



CITY OF HOBART

SUPPORTING INFORMATION

CITY PLANNING COMMITTEE MEETING

OPEN PORTION OF THE MEETING

MONDAY, 28 OCTOBER 2019

AT 5:00 PM

VENUE: LADY OSBORNE ROOM, TOWN HALL

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7.1.3 30 McRobies Road (CT 160085/3 and CT 126957/1) South Hobart - Partial Demolition, New Washdown Facility and Associated Works

Attachment D PLN-19-200 - 30 MCROBIES ROAD SOUTH HOBART
TAS 7004 - CPC Supporting Documents.....2





Report Prepared for:

City of Hobart

Prepared by:

Environmental Management & Consulting Pty Ltd

ABN: 17 273 533 294

Office/ Mail: Level 2, 67 Letitia St, North Hobart 7000, Tasmania

Assessment design, project supervision and report review by:	<p>Simon Chislett</p> <p>Principal Environmental Engineer, B.Eng (Env) Hons Environmental Management & Consulting Pty Ltd</p> <p>Certified Environmental Practitioner, Contaminated Site Specialist (CEnvP CS, EIANZ)</p> <p>EIANZ Certified Environmental Practitioner No: 1160</p> <p>EIANZ Site Contamination Specialist No: SC400112 Email: simon@enviromac.com.au</p> <div data-bbox="1018 701 1206 1055"> </div>
Field work and reporting completed by:	<p>Alex Lovibond, Senior Environmental Scientist, B.Sc (Env), LLB (Env) Environmental Management & Consulting Pty Ltd</p>

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**LIST OF COMMON REPORT ABBREVIATIONS**

• ANZECC	Australian and New Zealand Environment and Conservation Council
• AST	Above-ground Storