-Oct-2017 16:40
				EM1715132-028	EM1715132-030	EM1715132-032	EM1715132-033	EM1715132-034
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**20.7**	**20.1**	**2.8**	**22.4**	**16.2**
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	**160**	**20**	<10	**120**	**10**
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	**17**	**12**	**4**	**12**	**17**
Cobalt	7440-48-4	2	mg/kg	**16**	**13**	<2	**10**	**19**
Copper	7440-50-8	5	mg/kg	**27**	**36**	<5	**37**	**24**
Lead	7439-92-1	5	mg/kg	**10**	**13**	<5	**120**	**11**
Manganese	7439-96-5	5	mg/kg	**117**	**210**	**22**	**142**	**148**
Nickel	7440-02-0	2	mg/kg	**18**	**15**	<2	**11**	**20**
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg	**78**	**75**	**15**	**45**	**48**
Zinc	7440-66-6	5	mg/kg	**23**	**54**	**13**	**115**	**76**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	**0.9**	<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	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<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	<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	<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	<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



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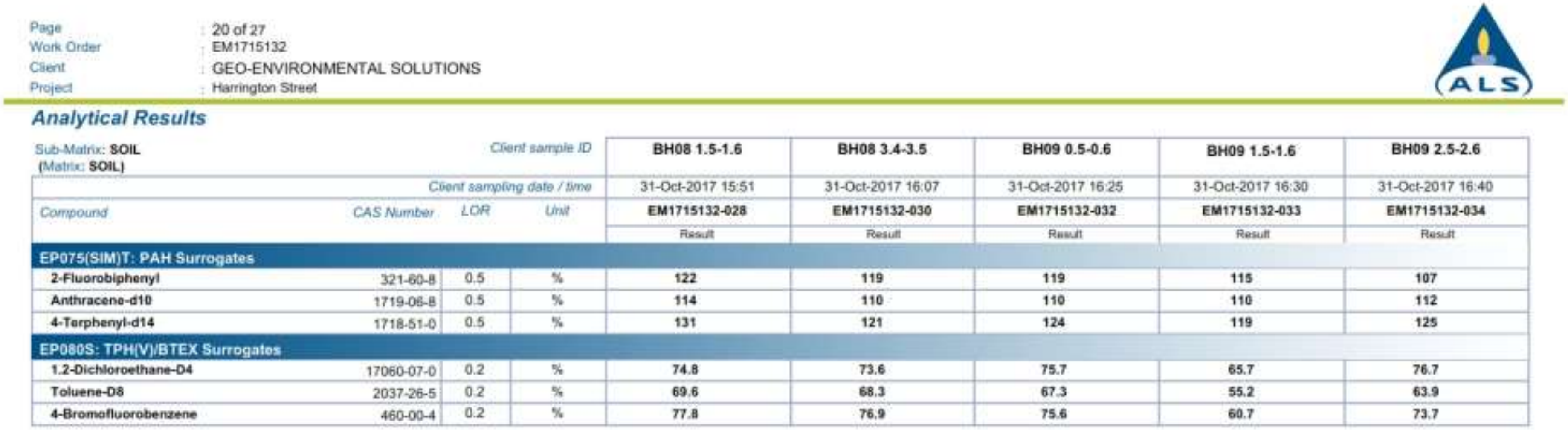
Work Order : EM1715132
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : Harrington Street

Analytical Results

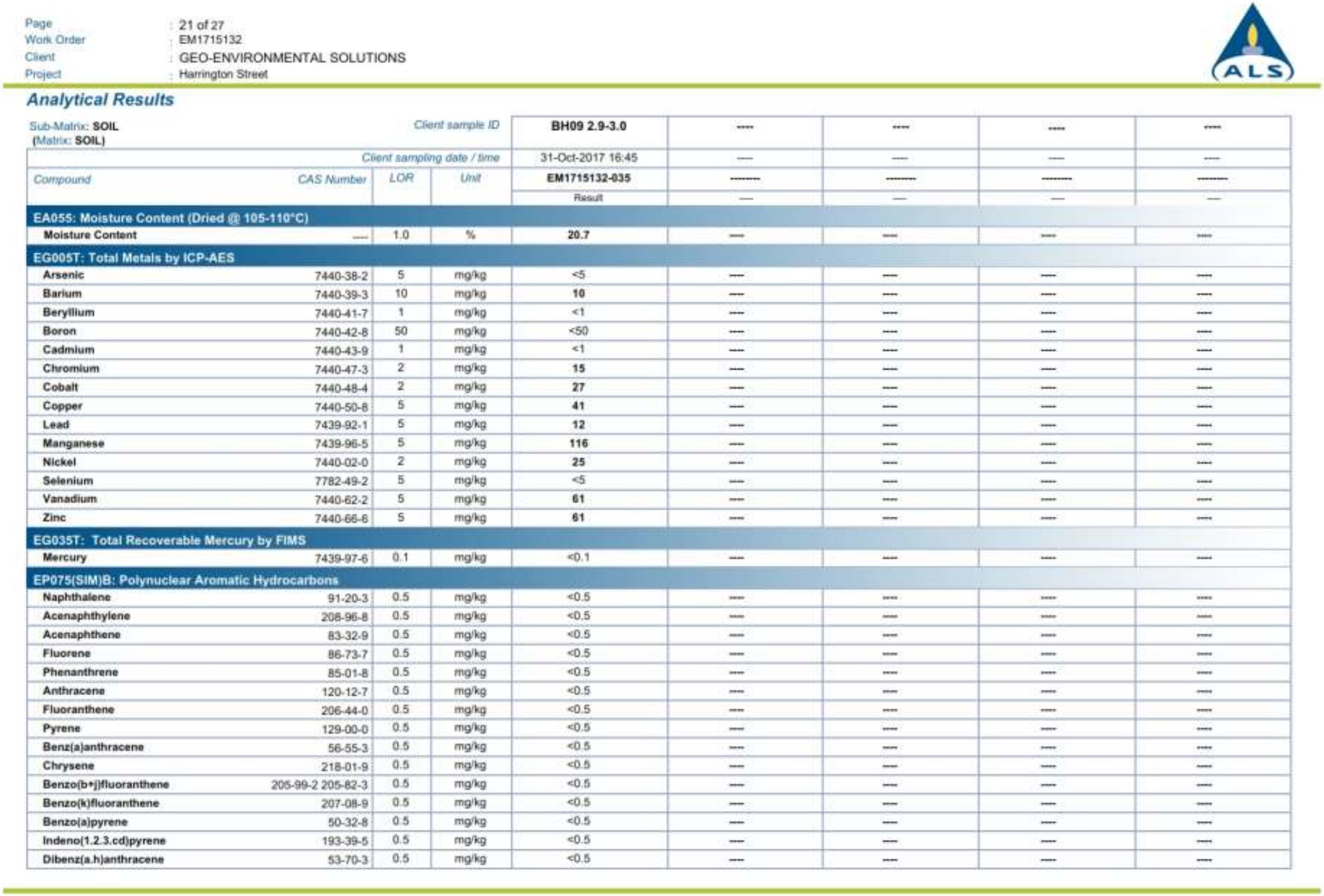
Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**BH08 1.5-1.6**	**BH08 3.4-3.5**	**BH09 0.5-0.6**	**BH09 1.5-1.6**	**BH09 2.5-2.6**
			Client sampling date / time	31-Oct-2017 15:51	31-Oct-2017 16:07	31-Oct-2017 16:25	31-Oct-2017 16:30	31-Oct-2017 16:40
Compound	*CAS Number*	*LOR*	*Unit*	**EM1715132-028**	**EM1715132-030**	**EM1715132-032**	**EM1715132-033**	**EM1715132-034**
				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	<0.5	<0.5
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**1.2**	**1.2**	**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	**140**
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	**260**
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	<50	<50	<50	<50	**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	<50	<50	<50	**230**
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	**170**
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	<50	<50	<50	<50	**400**
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	<50	<50	<50	<50	**230**
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**	1330-20-7	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	%	**99.8**	**97.2**	**98.7**	**92.5**	**96.8**
2-Chlorophenol-D4	93951-73-6	0.5	%	**98.4**	**97.4**	**96.2**	**90.3**	**94.9**
2.4.6-Tribromophenol	118-79-6	0.5	%	**68.4**	**64.3**	**68.5**	**68.6**	**63.5**



Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

			Client sample ID	BH08 1.5-1.6	BH08 3.4-3.5	BH09 0.5-0.6	BH09 1.5-1.6	BH09 2.5-2.6
			Client sampling date / time	31-Oct-2017 15:51	31-Oct-2017 16:07	31-Oct-2017 16:25	31-Oct-2017 16:30	31-Oct-2017 16:40
Compound	CAS Number	LOR	Unit	EM1715132-028	EM1715132-030	EM1715132-032	EM1715132-033	EM1715132-034
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**122**	**119**	**119**	**115**	**107**
Anthracene-d10	1719-06-8	0.5	%	**114**	**110**	**110**	**110**	**112**
4-Terphenyl-d14	1718-51-0	0.5	%	**131**	**121**	**124**	**119**	**125**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**74.8**	**73.6**	**75.7**	**65.7**	**76.7**
Toluene-D8	2037-26-5	0.2	%	**69.6**	**68.3**	**67.3**	**55.2**	**63.9**
4-Bromofluorobenzene	460-00-4	0.2	%	**77.8**	**76.9**	**75.6**	**60.7**	**73.7**



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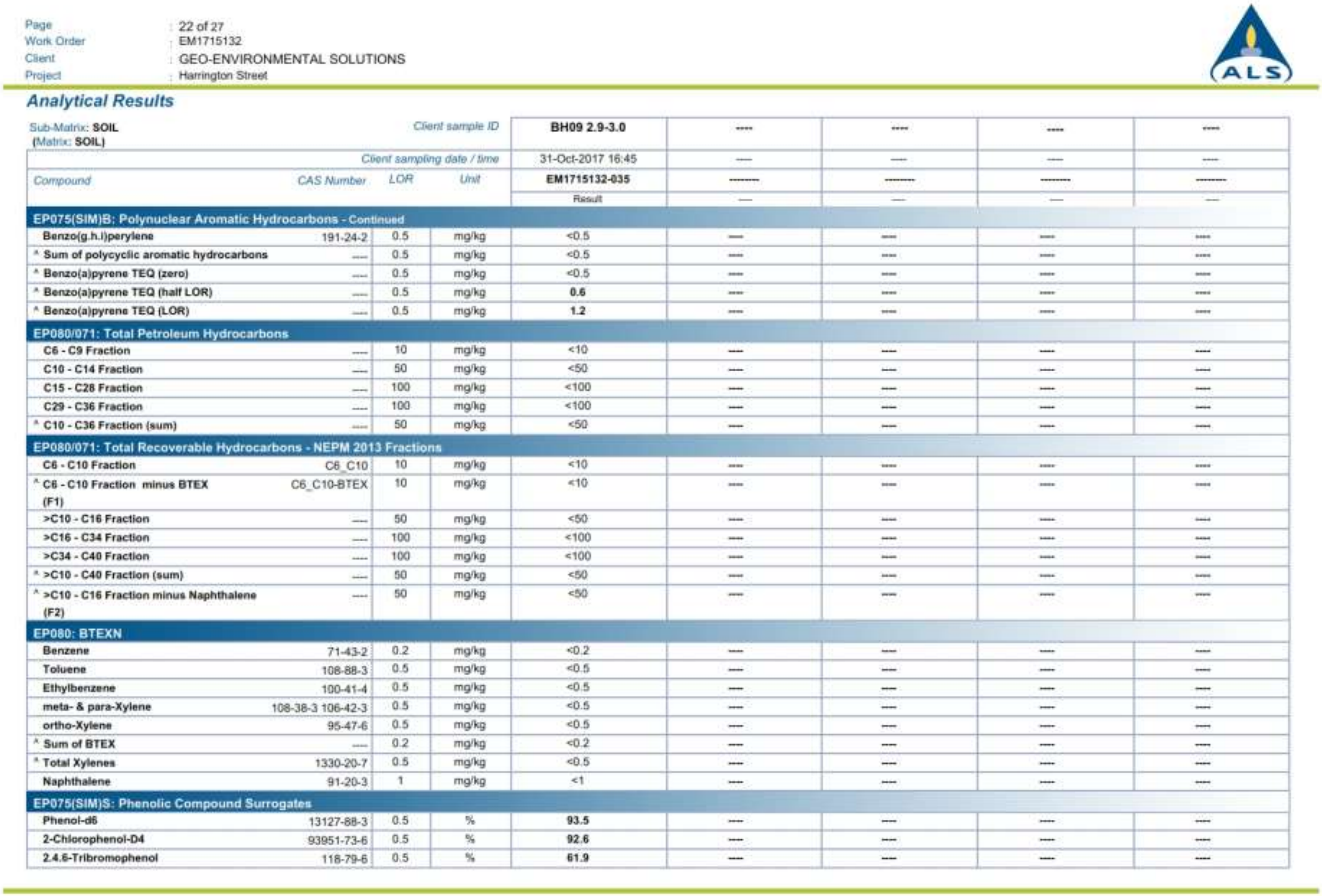
Work Order	: EM1715132
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Harrington Street

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	BH09 2.9-3.0	----	----	----	----
			Client sampling date / time	31-Oct-2017 16:45	----	----	----	----
				EM1715132-035	--------	--------	--------	--------
				Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**20.7**	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	----	----	----	----
Barium	7440-39-3	10	mg/kg	**10**	----	----	----	----
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	**15**	----	----	----	----
Cobalt	7440-48-4	2	mg/kg	**27**	----	----	----	----
Copper	7440-50-8	5	mg/kg	**41**	----	----	----	----
Lead	7439-92-1	5	mg/kg	**12**	----	----	----	----
Manganese	7439-96-5	5	mg/kg	**116**	----	----	----	----
Nickel	7440-02-0	2	mg/kg	**25**	----	----	----	----
Selenium	7782-49-2	5	mg/kg	<5	----	----	----	----
Vanadium	7440-62-2	5	mg/kg	**61**	----	----	----	----
Zinc	7440-66-6	5	mg/kg	**61**	----	----	----	----
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	----	----	----	----



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Work Order	: EM1715132
Client	: GEO-ENVIRONMENTAL SOLUTIONS
Project	: Harrington Street

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

			Client sample ID	**BH09 2.9-3.0**	----	----	----	----
			Client sampling date / time	31-Oct-2017 16:45	----	----	----	----
Compound	CAS Number	LOR	Unit	**EM1715132-035**	--------	--------	--------	--------
				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**	1330-20-7	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	%	**93.5**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	**92.6**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	**61.9**	----	----	----	----

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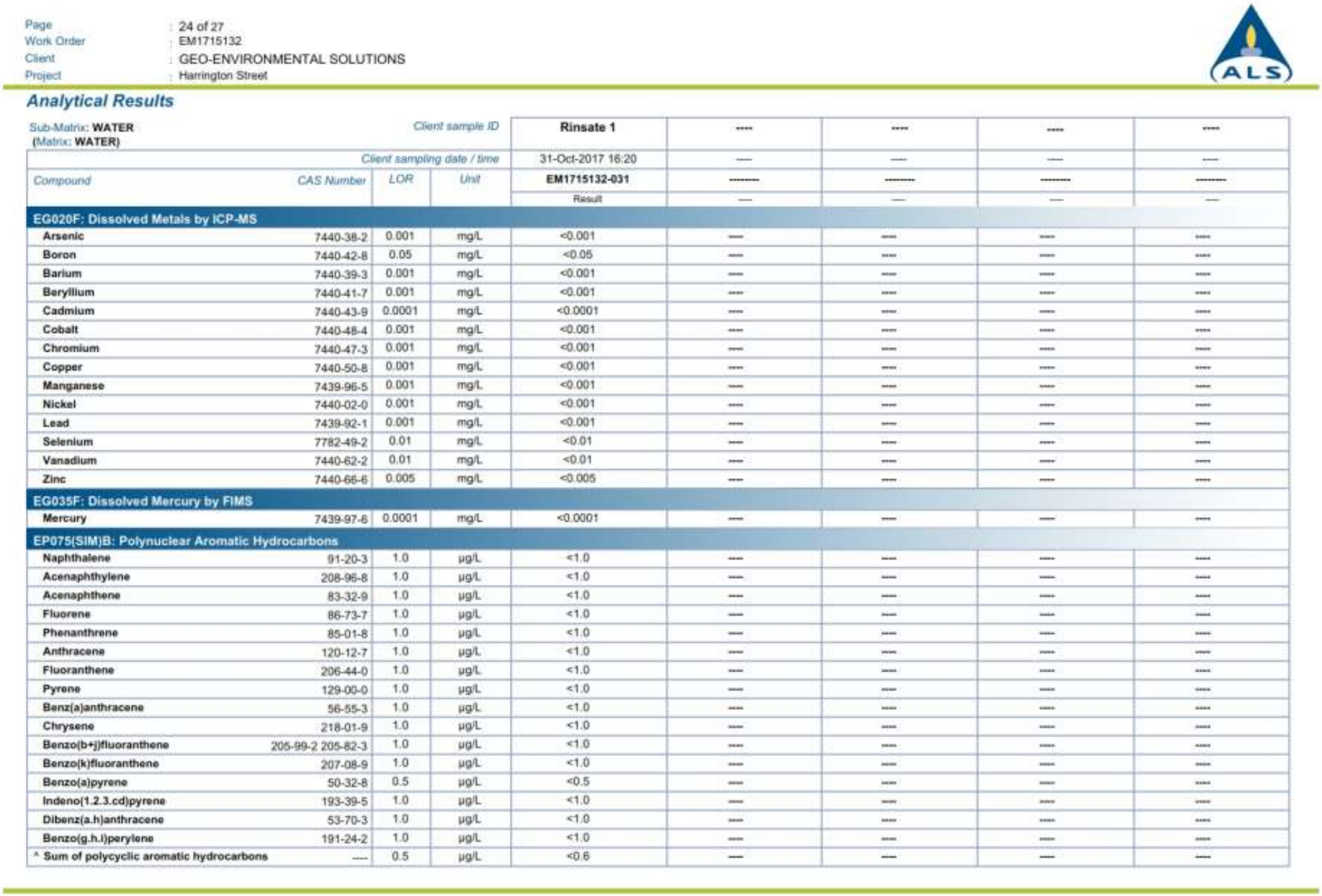
Project : Harrington Street

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

			Client sample ID	**BH09 2.9-3.0**	----	----	----	----
			Client sampling date / time	31-Oct-2017 16:45	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EM1715132-035**	--------	--------	--------	--------
				Result	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**114**	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%	**104**	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	**119**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**72.0**	----	----	----	----
Toluene-D8	2037-26-5	0.2	%	**67.4**	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	**73.5**	----	----	----	----



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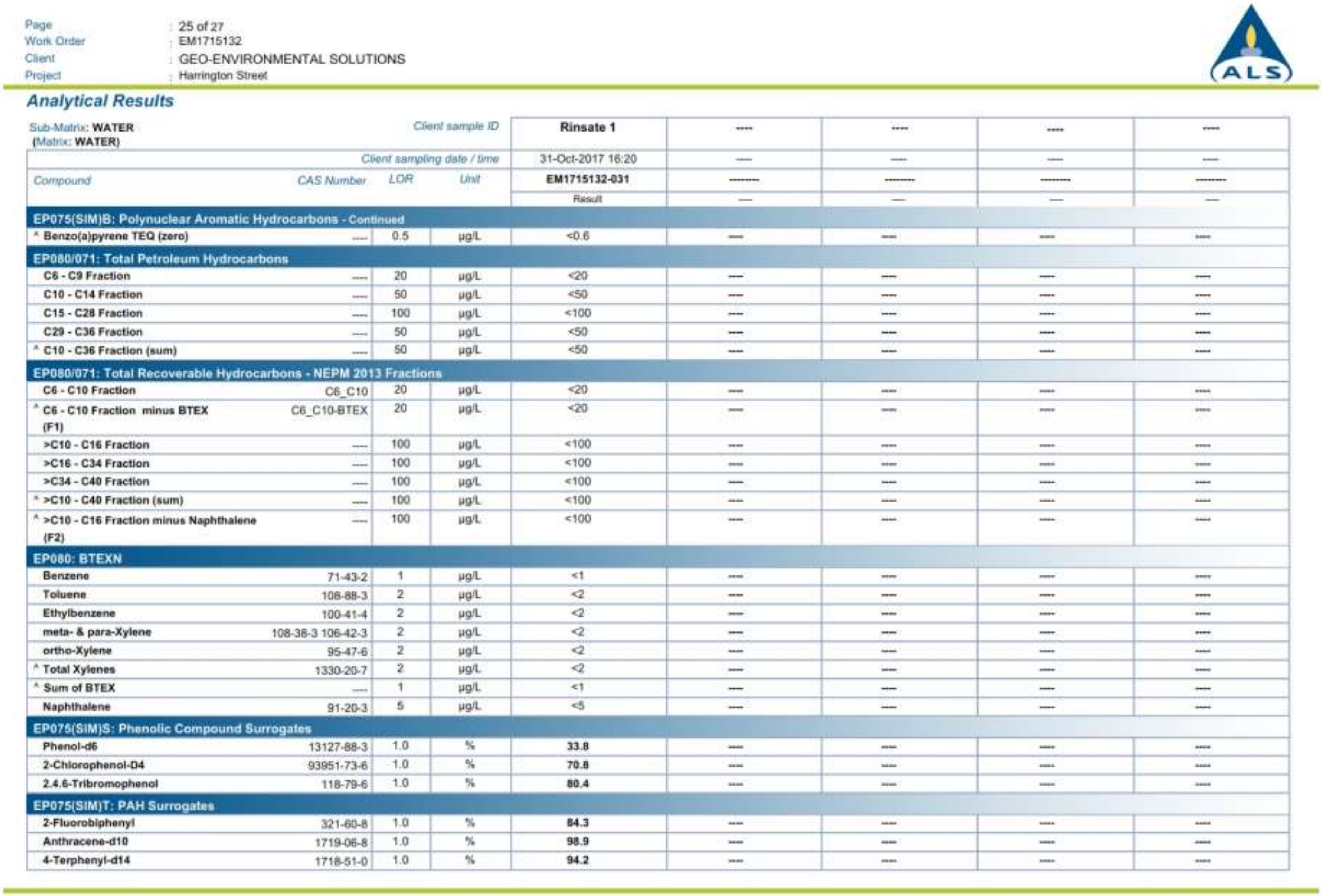
Project	: Harrington Street

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

			Client sample ID	**Rinsate 1**	----	----	----	----
			Client sampling date / time	31-Oct-2017 16:20	----	----	----	----
Compound	CAS Number	LOR	Unit	**EM1715132-031**	--------	--------	--------	--------
				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	<0.6	----	----	----	----



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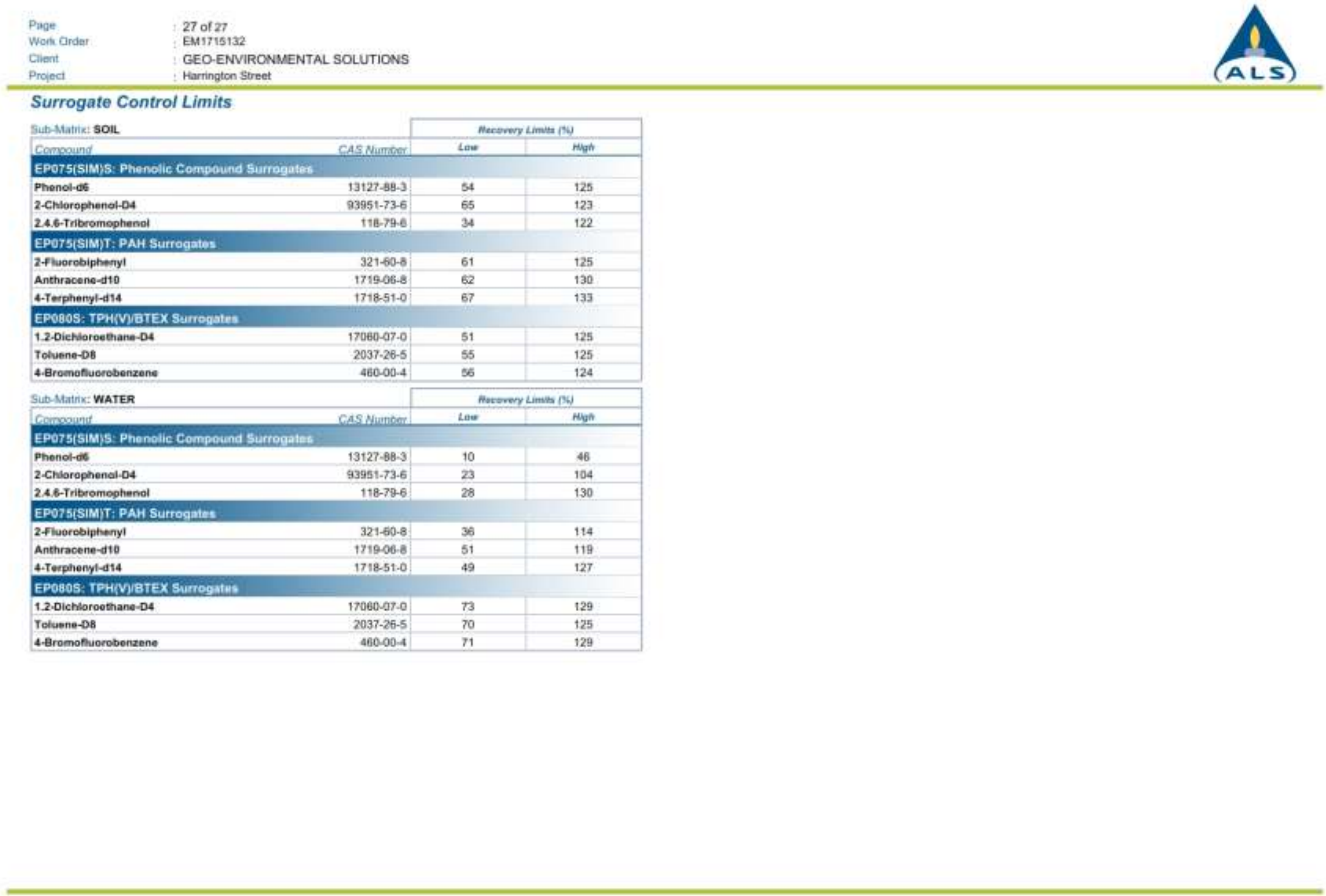
Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**Rinsate 1**	----	----	----	----
			Client sampling date / time	31-Oct-2017 16:20	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EM1715132-031**	--------	--------	--------	--------
				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**	1330-20-7	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	%	**33.8**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%	**70.8**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%	**80.4**	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	**84.3**	----	----	----	----
Anthracene-d10	1719-06-8	1.0	%	**98.9**	----	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%	**94.2**	----	----	----	----

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

			Client sample ID	**Rinsate 1**	----	----	----	----
			Client sampling date / time	31-Oct-2017 16:20	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EM1715132-031**	--------	--------	--------	--------
				Result	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	**92.5**	----	----	----	----
Toluene-D8	2037-26-5	2	%	**88.0**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	**105**	----	----	----	----



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Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	Recovery Limits (%) 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	Recovery Limits (%) 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

Appendix 10 CRC CARE Technical Report 10 HSL Application Checklist

HSL APPLICATION CHECKLIST

INTRODUCTION

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This checklist is designed to allow assessors to conceptualise potential issues with contaminated land, and how to apply the HSLs. The checklist is designed to trigger responses from the assessor in determining whether the HSLs are applicable or whether consideration should be given to a more site-specific determination of risk. It highlights the key limitations and considerations that are common to contamination assessments and risk assessment.

The checklist summarises the key items from this Application Document.
It is recommended that the Application Document be read in conjunction with the use of this Checklist.

	Summary of Steps
Step 1	**Identification of key limitations to the application of health screening levels**
Step 2	**Identification of key receptors and scenarios**
Step 3	**Identification of relevant soil type**
Step 4	**Identification of impacted media and depths**
Step 5	**Identification of source concentrations to be compared with health screening levels**
Step 6	**Selecting appropriate HSL and consideration of combining vapour intrusion and direct contact exposure**
Step 7	**Applying adjustments to the HSLs based on vapour biodegradation, soil organic carbon content, air exchange rate, and soil moisture content** **Consideration given to soil saturation and water solubility limits**
Step 8	**Adjustments for cancer risk assessment - modification of acceptable cancer risk level, assessment of cumulative cancer risk**

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Step 1 – Limitations to HSLs

Assessing contamination in soil and groundwater should only be carried out by a qualified professional.
Are guidelines relevant for site? Check the following limitations:

Have chemicals other than petroleum hydrocarbons been identified at the site?	n	May consider site-specific risk assessment (refer to Section 5.2 of the Application Document)
Is the groundwater to be used for irrigation purposes?	n	May consider site-specific risk assessment (refer to Section 2.4.5 of the Application Document)
Is the site conservation land?	n	May be required to also assess ecological values (refer to Section 2.4.6 of the Application Document)
Is the depth to groundwater impact less than 2m bgs ?	n	May consider site-specific risk assessment for direct contact May consider soil vapour sampling for vapour intrusion (refer to Section 2.4.2 of the Application Document)
Has significant odour been observed at the site?	n	May be required to also assess odour for sensitive land uses (refer to Section 5.4 of the Application Document)
Is the identified chemical a result of a solvent spill rather than petroleum spill/leak?	n	HSLs may be used where saturation point is not considered (refer to Section 5.3 of the Application Document)
Is the identified contamination an atypical petroleum mixture?	n	May consider site-specific risk assessment to consider cumulative effects between chemicals (refer to Section 3.6 of the Application Document)
Is the soil source thickness significantly different than 2 m?	n	For small source thicknesses, HSLs may be overly conservative if source fully depletes. For larger thicknesses HSLs may not adequately characterise risk, however lateral extent of contamination should also be considered. A site-specific HRA may be considered. (refer to Section 2.4.7 of the Application Document)
Does the building have a crawl space rather than slab-on-ground construction?	y	HSLs may be used as likely to be conservative. However, for situations where habitants may be exposed in crawl space area such as spaces under dwellings which incorporate garages/workshop then consideration may be given to ambient air sampling. (refer to Section 2.3.4 of the Application Document)
Does the building have or is likely to have a habitable basement?	n	May consider site-specific risk assessment (refer to Section 2.3.3 of the Application Document)

Note that the HSLs may be used for assessing health risk. In addition to this assessment, legislation requirements still need to be fulfilled which may include other considerations and assessments. Such considerations may include:

- Assessment of environmental values and ecological impacts
- Consideration of sustainability issues
- Risks for extraction and use of groundwater
- Soil source ongoing source to groundwater contamination
- Local planning requirements, such as sensitive uses under commercial zones, or future land use zones
- Social impacts and consultation with stakeholders

Step 2 – Identify receptors and scenarios to be considered

Check the receptors and scenarios to be assessed. Note that receptors and scenarios may require consideration of future land use planning and local regulations pertaining to site redevelopment.

	y	Residential use (refer to Sections 2.1.1 and 2.3.1 of the application Document)
HSL-A	n	Low-Density Residential – assumes access to soils with no management controls on site. Assessment may consider surface soils with direct contact, intrusive maintenance worker protection, and consider using surface soil HSL for all soils down to 3 m depth to protect uncontrolled excavation of contamination.
HSL-B	n	High-Density Residential – assumes limited access to surface soils with management controls on site. Assessment may consider surface soils/dust with limited direct contact. Intrusive maintenance workers may be protected under suitable site management plan.
HSL-A	n	Medium-Density Residential with grassed open space – assumes access to soils with management controls on site. Assessment may consider surface soils with direct contact and subsurface soils through vapour intrusion. Intrusive maintenance workers may be protected under suitable site management plan.
HSL-B	n	Medium-Density Residential with permanent paving open space – assumes limited access to soils with management controls on site. Assessment may consider surface soils/dust with limited direct contact. Intrusive maintenance workers may be protected under suitable site management plan.
HSL-A (for VI) *HSL-A or HSL-B (for DC)*	n	Low- or Medium-Density Residential with single basement garage – for vapour intrusion, low-density residential (HSL-A) may apply due to low air exchange rate for basement garage. HSL depth is displaced by depth of basement. For soil direct contact HSLs, select from above medium density scenarios based on access to soils. Intrusive maintenance workers may be protected under suitable site management plan (refer to Section 2.3.3 of the Application Document).
HSL-D (for VI) *HSL-B (for DC outside footprint)*	y	Medium- or High-Density Residential with communal basement car park – assumes no access to soils with management controls on site. HSL depth is displaced by depth of basement. Intrusive maintenance workers may be protected under suitable site management plan. Note that areas outside of the basement footprint may be required to be assessed as a building without basement and with limited direct contact with soil. Also, limited exposure time for basement users and therefore HSL for Commercial Worker may be used for vapour intrusion (refer to Section 2.3.3 of the Application Document)
HSL-C	n	Recreational / Public Open Space (refer to Section 2.1.2 of the Application Document)
	🟧	Parks, ovals, pedestrian areas
	🟥	National parks, conservation areas – may be required to also assess ecological values (refer to Section 2.4.6 of the Application Document)
HSL-D	n	Commercial / Industrial Workers (refer to Section 2.1.3 of the Application Document) – considers only healthy adults under normal working conditions. Does not consider sensitive commercial uses such as schools, day care centres and medical practices.
	🟧	Commercial sensitive users – may consider using residential HSLs or a site-specific HRA (refer to Section 2.4.1of the Application Document)
	🟥	Agricultural land – may consider a site specific HRA (refer to Section 2.4.5 of the Application Document)
	n	Shallow intrusive workers down to 1 m deep. May require assessment of direct contact for soils surface to <2 m (refer to Sections 2.1.4 and 2.4.3 of the Application document)
	🟥	Deep intrusive workers down to >1 m deep, such as sewer. Should be managed with appropriate procedures and work practices for confined spaces (refer to Section 2.4.4 of the Application Document)

Is a site management plan (that includes specific occupational hazard management for works on the site) to be implemented on the site (controlled site)? → n May not need to consider health risks to intrusive workers

Step 3 – Identify soil type relevant to site (soils above impacts in soil and/or groundwater)

Note the following before selecting soil type for use in assessment:

1. The prime parameter that influences the value of the HSL is the air filled porosity and volatility of the specific chemical. The higher the air filled porosity the greater the potential for volatile chemicals to migrate vertically through the soil profile.
2. The selection of a generic soil type requires knowledge of the soil profile across the site.
3. The selection of generic soil types should take into account the predominant characteristics of the soil profile and depth of contamination. The generic soil types assume a uniform profile, which at many, if not all, sites will not be the case. Where the overlying profile is predominantly fine materials (clays) (i.e. > 50% for soil column), these may be considered as the generic soil type. If the profile has a significant proportion of loose/coarse materials (including backfill) (i.e. > 50%), these materials may be considered as the generic soil type.
4. Air filled porosity is affected by moisture content. The wetter the soil, the lower the air filled porosity. Generic soil types have assumed a typical moisture content for the profile typical of average soil conditions occurring at depth. Moisture content will vary greatly by location and season. Moisture content will also vary between sub-categories of soil, e.g. between sand and clayey sand. HSLs may be adjusted based on moisture content. This is done in Step 7.
5. The selection of appropriate soil type is discussed in Section 3.2 of the Application Document.

Is there one dominant soil type on the site (> 50% of soil column)?
Or can a geological setting be conservatively identified (i.e. allowing greater vapour transport)? →

☐ Y - Proceed
☒ N - Consideration may be given to assuming the more conservative soil type, or may be given to a site-specific HRA (refer to Section 4.6 of the Application Document)

Has excavated area(s) been backfilled with more porous materials ? →

☐ Y - Consideration should be given to adopting a more porous soil type (refer to Section 3.2 of the Application Document)
☒ N - Proceed

Does the site lithology contain rock formations
or soil with large cracks that can form preferential pathways? →

☐ Y - The derived HSLs do not include lithologies with rock formations. Consideration may be given to using soil-vapour sampling or carrying out a site-specific HRA (refer to Section 4.6 of the Application Document)
☒ N - Proceed

Identify HSL soil type relevant to site and assessment (above impacts)

The soil profile properties have been based on a predominant soil texture grouping developed by the US Department of Agriculture. The 12 texture classes have been grouped into 3 groups: sand, silt and clay. The groupings of the classes are based on mean particle size and saturation porosities. Refer to Section 3.2 for further discussion on the soil properties.

HSL soil type selected:

☐ **Sand** – Properties selected to be representative of a coarse textured undisturbed soil profile. Consists of texture classes sand, sandy clay.

☐ **Silt** – Properties selected to be representative of a coarse textured undisturbed soil profile. Consists of texture classes silt, silty clay.

☐ **Clay** – Properties selected to be representative of a fine textured undisturbed soil profile. Consists of texture classes clay.

☒ **Other** – Including soil with large cracks (preferential pathways) and fractured rock (basalt, sandstone, siltstone, limestone) - refer to Section 4.6 of the Application Document. Soil vapour measurement is preferred to soil or groundwater. Due to fractures and preferential vapour pathways in rock, consideration should be given to overlying weathered soil, or to using HSLs for surface soil in sand.

For soil assessment (texture classification) undertaken in accord with AS 1726 the classifications of sand, silt and clay may be applied as coarse, fine with liquid limit less than 50%, and fine with liquid limit greater than 50% respectively.
Where there is uncertainty, laboratory analysis should be carried out. This may include parameters for detailed particle analysis and exact soil texture sub-class, and saturation porosity.

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Step 4 – Impact media

Are there impacts to media other than soil and groundwater? → n As well as human health assessment, consideration of other issues such as ecological, aesthetics, etc. may be required.
(e.g surface water, biota, odours etc)
Note: aesthetic issues (odours/staining/ecological impacts etc.) to be addressed separately

Soils

Are there soil impacts remaining on the site? →
x Y - Proceed
☐ N - Go to groundwater section

-

Depth to soil impacts. Note if considering basements, depths need to be displaced e.g. a 3 m deep basement means surface to <1 m represents 3 m to <4 m.

(refer to Section 2.3.3 of the Application Document)

x	surface to <1 m	☐	Displacement due to basement
x	1 m to <2 m		Distance of displacement (m) **1 to 3 m**
x	2 m to <4 m		
☐	4 m and deeper		

Is the site of interest an uncontrolled site where excavation activities such as construction may result in subsurface soil contamination brought to surface in the future? → y Consideration may be given to use of HSLs for direct contact and surface HSLs for vapour intrusion, for deeper soils. A site management plan may be used to address uncontrolled excavation at a site.
(refer to Sections 2.3.1, 3.4.1, and 4.7 of the Application Document)

Groundwater

Are there groundwater impacts beneath the site? →
☐ Y - Proceed
n N - Go to soil vapour section

Is the depth to groundwater less than 2 m? → n Y - The HSL values may not adequately address this scenario. A site-specific HRA may be considered.
Soil vapour sampling may be used to assess vapour intrusion.
(refer to Section 2.3.3 of the Application Document)

Depth to groundwater impacts. Note if considering basements, depths should be displaced e.g. a 3 m deep basement means surface to 2 m represents 5 m (refer to Sections 2.3.3 of the Application Document). With basements, groundwater HSLs may not adequately characterise risks where the groundwater level is within 2 m of basement foundation.

☐	2 m to <4 m	y	Displacement due to basement
y	4 m to <8 m		Distance of displacement (m) 1 to 3
☐	8 m and deeper		

Step 4 – Impact media (cont.)

Soil vapour

Has soil vapour sampling been used to characterise vapour intrusion at the site? →

☐ Y - Proceed
☒ N - Proceed to Step 5

Depth to soil impacts. Note if considering basements, depths need to be displaced e.g. a 3 m deep basement means surface to <1 m represents 3 m to <4 m. (Refer to Section 2.3.3 of the Application Document.)

☐ surface to <1 m
☐ 1 m to <2 m
☐ 2 m to <4 m
☐ 4 m to <8 m
☐ 8 m and deeper

☐ Displacement due to basement
Distance of displacement (m) ________________

In using soil vapour sampling, please note the following:
1) It is recommended that soil vapour samples be taken as laterally close to a vapour source as possible (within or above).
2) Any sample taken within 1 m of the open air is subject to high levels of uncertainty due to atmospheric and meteorological effects. This includes the base and wall of excavation pits.
3) For sites subject to redevelopment with residential or commercial buildings, the soil vapour profiles are subject to change due to presence of concrete slabs. Caution is required on the use of soil vapour samples that are not within a soil source and in locations where buildings currently do not exist (refer to Section 1.6 of the Application Document).

Step 5 – Selection of relevant source concentrations

Soil concentrations

1. Is the investigation site likely to be subdivided into smaller lots? →

☐ Y - Statistical analysis using entire data set may not be applicable. Consideration may be given to using the maximums or using a sub-set for statistical analysis (refer to Section 3.4.1 of the Application Document)

☒ N - Statistical analysis using entire data set may be applicable

2. Is the site public open space / recreational land where users are unlikely to be in the same location for extended period? →

☐ Y - Statistical analysis using entire data set may not be applicable. Consideration may be given to using the maximums or using a sub-set for statistical analysis (refer to Section 3.4.1 of the Application Document)

☒ N - Statistical analysis using entire data set may be applicable

<u>If statistical analysis is appropriate consideration should be given to the following methodology (refer to Section 3.4.1 of the Application Document):</u>

1. Samples should be sub-divided into appropriate depth ranges as defined by HSLs (i.e. surface to <1 m, 1 m to <2 m, 2 m to <4 m, 4 m+).
   Note if considering basement, the appropriate displacement distance should be accounted for.
2. For each depth range, the statistical mean (e.g. 95% UCL arithmetic mean) soil concentration should be calculated for each chemical. One approach is described in the NSW EPA *Contaminated sites: Sampling design guidelines* (1995). The coefficient of variance test described in the document may be used to determine if the distribution is normal or lognormal. Consideration of other statistical methods may be adopted if justified (e.g. distribution does not fit a normal or lognormal distribution).
3. For samples with no detection, it is recommended to use half the detection limit during statistical analysis.
4. If the standard deviation is very large (due to outliers or low number of samples) the statistical mean may be higher than the maximum concentrations. In this case it is recommended to use the maximum.
5. It is recommended to keep note of maximum concentrations as well as statistical mean concentrations. Maximum concentrations may be required to address potential acute exposure issues.

Groundwater concentrations

Has floating product been identified in any well? →

n Y - Refer to point (a)

(a) If PSH is identified, dissolved phase is likely to contain chemicals at solubility limits. Proceed with HSL comparison, noting that if there is at least one chemical for which HSLs in groundwater is limiting (i.e. not all chemical HSLs are NL) then presence of PSH may be a potential vapour risk to site users (refer to Section 3.4.2 of the Application Document). Also note that the presence of PSH may trigger other legislative requirements for remediation/monitoring.

Is the area of interest represented by a single groundwater location or multiple ? →

☐ Single - small area of interest such as residential dwelling may be represented by the maximum groundwater concentration if the dwelling location is unknown, otherwise if the building footprint is known, the groundwater well nearest to the point of interest may be used.

☒ Multiple - where exposure may occur over larger areas such as recreational parkland, consideration may be given to averaging the concentrations across the area of interest.

In deciding which set of monitoring data is most useful for analysis consideration may also be given to:
- Historical results to determine trends in groundwater concentrations (i.e. the likelihood that concentrations may increase)
- Upgradient wells and background concentrations
- Groundwater flow direction

(Refer to Section 3.4.2 of the Application Document.)

Step 5 – Selection of relevant source concentrations (cont)

Soil vapour concentrations

Is the area of interest represented by a single or multiple vapour location?	→	🟦 Single - small area of interest such as residential dwelling may be represented by the maximum soil vapour concentration if the dwelling location is unknown, otherwise if the building footprint is known, the groundwater well nearest to the point of interest may be used. 🟩 Multiple - where exposure may occur over larger areas such as recreational parkland, consideration may be given to averaging the concentrations across the area of interest.
Are soil vapour samples measured in shallow soil less than 1 m from the surface where there is no existing slab or concrete paving?	→	🟨 Y - Measurements are subject to influence from weather and atmospheric conditions and may not be considered reliable.
Are soil vapour samples measured in areas where there is no existing slab or concrete paving, and the site is planned to be redeveloped where a building will exist (residential/commercial/ industrial use)?	→	🟨 Y - Soil vapour samples not measured within a soil or groundwater source, may not be representative of the soil vapour in the future when a building is located on site. The placement of an impermeable barrier such as a concrete slab can cause build-up of soil vapour within the soil and sub-slab, above levels measured where there is no slab present. Note soil vapour measurements from within soil and groundwater sources are not subject to vapour build-up as the soil vapour is likely to be at its maximum concentration when located within the source.

Soil vapour measurements may be taken at multiple depths, including within the source zone, above the source zone, and directly under a building foundation. Each of the measurement depths should be considered individually.

Refer to Sections 3.4.3 and 1.6 of the Application Document.

Step 6 – HSL determination and combined vapour intrusion and direct contact

HSL determination

HSLs and satuaration/solubility limits are presented in the Appendix B HSL tables. Select the appropriate HSLs for vapour intrusion from tables for:
1) Each selected receptor listed in Step 2
2) Dominant soil texture classification listed in Step 3
3) Source depth listed in Step 4
HSLs may be compared to soil/groundwater/soil vapour source concentrations determined in Step 5.
Note for TPH C6 to C10, BTEX should be subtracted from analytical result prior to comparing with HSL

1. Is the HSL value Not Limiting 'NL'? →
   - ☐ Y - Indicates that vapour reaches saturation point and cannot increase to a point which would result in an unacceptable health risk
   - x N - Continue with Question 2 for groundwater, or proceed to Question 3

2. Is groundwater HSL not 'NL' and PSH identified in water? →
   - ☐ Y - May indicate potential vapour risk (refer to Section 3.4.2 of Application Document)
   - x N - Proceed to Question 3

3. Are comparisons being made against soil HSLs? →
   - x Y - Proceed to Question 4
   - ☐ N - Proceed to Question 5

4. Does direct contact need to be considered as well as vapour intrusion? →
   - n HSL-A Low-Density Residential - surface soils, and possibly subsurface soils if determined to be relevant (refer to Section 4.7 of Application Document). Proceed to 'Combined pathways exposure'
   - n HSL-B High-Density Residential – surface soils. Proceed to 'Combined pathways exposure'
   - n HSL-C Open Space Recreational – surface soils. Proceed to 'Combined pathways exposure'
   - y HSL-D Commercial / Industrial – surface soils. Proceed to 'Combined pathways exposure'
   - y Intrusive Maintenance Worker – down to 2 m. Proceed to 'Combined pathways exposure'
   - ☐ N - Proceed to Question 5

5. Do cross-scenario exposure need to be considered? →
   (eg. adjacent residential and open space)
   - ☐ Y - Proceed to 'Combined pathways exposure'
   - n N - Proceed to Step 7

Combined pathways exposure

Refer to Section 3.3 of the Application Document.
Combined exposures may occur on the same property where indoor vapour intrusion occurs concurrently with outdoor direct contact.
Combined exposure may also occur on adjacent properties, e.g. vapour intrusion on residential property and direct contact on adjacent open space (park).
For the given scenarios/chemicals, list the HSLs.
Where a vapour intrusion HSL is Not Limiting (NL) the chemical / scenario does not need to be considered in the combined pathway exposure.
The combined exposure is assessed as follows:

Multiple exposure pathways:

$$\text{Cumulative Fraction} = \frac{C_{\text{UnderBuilding}}}{HSL_{\text{VapourIntrusion}}} + \frac{C_{\text{OutsideBuilding}}}{HSL_{\text{DirectContact}}}$$

where vapour intrusion can refer to soil, groundwater or soil vapour source

Multiple exposure scenarios:

$$\text{Cumulative Fraction} = \frac{C_{\text{Land use 1}}}{HSL_{\text{Land use 1}}} + \frac{C_{\text{Land use 2}}}{HSL_{\text{Land use 2}}}$$

where the HSLs may refer to HSLs for vapour intrusion or direct contact

If a given C/HSL fraction is less than 0.1, the contribution of risk may be considered insignificant and the cumulative exposure need not be assessed for this scenario.
Where a cumulative fraction is less than 1 risk is normally acceptable. Where the value exceeds 1 a site-specific assessment should be undertaken, or proceed to Step 7.

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Step 7 – HSLs and adjustments (vapour intrusion)

HSL adjustments (vapour intrusion only)
For each adjustment, careful consideration and justification is required.

1. Vapour biodegradation (refer to Section 4.2 of Application Document)
Prior to applying attenuation factor for vapour degradation, it is recommended to read the source documentation (Davis et al. 2009).
The minimum requirements for allowing attenuation factors for vapour degradation are as follows:

1. Is there evidence of oxygen penetration? →	☐	Y - Requires measurement of oxygen in soil gas with at least 5% at 1 m depth
(refer to Section 4.2.1 of Application Document)	☒	N - Attenuation factor may not be applicable
2. Is the source depth 2 m or deeper? →	☒	Y - Continue to Question 3
(refer to Section 4.2.2 of Application Document)	☐	N - Attenuation factor may not be applicable
3. Does the slab have one side less than 15m length? →	☒	Y - Degradation factor may apply. Less than 4 m depth, a factor of 10 may apply. 4 m and deeper, a factor of 100 may apply.
(refer to Section 4.2.3 of Application Document)	☐	N - Attenuation factor may not be applicable

2. Soil organic carbon content (refer to Section 4.3 of Application Document)
May be used to adjust soil HSLs only. Soil HSLs were based on fraction organic carbon content of 0.003.
HSL may be adjusted if background levels of organic carbon content at the same depth as source is different from baseline. Background sample must not be contaminated with hydrocarbons. If surface soil, background sample in open space may not be appropriate to use if comparing for soil under slab.

Adjustment is linear, i.e. doubling the organic carbon will double the HSL. Applies only to soil HSL for vapour intrusion.

3. Air exchange rate (refer to Section 4.4 of Application Document)
HSLs are based on air exchange rate (AER) of 0.6 h^{-1} for residential and 0.83 h^{-1} for commercial.
Careful justification may be required prior to changing AER. Consideration should be given to weather conditions, practice of leaving doors/windows open, or closed in climate controlled building. New buildings tend to be more air tight to comply with energy saving regulations.

For soil and groundwater, adjustment is linear with respect to AER.
For soil vapour, adjustment is variable depending on soil type and depth.
Refer to the charts in Appendix D to determine the adjustment factor.

4. Moisture content (refer to Section 4.5 of Application Document)
HSLs may be adjusted if moisture content in soil is significantly different from baseline HSLs. The baseline moisture contents used were (dry wt) for sand 8%, silt 22% and clay 20%.
Moisture content should be representative of long-term moisture content and not short-term result from recent rain event. Also note that for a development with future building where no building currently exists, moisture contents on site may not be representative for the future state of the site.
HSL scaling factors for different land use/chemicals/soils are presented in Appendix C of the Application Document and may be applied as described in Section 4.5.

Step 7 – HSLs and adjustments (vapour intrusion) (cont.)

Saturation/solubility limits (soil and groundwater HSLs only)

Apply the adjustments to the HSLs for vapour intrusion by multiplying by the determined factors.

After applying the adjustments to the HSLs, is the revised HSL greater than the solubility / saturation limit? →

☐ Y - Indicates that the predicted source concentration to produce an unacceptable vapour risk is higher than the saturation point. The revised HSL is not limiting to vapour (NL). Note this does not apply to soils with direct contact.
☒ N - Revised HSL may be compared with measured source concentrations.

Multi-Pathway Exposure

1. Is inclusion of direct contact with soils required? →

☐ Y - Repeat Step 6 with Adjusted Vapour Intrusion HSLs and Direct Contact HSLs
☒ N - Proceed to Question 2

2. Is cross-scenario exposure required to be assessed?

☐ Y - Repeat Step 6 with Adjusted Vapour Intrusion HSLs and Direct Contact HSLs
☒ N - Proceed to 'Screening assessment'

Screening assessment

Is the adjusted HSL less than source concentration? →

☐ Y - Indicates potential health risk
☒ N - Considered within acceptable health risks. If cancer endpoint (benzene) may also need to assess cancer risk level and cumulative cancer risk in Step 8

Is the maximum soil, groundwater or soil-vapour concentration greater than the HSL by more than one or two orders of magnitude? →

☐ Y - Indicates potential acute risk around hotspot
☒ N - Considered within acceptable health risks

If the screening assessment indicates the potential for unacceptable health risk, consideration may be given to further investigations such as further contamination delineation, site-specific health risk assessment or site management. Before deciding the appropriate form of action considerations should include:
- The magnitude of HSL exceedance
- The nature of the source
- The time frame required for managing health risks
- Other statutory requirements

Step 8 – Cancer risk assessment

Acceptable cancer risk

(Refer to Section 5.1 of Application Document)

HSLs for benzene have been based on 1 x 10^{-5} cancer risk. In some jurisdictions it may be required to assess carcinogenic risks based on 1 x 10^{-6} cancer risk.

1) The HSLs are linearly related to acceptable risk. HSLs based on a cancer risk of 1 x 10^{-6} may be calculated by dividing the HSLs in Appendix B by a factor of 10.
2) If the HSL is NL (vapour only HSL), it is possible that it may become limiting if the HSL is within a factor of 10 of the soil saturation concentration (or solubility limit for groundwater).
3) If soil or groundwater source concentration is less than an order of magnitude of the saturation concentration / solubility limit (in Appendix B), then even dividing the non-limiting HSL by 10 would result in an acceptable risk. Hence there is no need to proceed further.
4) If soil or groundwater source concentration is within an order of magnitude of the saturation concentration / solubility limit it is recommended to calculate the revised HSL from the non-limiting HSL. This process is outlined as follows:

Calculating revised HSL for 10^{-6} cancer risk from non-limiting HSL.

1) The non-limiting HSLs are presented in Friebel & Nadebaum 2011 (Part 1).
2) The derived HSLs are presented in Appendix F.
3) Find the pages that correspond to the source type (soil, groundwater, soil vapour) for the given scenario (residential / commercial / recreational / intrusive maintenance). Note indicator chemicals and TPH have been separated.
4) For the corresponding soil category, depth and chemical, the Vapour Intrusion HSL and saturation/solubility concentration is presented in the columns on the right.
5) If this HSL is divided by 10 and the result is greater than Csat (for soil) or saturation limit (for groundwater), then the revised HSL is still NL. Otherwise the result is the revised Vapour HSL.

Cumulative cancer risk

(Refer to Section 3.6.1 of Application Document)

HSLs for benzene have been based on 1 x 10^{-5} cancer risk. In most jurisdictions it is required to assess total carcinogenic risks based on 1 x 10^{-5} cancer risk.

If HSLs are not NL for benzene and another carcinogenic chemical is identified, such as PAHs, follow the proedure outlined in Section 3.6.1.

The cumulative fraction may also be applied to more than two chemicals.

Note that multiple sources should be considered. For example, a resident may be exposed through direct contact with PAHs in surface soil, but also benzene vapours from soil and groundwater. For vapour risk (benzene), the risk contribution should consider the greatest risk for the receptor from all vapour sources. Because multiple sources do not have an additive effect, the source with the greatest risk needs to be identified (refer to Section 3.5 for discussion on multiple vapour sources). This means that for all sources/depths the source concentration should be divided by their respective HSLs to calculate the benzene contribution to cumulative risk. The highest fraction determines which source poses the greatest risk to receptors.

The same may be carried out for carcinogenic PAHs. The sum of the highest benzene fraction and the highest PAH fraction results in the highest possible cumulative fraction.

Howarth Fisher and Associates
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Structural, Civil and Traffic Engineering

Structural and Civil Engineering

Project Design and Management
Forensic Engineering and Structural Inspections
Research and Development Facilitators

Traffic Engineering

Traffic Management Studies and Traffic Impact Assessment
Expert Witness Representation
Road Safety Audits

Traffic Impact Assessment Report

209 - 215 Harrington Street, Hobart
Mixed Use Development

Prepared for

6ty° Pty Ltd obo Stephen Chau

Date
November 2018

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Table of Contents

	Name	**Signature**	**Date**
Authorised by:	**Joanne Fisher**		**20th November 2018**

1. Introduction

1.1 Client Details

This document has been prepared for the following:

Client Contact Details: Mr George Walker

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1.2 Project Details

The report is undertaken for the site at 209 -215 Harrington Street, Hobart.

A copy of the proposed development plans can be found at **Appendix B.**

2. Scope of Consultancy

The scope of consultancy involves the following:

- To obtain background information and plans.
- Liaise with Hobart City Council
- To undertake a site visit
- To assess sight distances in accordance with the requirements of the Planning Scheme.
- To assess intersection operation in light of the proposed development.
- To assess access provision in accordance with the requirements of the Australian Standard and the Hobart Interim Planning Scheme.
- To assess parking requirements and assess shortfall against the performance criteria outlined in the Planning Scheme.
- Undertake a parking survey (including an inventory) within 400metres walking distance of the proposed site on a Thursday to assess on street parking availability in walking distance of the proposed development between 7am – 7pm (12hrs)
- Analyse and assess findings (4hrs)
- Investigate other similar developments and assessments of parking supply for comparison purposes.
- Assess trip generation rates against current use.
- Assess layout of the car parking and check compliance against the AS2890.1: Off Street parking 2004.
- Assess servicing requirement and provision.
- Run Autotrack paths.
- Assess access against sustainable transport modes.
- Document findings in a Traffic Impact Assessment Report.

3. Location of the Development

Figure 1 shows the location of the proposed development in the context of the surrounding street network.

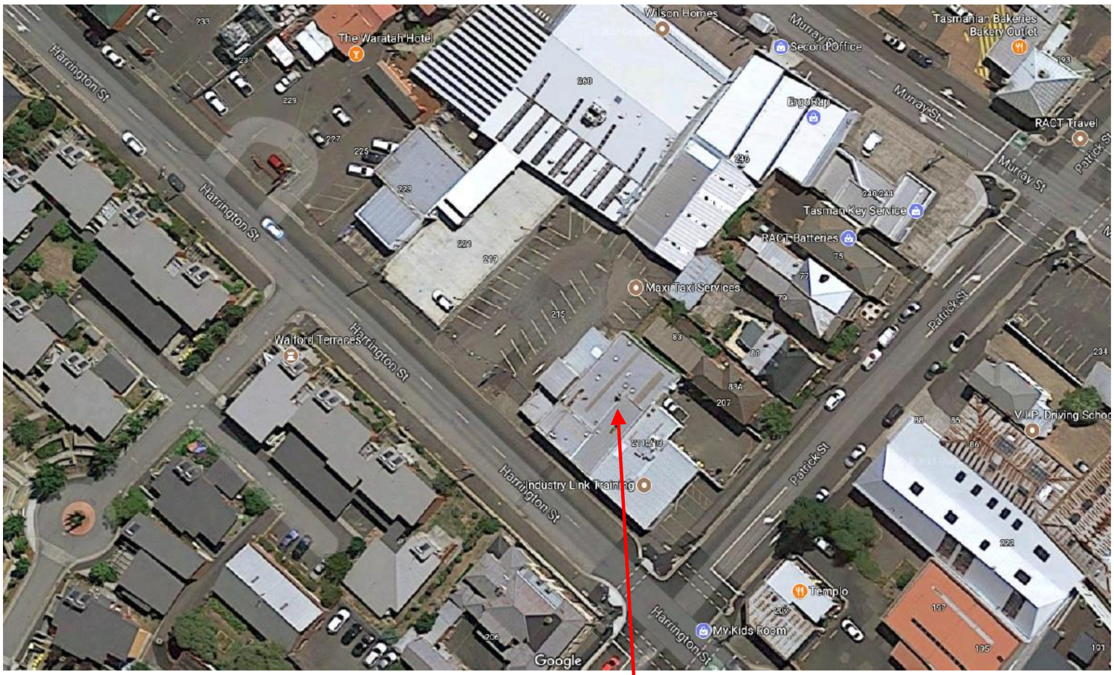

Figure 1: Location *(source: Google Maps 2017)*

4. Existing Situation

4.1 Site Details

The site is located at 209-215 Harrington Street, Hobart. The development has frontage onto both Patrick Street and Harrington Street, Hobart. The intersection at Patrick Street and Harrington Street is subject to traffic signal control.

Photograph 1: Traffic Signal control at the intersection of Harrington and Patrick Streets.

Harrington Street operates as a one way northbound road with two through lanes and on street restricted parking on both sides of the road. There are two crossovers / accesses on Harrington Street from the car park (an ingress and egress).

The ingress into the car park located on the Harrington Street frontage is 3.7 metres wide and the separate egress is 4.6 metres wide. The accesses are shown in the photograph overleaf:

Photograph 2: Showing the separate access and egress into the carpark on Harrington Street

Photograph 3: The crossover to the Patrick Street off street parking is 15 metres wide as shown in the photograph above

Photograph 4: Patrick Street has two westbound lanes and one eastbound lane with restricted on street parking on both sides of the road.

There are four on site car parks requiring vehicles to drive in from Patrick Street and reverse out on to Patrick Street. There is also an adjacent off street parking which makes provisions for seven vehicles inclusive of a garage (as shown in the photographs 5 and 6).

4.2 Road Width

The existing accesses into the site are via both Harrington Street and Patrick Street. The road widths of the two roads are outlined below:

Patrick Street - 11.7 metres wide (measured between kerb face).

Harrington Street - 11.2 metres wide (measured between kerb faces).

Photographs 5 and 6: Showing existing crossovers on Patrick Street

The site is currently used as an off street car park accommodating 28 long stay vehicles accessed off Harrington Street. There was formerly a Jackson Security retail outlet on the corner of Harrington Street and Patrick Street and latterly a culinary training centre.

4.3 Traffic Volumes

The Hobart City Council has been contacted and has advised of the following traffic counts:

Patrick Street	No traffic counts available.
Harrington Street	6,836 vehicle movements per day (forecast 2017 flows 7,779 per day). 725 during the evening peak hour (forecast 2017 flows 825 vehicles per hour). 650 during the morning peak hour (forecast 2017 flows 740 per hour).

These figures are based on Hobart City Council Metro Count data from 2004. Given that this data is 13 years old a traffic growth factor of 1%[1] per annum compound growth rate has been applied

Harrington Street is a major collector road providing an important northbound one way link through the City, it provides a connection from Sandy Bay Road, Davey Street and Macquarie Street in the South, to North Hobart.

Patrick Street is a minor collector road operating in an east west direction through the City, it provides an east west connection between West Hobart and Campbell Street.

4.4 Posted Speed Limits

The speed limit along Harrington Street and Patrick Street, in the vicinity of the proposed development is 50km/hr, the standard urban default speed limit.

4.5 Accident History

In line with standard traffic engineering practice, the accident history for the past five years has been obtained from the Department of State Growth.

There have been seven accidents in the vicinity of the proposed development in the last five years.

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[1] Estimated - based on traffic growth figures of approximately 1% compound growth on roads in Hobart as outlined in the Traffic Congestion Report, 2016.

Six of these were property damage only accidents and one was a minor damage only accident.

Three were three cross traffic accidents at the intersection of Harrington and Patrick Streets and one side swipe accident. One involved a vehicle emerging from a driveway or lane way, another involved a vehicle entering a parking area and the other was classified as a cross traffic accident involving straight through vehicles.

4.6 Proposed Development

The proposed mixed use development comprises 39 residential apartments, comprising 9 x 3 bedroomed apartments, 27 x 2 bedroomed apartments, 3 x 1 bedroomed apartments and two retail tenancies, (retail tenancy 1 has a floor area of 127m^2 whilst retail tenancy 2 has a floor area of 85m^2).

There are 39 car parking spaces on the ground floor, including one accessible bay. This equates to one parking space per apartment.

There are 9 bicycle parking cages proposed within the car parking area to facilitate and encourage cycling as a mode of transport to and from the site.

5. Assessment of Trip Generation

5.1 Existing Trip Rates

A survey was undertaken on Monday 31st October between 4.30pm and 5.30pm to determine trip generation to the existing site. The results have been documented in the table below:

Time and Date	Number of Trips	TOTAL
4.30pm - 5.30pm Monday, 31st October 2017	15 trips All vehicles exiting the car park and the Training Centre parking	15 trips

Table 1: Showing trip generation to the existing site during the evening peak hour. October 2017

5.2 Proposed Trip Generation

5.2.1 Survey Data

Surveys of trip generation to Inner City Hobart apartments have been undertaken for comparison purposes. The following peak hourly trip rates were observed.

Land Use	Trip Generation Rates	Total
Hobart city apartments *Block of 76 apartments* *2 and 3 bedroomed*	Evening peak hour 5pm-6pm	12 0.15 per apartment

Table 2: Additional Trip Generation for Apartments: Source: *Howarth Fisher and Associates, 1 Collins Street Survey.*

Based on a pro rata trip generation the proposed development will generate an estimated 6 trips during the peak hour associated with the residential component. The evening peak hour trip generation for restaurants of 5 per $100m^2$ (based on the rates contained in the NSW, RTA Guide to Traffic Generating Developments 2002). This equates to a worst case scenario of an additional 11 trips in the evening peak period.

5.2.2 Greater Hobart Household Travel Survey

For comparison purposes, trip generation rates based on the results of the Greater Hobart Travel Survey have been made. This survey was undertaken in December 2010 and concluded that on average each resident in Greater Hobart makes 2.7 trips per day on a typical weekday. Based on the typical demographic of predominantly one and two bedroom apartments being accommodated by single people and couples, it can be estimated that the residential element of the development will generate approximately:

TOTAL = 73 trips per day

Based on the assumption that 10% of trips occur during the peak hour this equates to **8 peak hourly trips**.

Also assuming that there is a 50:50 split between single and two persons ownership, the development will generate approximately 73 trips per day of which typically 10% occur in the peak hour (approximately 8 trips per hour). Given its location, the development is well located to take advantage of access to the site by sustainable transport, therefore reducing the dependence on car based transport.

The site is located in close proximity to the City of Hobart as well as the commercial precinct of North Hobart, reducing the reliance on the use of the private car and enabling short distance walking trips.

There is a good network of pedestrian footpaths in the location of the site further facilitating walking as a mode of travel to and from the proposed development site.

The site is also located in close proximity to the Hobart bicycle network. There are also 9 bicycle parking lockers provided to facilitate safe and secure parking for cyclists.

6. Assessment of Parking

6.1 Existing Situation

There are 28 parking bays on the existing site as shown in the photograph below:

Photograph 7: Existing Parking Bays located at the site

It is anticipated that the 28 long term parking spaces accessed off Harrington Street will be relocated to another private long stay car park in the vicinity of the site. There are a number of private long stay car parks located in the vicinity of the site. Two of the spaces in this car park are leased to the current culinary training centre and therefore this parking demand will not exist once the proposed development proceeds.

There are five on site car parks requiring vehicles to drive in from Patrick Street and reverse out on to Patrick Street. There is also an adjacent off street park which makes provisions for approximately seven vehicles inclusive of a garage (as shown in the photographs 5 and 6).

6.2 Parking Requirements

Table 4: Parking requirements for the Proposed Development Land Uses based on the Requirements of the City of Hobart Interim Planning Scheme (2015)

Land Use	Parking Rates	Total Requirement
30 Apartments *2 & 3 bedroomed* *Assumed multiple dwelling containing 2 or more bedrooms* *(including all rooms capable of being used as a bedroom)*	*2 for each dwelling and 1 dedicated visitor parking space per 4 dwellings (rounded up to the nearest whole number).*	60 + 8
9 x 1 bedroomed	*1 for each dwelling and 1 dedicated visitor parking space per 4 dwellings (rounded up to the nearest whole number).*	9 + 2
Retail Area *85m^2* *Assumed General Retail / Food services* *127m^2*	*General Retail 1 for each 30m^2 of floor area* *Food Services* *15 for each 100m^2 of floor area*	7.07 - 31.8
TOTAL		87 – 111 spaces

6.3 Proposed Parking Provision

The proposed development comprises 36 parking spaces, which results in a shortfall of between 87 and 111 space shortfall (depending on whether the tenancies are filled with general retail or food services).

As outlined at section E6.6.1 of the City of Hobart Interim Planning Scheme, 2015:

Objective

To ensure that 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

Performance Criteria

The number of onsite car parking spaces must be sufficient to meet the reasonable needs of users having regard to all of the following:

a) *Car parking demand;*

It is assumed that there will be a residential parking demand of at least 1 bay per apartment (a total of 39 spaces). Whilst the parking associated with visitors to the retail, food service and residential function cannot be provided on the site, it is anticipated that they will require short term car parking which will be accommodated within the on street restricted parking area, which operates in the immediate vicinity of the site.

Furthermore, people purchasing or renting the apartment will be aware of the parking space provision and will only chose to live in an apartment of the parking provision is appropriate. There are many examples of apartment in and close to the Hobart CBD where parking spaces is limited. For example, Collins Street / Sun Street apartment provides 1 parking space per apartment (some of which are 2 and 3 bedroomed). In addition the Battery Square apartment, in Battery Point also provide one car parking space for each 2 bedroomed apartment. Two bedroomed apartments at 77 Molle Street and 92 Barrack Street have one parking space per apartment. Whilst the 1 bedroomed apartments located at 156 Bathurst Street have no parking provision associated with them.

b) *The availability of on street and public parking in the locality;*

Currently there is restricted on street parking in the vicinity of the site on Patrick Street and Harrington Street. There is 1 hour restricted parking along the road frontage operating between 8am-6pm, Monday – Friday and 8am - 12pm Saturday and 15 minutes restricted parking along the Harrington Street frontage which can accommodate approximately 4 vehicles.

There is 2 hour restricted parking along the opposite side of Harrington Street, which can be utilised for users of the retail function and for visitor parking. There is 1 hour restricted parking along Patrick Street which can be utilised by visitors and residents of the proposed redevelopment

The consolidation of the crossovers in Harrington Street will increase the amount of kerbside parking available and the reduction in crossover widths on Patrick Street from 15 metre to 5.5 metre will provide an additional two on street parking bays in the vicinity of the site.

An inventory of parking was undertaken within a 400metre walking distance of the proposed development site. A parking survey was undertaken on Thursday 1st November 2018, to determine the parking availability within a 400 metre walking distance of the site.

A patrol type survey was undertaken starting at 7am and concluding at 7.30pm.

The results of the survey are tabulated below:

Street Name	**Number of Vacant Spaces**								
	7am	**9am**	**1015am**	**1130am**	**1pm**	**3pm**	**4pm**	**5pm**	**6.30pm**
Elizabeth Street	52	40	36	28	28	27	39	33	10
Murray Street	50	34	24	32	38	34	49	50	48
Harrington Street	35	15	38	37	27	25	58	51	59
Watkins Street	0	1	2	2	2	5	15	10	7
Browne Street	0	0	2	0	0	2	3	3	4
Warwick Street	32	4	3	25	16	21	0	34	20
Patrick Street	45	10	24	19	16	21	32	42	53
Brisbane Street	42	21	22	8	23	10	39	46	40
Melville Street	19	16	18	10	20	18	30	16	16
TOTAL	**275**	**141**	**169**	**161**	**170**	**163**	**265**	**285**	**257**

Table 5: Vacant parking supply within 400 metres walking distance of the site

Predominantly the parking within a 400metre walking distance of the site is subject to some restriction. However, typically most parking in the vicinity of the site starts at 8.30am and finishes at 6pm, providing a large supply of unrestricted parking between outside these hours, for visitors and or users of the retail and /or restaurant space. Notwithstanding the above, there are a minimum of 141 vacant spaces and a maximum of 285 vacant spaces in a reasonable walking distance of the site. Given the above there are enough on street parking spaces to cater for the shortfall in parking supply, although some may be subject to a short time restriction.

c) *The availability and frequency of public transport within a 400 metres walking distance of the site;*

The site is located in close proximity to a very high frequency public transport service operating along Elizabeth Street which is 300 metres from the proposed mixed use development. The 500, 501, 502, 503, 504, 510, 511, 512, 513, 520, 522 all operate along Elizabeth Street, which provide a 10 minute frequency bus service between Glenorchy and Hobart, Monday to Friday between 7am – 7pm, a twenty minute frequency service on Saturdays between 7am – 7pm and every 30 minutes frequency service on Sundays and public holidays.

This is one of the highest frequency public transport operations in the state which can be readily used by users of the proposed redevelopment.

d) *The availability and likely use of other modes of transport;*

The site is served on both sides by 2.9 metre wide footpaths. There are good pedestrian crossing facilities located at the traffic signal pedestrian controlled intersection of Patrick Street and Harrington Street.

e) *The availability and suitability of alternative arrangements for car parking provision;*

There is restricted short term on street parking in the immediate vicinity of the site, including the street frontage on Harrington Street and Patrick Street which can be used for parking associated with the retail and / or food restaurant land uses proposed on the site. It is anticipated that all residential parking can be contained on the site given that it is unlikely that all residents of a two and three bedroomed apartment will own two cars. Furthermore, people purchasing or renting these apartments will be aware there is a single parking space. The parking restriction on the surrounding street network typically operates between 8.30am to 6pm, Monday to Friday. Therefore, any parking requirement, for example, people visiting a restaurant or residents in the apartments in the evenings, will be able to do so without any issue.

Furthermore, there is a residential parking zone (area II) which can be used by residents in the unlikely case that extra residential parking be required.

f) *Any reduction in car parking demand due to the sharing of car parking spaces by multiple uses;*

It is likely there will be residents of the proposed apartment land use who will also be patrons of the retail and or food tenancies located on the site. This shared parking demand should be considered in order to prevent double counting of total parking demand. Similarly, residents of the proposed apartment development may also work in the retail / food tenancies, thereby reducing further the total overall parking requirement at the site.

The retail / food service land uses will also be utilised by people living and working in the vicinity of the proposed development site. Again many of these people will already be parked in a space and will not require additional parking spaces. There are both residential and commercial land uses in the vicinity of the proposed site that will facilitate users of the proposed development to either walk or cycle to the site.

g) *Any car parking deficiency or surplus associated with the existing use of the land;*

Currently there is a culinary training centre operating on the site with five parking bays. Based on the requirement of the current Hobart Interim Planning Scheme 2015, this land use has eight administrative and teaching staff and a maximum of ten students. The staff use the five bays in the vicinity of the site and have two off site bays. However, it is likely that some of the students park in the vicinity of the site whilst attending courses.

It is anticipated that this shortfall in parking is catered for by the surrounding road network.

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 (n/a)

i) *The appropriateness of a financial contribution in lieu of parking toward the cost of parking facilities or other transport facilities, where such facilities exist or are planned in the vicinity.*

n/a

j) *Any verified prior payment of a financial contribution in lieu of parking for the land;*

n/a

k) *Any relevant parking plan for the area adopted by Council;*

Action 3 of the Hobart City Council Parking Plan states that:

The future installation of parking metres in existing high demand timed limited zoned spaces close to shops and restaurants would improve the turnover of spaces and therefore increase the parking opportunities for visitors and shoppers looking for short term parking.

Further actions contained in Action 1 of the Parking Plan which would help ensure the availability of the on street parking supply in the vicinity of the proposed development is outlined below:

Maintain regular reviews of non-metered parking zones and restrictions to ensure they are appropriate to meet the needs of residents and businesses located near to them

Investigate the possible installation of parking meters as an extension of the existing metered area to assist visitors to local businesses to find parking spaces.

l) *The impact on the historic cultural heritage significance of the site if subject to the Local Heritage Code;*

n/a

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.*

n) *n/a*

The proposed layout of the parking can be found **in Appendix B** of this report.

6.4 Dimensions and Manoeuvring

In line with the requirements of the Australian Standard staff and residential parking bays are defined as user Class A parking and are required to be 2.4 metres x 5.4 metres long (except where parking is to a low kerb where they can reduce to 4.8metres in length). The parking layout complies with the Standard requirement.

6.5 Circulation and Search Pattern

Two way circulation patterns are proposed throughout the car park. It is proposed that discretion is sought, given that turning end bays are not being provided at blind aisles, as each space will be allocated to a residential apartment or staff member in the retail / food service outlet.

6.6 Accessible Parking

In line with the requirements of section E6.6.2 of City of Hobart Planning Scheme, 2015, *to ensure that a use or development provides sufficient accessible car parking for people with a disability.*

A1) Acceptable Solution

Car parking spaces provided for people with a disability must:

a) Satisfy the relevant provision of the Building Code of Australia
b) Be incorporated in the overall car parking design.
c) Be located as close as possible to the building entrance.

There is no requirement for accessible parking associated with the apartments. In spite of this there is one accessible bay provided.

There is a requirement for one accessible bay associated with the shops / café (class 6). There is a requirement of one space for every 50 car parking spaces or part thereof.

There is a requirement of one accessible bay associated with this retail use. It is proposed that the disabled bay be located on the street frontage to provide an at grade access to the retail facilities.

6.7 Bicycle Parking

The requirement for bicycle parking is contained in Table E6.2 of the City of Hobart Interim Planning Scheme, 2015.

Land Use	**Parking Rates**	**Total Requirement**
39 Apartments *Assumed multiple dwelling*	*No requirement*	0
Retail Area *212m^2* *General Retail* *Food services*	***Food Services*** ***Employee*** *1 for each 100m^2* *of floor area*	2.12
	Visitor *1 for 200m^2 floor area after the first 200m^2* (minimum 2)	2
	General Retail ***Employee*** *1 for each 500m^2 floor area after the first 500m^2*	0
	Visitor *1 for each 500m^2 floor area*	1
TOTAL		3 employee spaces 2 visitor spaces (for food services land use) or 1 visitor space for general retail

Table 3: Showing the Bicycle Parking Requirement for the proposed Development

Based on the requirement of the planning scheme the employee spaces need to be locked compounds with communal access using duplicate keys. The visitor bays need to be facilities to which the bicycle frame and wheels can be locked.

A bicycle storage area has been provided within the car park, significantly exceeding the requirement of the Planning Scheme and demonstrating the proponent’s commitment to more sustainable transport modes.

7. Assessment of Access

7.1 Existing Situation Access Width

There are four existing accesses at the site, two located on Patrick Street and two on Harrington Street.

Photograph 8: Showing the existing accesses onto Harrington Street

Photograph 9: Showing the existing 15 metre wide crossover onto Patrick Street

The one 15 metre wide crossover on Patrick Street forms an access into the secure off street car park as well as the 90 degree angled parking bays, (which require vehicles to drive in and reverse out on to Patrick Street).

7.2 Proposed Accesses

The proposed development involves the provision of one 5.5 metre wide access serving 28 spaces accessed from Harrington Street.

There is a separate 5.5 metre wide access on Patrick Street which serves 34 bays on a basement floor level. There is also access to a 23 space bicycle storage area and 4 motorcycle bays.

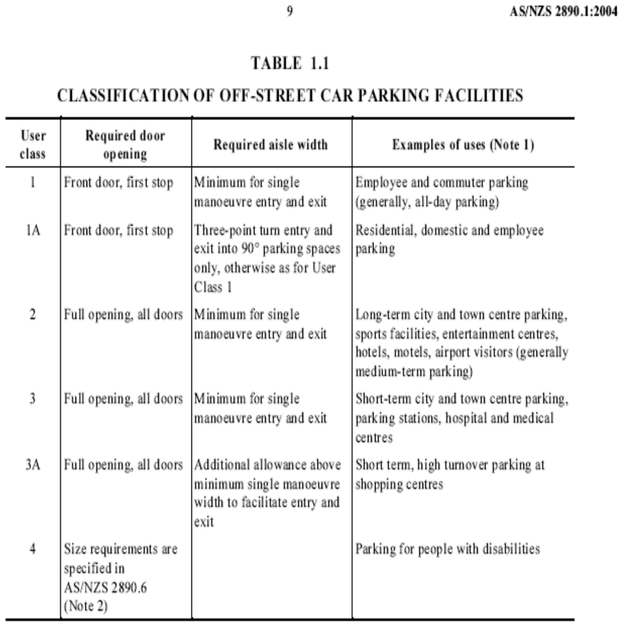
This is in line with the acceptable solution which states at section E.6.7.1:

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.

The development provides the opportunity to rationalise and reduce the number of crossovers along the Harrington Street frontage and reduce the overall crossover widths in both Harrington Street and Patrick Street. This is fully compliant with the acceptable solution contained within the City of Hobart Interim Planning Scheme, 2015.

7.3 Australian Standard Requirement

In line with Australian Standard AS2890.1 Off-street car parking facilities the class of the proposed parking facility is determined from the table 1.1 below:



9 AS/NZS 2890.1:2004

TABLE 1.1

CLASSIFICATION OF OFF-STREET CAR PARKING FACILITIES

User class	Required door opening	Required aisle width	Examples of uses (Note 1)
1	Front door, first stop	Minimum for single manoeuvre entry and exit	Employee and commuter parking (generally, all-day parking)
1A	Front door, first stop	Three-point turn entry and exit into 90° parking spaces only, otherwise as for User Class 1	Residential, domestic and employee parking
2	Full opening, all doors	Minimum for single manoeuvre entry and exit	Long-term city and town centre parking, sports facilities, entertainment centres, hotels, motels, airport visitors (generally medium-term parking)
3	Full opening, all doors	Minimum for single manoeuvre entry and exit	Short-term city and town centre parking, parking stations, hospital and medical centres
3A	Full opening, all doors	Additional allowance above minimum single manoeuvre width to facilitate entry and exit	Short term, high turnover parking at shopping centres
4	Size requirements are specified in AS/NZS 2890.6 (Note 2)		Parking for people with disabilities

From the Table 1.1 it can be seen that the type of the proposed parking facility is a user class 1A residential and employee parking.

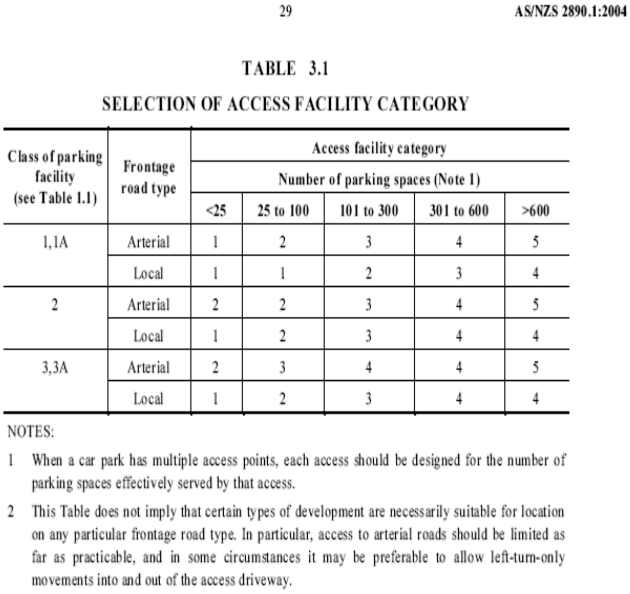
7.3.1 Category of Access Driveway

In line with AS2890.1 *to determine access driveway widths and restrictions on their location along frontage road table 3.1 categorizes driveways according to –*

a) the class of parking facility as shown is table 1.1;

b) the frontage road type, either arterial (including sub-arterial) or local (including collector):and

c) the number of parking spaces served by the access driveway



29 AS/NZS 2890.1:2004

TABLE 3.1

SELECTION OF ACCESS FACILITY CATEGORY

Class of parking facility (see Table 1.1)	Frontage road type	Access facility category				
		Number of parking spaces (Note 1)				
		<25	25 to 100	101 to 300	301 to 600	>600
1,1A	Arterial	1	2	3	4	5
	Local	1	1	2	3	4
2	Arterial	2	2	3	4	5
	Local	1	2	3	4	4
3,3A	Arterial	2	3	4	4	5
	Local	1	2	3	4	4

NOTES:

1 When a car park has multiple access points, each access should be designed for the number of parking spaces effectively served by that access.

2 This Table does not imply that certain types of development are necessarily suitable for location on any particular frontage road type. In particular, access to arterial roads should be limited as far as practicable, and in some circumstances it may be preferable to allow left-turn-only movements into and out of the access driveway.

From table 3.1 above it can be shown that the proposed driveway of the user class 1A parking facility serving 28 and 34 spaces accessing a local frontage road falls into a Category –1 driveway.

7.3.2 Access Driveway Widths Requirement

In line with AS2890.1 the recommended width for the proposed category 1 driveway is determined from Table 3.2, which is between 3 metres – 5.5 metres combined. The proposed accesses are both 5.5metres wide and comply with the requirements of the AS2890.1: Off street parking - 2004 and the Hobart City Council Interim Planning Scheme, 2015.

The location of the access and egress points can be found on the plan at **Appendix B** of this report.

8. Assessment of Sight Distance

8.1 Planning Scheme Requirements

In accordance with the requirements of section E5.6.4 of the Hobart Interim Planning Scheme, 2015 a safe intersection sight distance requirement of 80 metres is required for a road with a 50km/hr posted speed limit.

8.1.1 Harrington Street Access

The sight distance from the proposed Harrington Street access was measured to exceed 80 metres as shown in the photograph below:

Photograph 10: Showing sight distance along Harrington Street exceeding the 80 metre requirement for a 50km/hr road.

8.1.2 Patrick Street Access

The sight distance from the proposed Patrick Street access was measured to well exceed 80 metres, in both directions, as shown in the photographs below:

Photograph 11: Showing sight distance along Patrick Street to the west

Photograph 12: Showing sight distance along Patrick Street to the east.

The sight distances from the two proposed accesses fully comply with the requirements of the Hobart Interim Planning Scheme 2015, for a road subject to a 50km/hr posted speed limit.

8.2 Pedestrian Sight Distance

Pedestrian sight distance will be maintained in line with the requirements of the AS2890.1: Off Street parking 2004, at both of the accesses. Materials which enable a vehicle to have visibility on the approach to the pedestrian footpath will be utilised in accordance with the requirements of Figure 3.3 below.

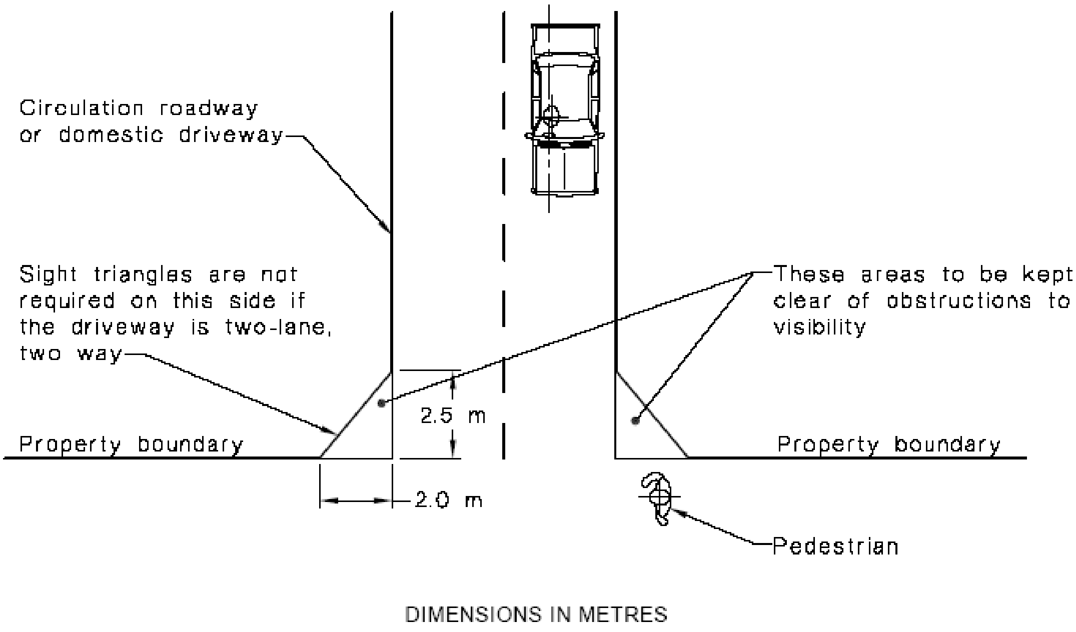


FIGURE 3.3 MINIMUM SIGHT LINES FOR PEDESTRIAN SAFETY

9. Servicing

It is proposed that the site will be serviced on street. There is currently a 19 metre length of 15 minute parking on the Harrington Street frontage which operates between 8am - 6pm, Monday to Friday, and 8am -12noon on Saturday. It is recommended a 10 metre length of this kerbside space be dedicated to service vehicles as a loading bay to cater for refuse collection and service vehicles at the site.

10. Sustainable Transport

10.1 Pedestrian

The site is located in close proximity to the City of Hobart and the commercial area of North Hobart, reducing the reliance on the use of the private car and enabling short distance walking trips.

There is a good network of pedestrian footpaths and traffic signal controlled crossing points in the vicinity of the development to further facilitate walking as a mode of travel to the residential and retail development.

10.2 Cycling

The site is located in close proximity to the City of Hobart and the commercial centre of North Hobart, making the proposed residential and retail land uses ideally situated to facilitate bicycle access. A significant number (72) bicycle parking facilities are incorporated into the car park design to further increase support and facilitate access to the site by bicycle.

10.3 Buses

The site is located in close proximity to a very high frequency public transport service operating along Elizabeth Street which is 300 metres from the proposed mixed use development. The 500, 501, 502, 503, 504, 510, 511, 512, 513, 520, 522 all operate along Elizabeth Street, which provide a 10 minute frequency bus service between Glenorchy and Hobart, Monday to Friday between 7am – 7pm, a twenty minute frequency service on Saturdays between 7am – 7pm and every 30 minutes frequency service on public holidays and Sundays. This is one of the highest frequency public transport operations in the state which can be readily used by users of the proposed redevelopment.

11. Conclusion and Recommendation

The proposed development has been assessed in relation to the following:

Trip Generation

A survey was undertaken to assess evening peak hour trip generation to the site. There were 15 vehicles observed leaving the existing site during a weekday evening peak hour. An estimate of 27 evening peak trips have been calculated (based on Howarth Fisher survey data undertaken at other residential developments that are located close to the CBD), as well as trip generation rates determined from the NSW, RTA, Guide to Traffic Generating Developments,2002, for restaurant land uses.

Parking

Based on the proposed land uses and the requirements of the Hobart City Council Interim Planning Scheme 2015, there is a shortfall in parking ranging between 87-111 spaces dependent upon the uptake of either retail or food land use in the proposed tenancies.

It has been assumed that not all owners of two bedroomed apartments are going to own two cars and the proposed on site provision of 39 spaces and development will adequately cater for the parking demand associated with the site.

The owners and tenants of the apartment will be well aware of the supply of parking and unlikely to purchase an apartment if demand for parking exceeds the supply of one parking space per apartment. The proximity of the apartment development to the CBD makes the development conveniently located for residents to walk into town for work, shopping and for other purposes, given that many commuters park in the nearby streets and walk a similar distance.

The one Collins Development, for example, provides one space for each unit, townhouse or apartment despite some of them being one bedroomed, two bedroomed or three bedroomed. There are other examples, in the City, of other apartment developments only providing one parking.

There is restricted short term parking for the retail /food service land uses along the street frontage and in the immediate vicinity of the site.

There is also likely to be an element of shared parking demand associated with residents of the apartments also visiting the retail / food tenancies below. This element of potential double counting needs to be considered when calculating overall parking requirements.

Sight Distance

The sight distances from the two proposed accesses fully comply with the requirements of the Hobart Interim Planning Scheme, 2015, for a road subject to a 50km/hr posted speed limit.

Access

The access widths, 5.5 metres, complies with the requirement for class 1 access driveway servicing 28 and 34 spaces, accessing onto a local road.

Servicing

It is proposed that the site will be serviced on street. There is currently a 19 metre length area of 15 minute parking on the Harrington Street frontage which operates between 8am - 6pm Monday to Friday and 8am - 12noon on Saturday. It is recommended a 10 metre length of this kerbside space be dedicated to service vehicles to cater for refuse collection (typically 8.8metres) and other service vehicles.

Sustainable Transport

The site is located in close proximity to the City of Hobart and the commercial area of North Hobart, reducing the reliance on the use of the private car and enabling short distance walking trips.

The site is also located in close proximity to the Hobart bicycle network and has provided 72 bicycle parking spaces to provide safe and secure parking for cyclists.

The site is located in close proximity to a very high frequency public transport service operating along Elizabeth Street which is 300 metres from the proposed mixed use development. The 500, 501, 502, 503, 504, 510, 511, 512, 513, 520, 522 all operate along Elizabeth Street, which provide a 10 minute frequency bus service between Glenorchy and Hobart, Monday to Friday between 7am – 7pm, a twenty minute frequency service on Saturdays between 7am – 7pm and every 30 minutes frequency service on Sundays and public holidays.

Appendix A

PHOTOGRAPHIC EVIDENCE OF PARKING SUPPLY IN THE VICINITY OF DEVELOPMENT SITE TAKEN THROUGHOUT THE DAY


Cellarbrati

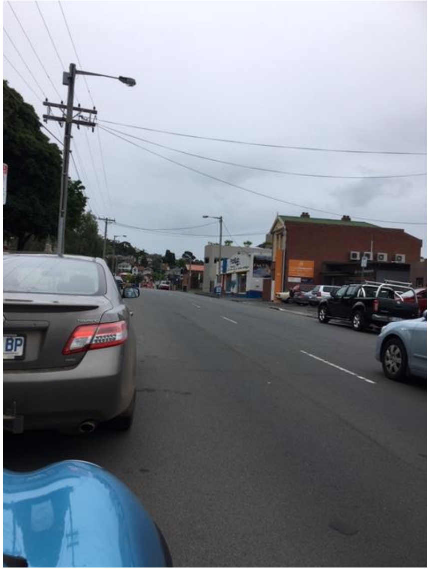

ELIZABETH ST
PATRICK ST


ELIZABETH ST
PATRIC


PATRICK ST


ELIZABETH ST
PATRICK ST


8.30 AM - 6 PM
MON-FRI

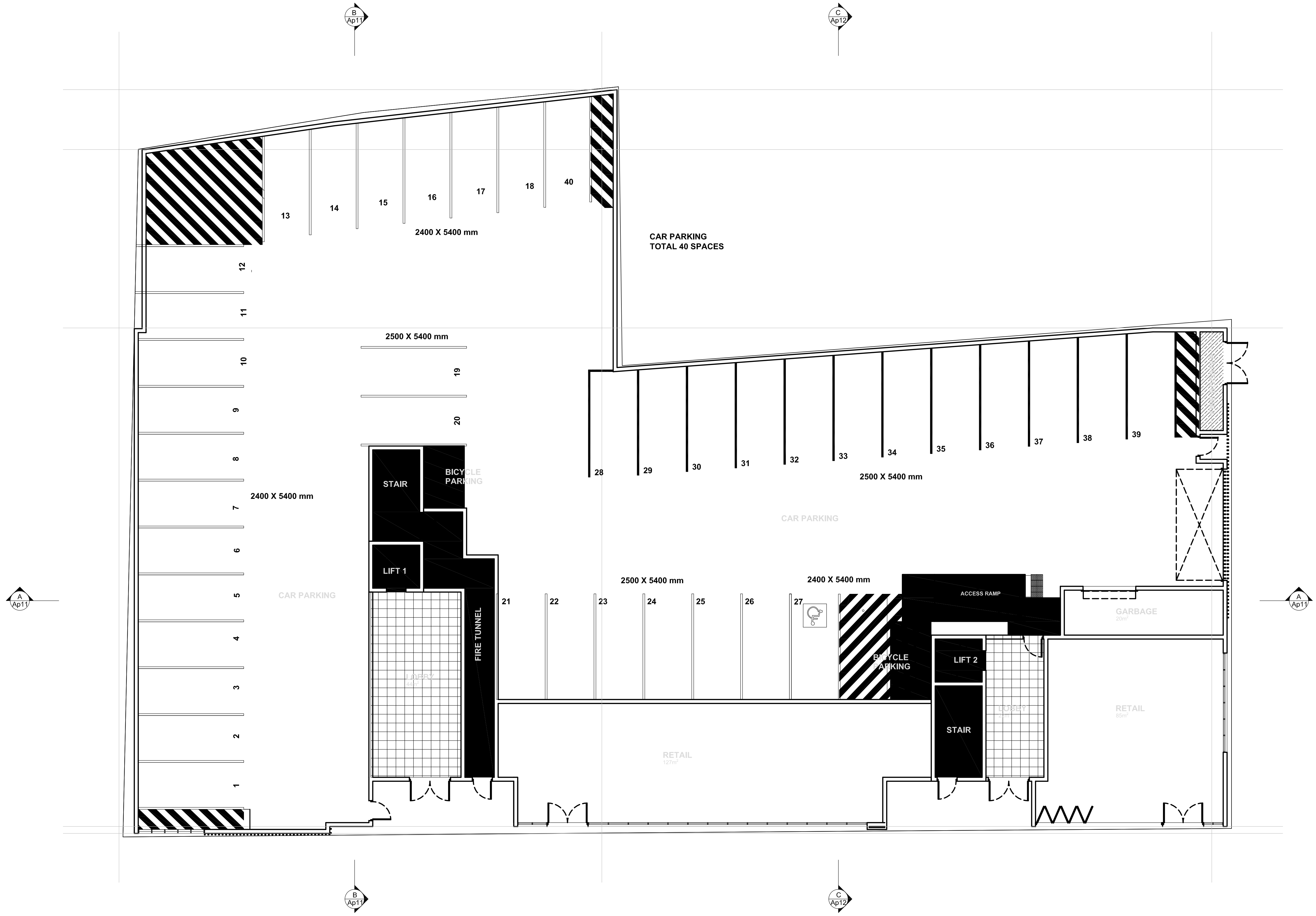



HAVE MOVED
531 ALBERT ROAD
MOONAH

APPENDIX B

DEVELOPMENT PLANS & AUTOTRACK PATHS

DO NOT SCALE OFF DRAWINGS



PRELIMINARY - NOT FOR CONSTRUCTION

	ISSUE	BY	APPROVED	DATE
1	FOR APPROVAL	JF	DF	23/11/18

HF
HOWARTH FISHER & ASSOCIATES
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CHAU NOMINEES
209-215 HARRINGTON STREET
HOBART, TAS

PROPOSED CAR PARKING LAYOUT

APPROVED BY:-
DATE: / /

SCALES 1: 100 @ A3
DRAWN JF
DESIGN DF
ISSUE: 1

PROJECT NO. 17J391
DOCUMENT IDENTIFICATION -D-
DRAWING NO. P.1

A3

Nov 23, 2018 - 1:07pm - S:\Projects\17J391 - Geoge Walker - 209 -215 Harrington Street - TIA\DWG\COMPLETED ANALYSIS 3\17J391.SC.DWG.231118.dwg

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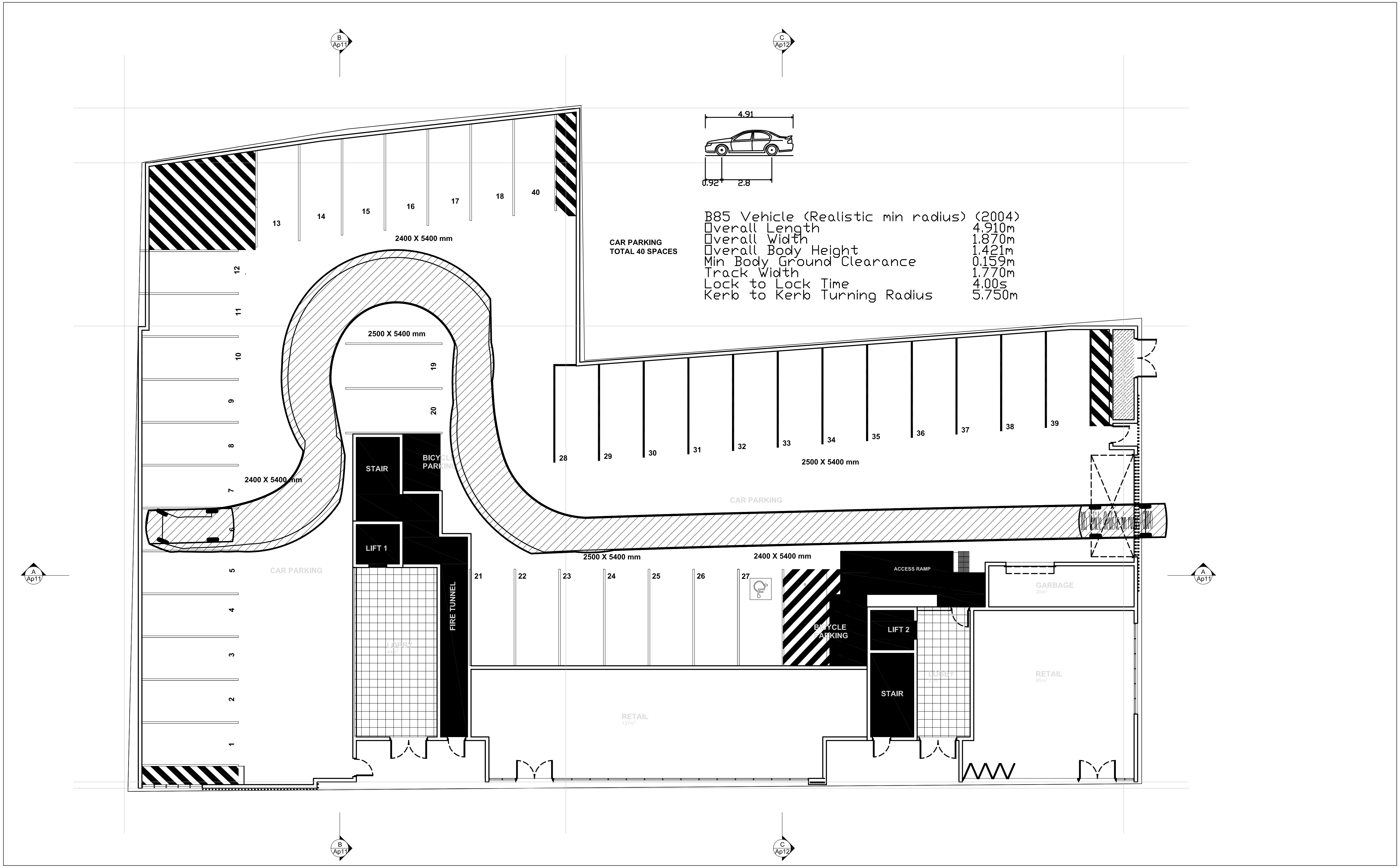
DO NOT SCALE OFF DRAWINGS



PRELIMINARY - NOT FOR CONSTRUCTION

	ISSUE	BY	APPROVED	DATE
1	FOR APPROVAL	JF	DF	23/11/18

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CHAU NOMINEES
209-215 HARRINGTON STREET
HOBART, TAS

AUTOTRACK VEHICLE PATH (TYP.)

APPROVED BY:- DATE: / /
SCALES 1: 100 @ A3
DRAWN JF
DESIGN DF
ISSUE: 1
PROJECT NO. 17J391
DOCUMENT IDENTIFICATION -D-
DRAWING NO. P.2

0 50 100 150 200 300 on original

A3

Stormwater Report

209-215 Harrington Street, Hobart

Prepared for:
City of Hobart

Measured form and function 6ty°

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Issue	01
Date	21 February 2019
Project Name	Harrington Street Apartments
Project Number	17.275
Author	Mark Walters
Document	

Contents

1.0 Introduction

This report examines the stormwater design requirements for the redevelopment of an existing commercial site into a multi-storey apartment building and ground floor retail tenancy. The site is 209-215 Harrington Street, Hobart (the site - refer to Figure 1).

Figure 1 - aerial image identifying the perimeter of the site.

2.0 The Existing Stormwater System

The development site is located on the corner of Patrick Street and Harrington Street in Hobart. The land is comprised of 6 titles of which three titles formed the 209-213 Harrington Street parcel containing the Jacksons Security business and the remaining three being used as a commercial car park with the address of 215 Harrington Street. All of both sites are either buildings or sealed car parking and have a total area of some 1700 m^2.

The land falls away from Harrington Street, with the northern boundary of 215 Harrington Street being some 2.0m lower than the kerbing in Harrington Street. There is no stormwater system in Harrington Street other than the kerbing. Patrick Street descends from Harrington Street intersection and a Council drainage pipe is located along the frontage.

There are a number of kerb connections on both Harrington Street and Patrick Street. The four connectors on Harrington Street collect the downpipes for the roof areas immediate to the street which has an area of roughly 145m^2. Harrington Street kerb drains to the northwest rather than to Patrick Street making this building the top of the Harrington Street catchment.

The two connectors to Patrick Street pick up the trench grate at the gate to the internal carpark and the down pipes on this side of the buildings. The 90o degree car parking on the Patrick Street corner drain directly to kerb. These car parks on the south eastern side of the building are all directly connected to the kerb of Patrick Street. It can be assumed that some 800m^2 of the site are connected to either the kerbing in Harrington Street or the kerbing in Patrick Street.

The bulk of the land, being the extensive car park on 215 Harrington Street, drain to a grated pit in the low point of the car park, set up as a sump pit with an elevated outlet. There is little on the much-repaired surface to indicate the exact route of this pipe but advice from Council is that the pit drains via an informal connection through the neighbouring properties of 221 and 223 Harrington Street.

Figure 2 - site plan showing existing services.

3.0 The Proposed Development

The proposal is to remove the existing buildings from the land and to construct a multi-storey apartment building. The building will fully occupy the land, replacing the existing expanse of outside car parking with a building has a floor of parking.

The roofed area is to discharge to Patrick Street via a new connection to the Patrick Street stormwater pipe and will not rely on the existing kerb connections nor on the original piped connection from 215 Harrington Street.

4.0 Stormwater Management

Advice from Council is that stormwater flows from the site, if entirely directed to Patrick Street, must not exceed the flows currently arriving in the Patrick Street system from the site. That is, stormwater is be detained so as not to exceed the 800m^2 are of the existing site that drains to Patrick Street.

Design Flows:

A Watercom Drains model has been developed for the site. For a total catchment area of 1705 m2, developed to 100% impervious, it can be shown:

- Q_{5ARI} = 23 l/sec
- $Q2_{0ARI}$ = 36 l/sec

For the 800m^2 discharging to Patrick Street, the flows are:

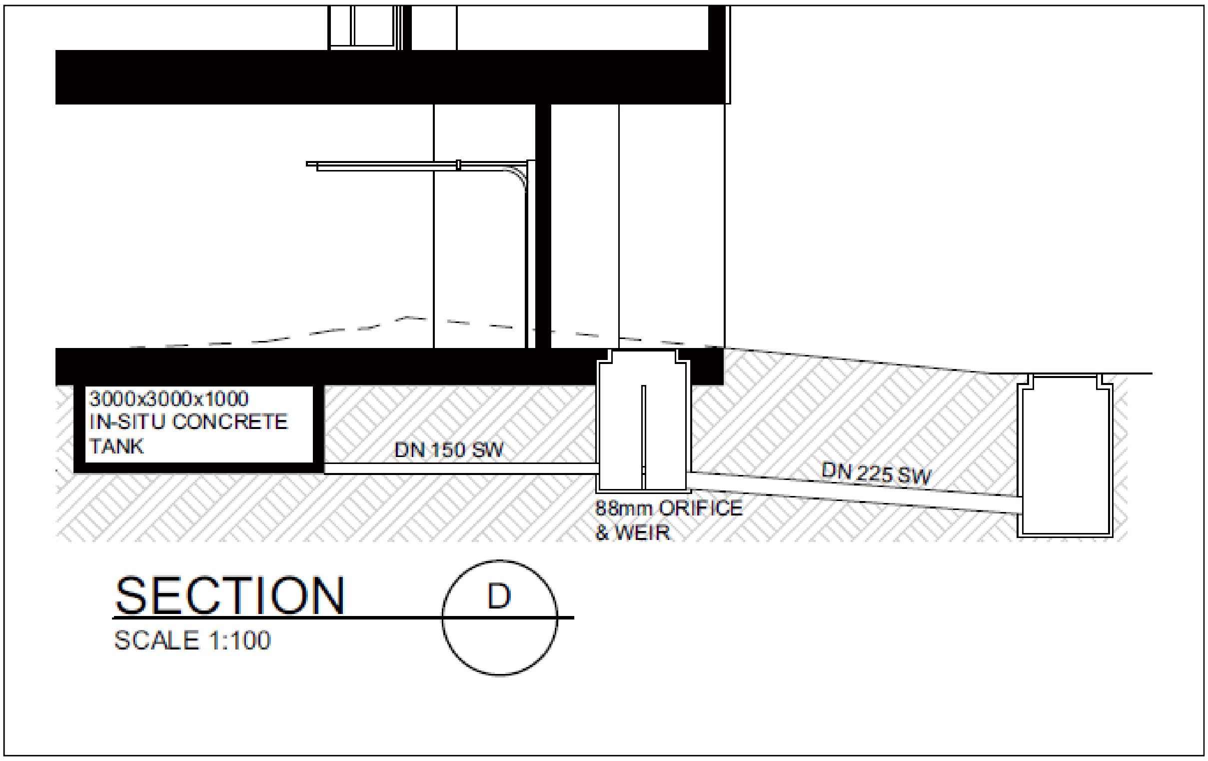
- Q_{5ARI} = 11 l/sec
- Q_{20ARI} = 16 l/sec

Detention Storage:

Flows from the site are to be limited to 16 l/s for the 20year ARI event by roofed areas being directed into a storage beneath the floor of the parking area. The storage is to discharge to a new pit located within the entrance of the parking area which is to contain a low flow pipe at the base of the pit and an elevated weir at the top of the pit so as to allow the passage of flows from an extreme event. The discharge pit is to be connected to the stormwater pipe in Patrick Street.

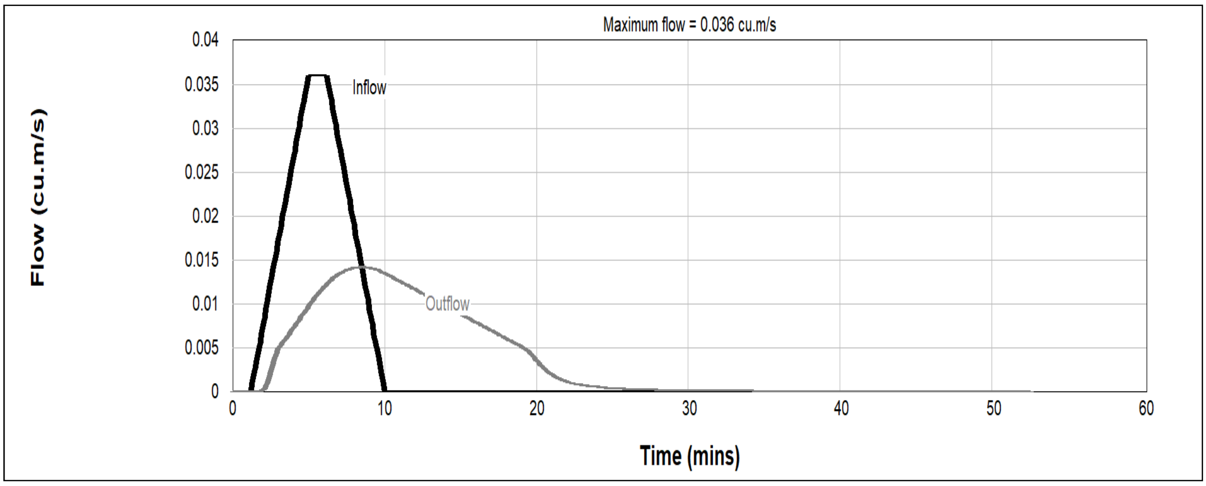
The Drains model for system indicates that a 9.0m^3 storage will be sufficient, discharging through a 0.88mm orifice as shown on the following section:

Figure 3 - Section through the proposed detention basin and discharge pit.



The outflow of this arrangement is shown in the following hydrograph:

Figure 4 - Inflow-outflow hydrograph for 20 year ARI.



5.0 Summary

The detention storage and outlet arrangement will direct all of the stormwater from the site to the public drainage system in Patrick Street at a rate that does not exceed that of the site as currently developed. There is no increase in impervious areas on the site as a result of the proposed development.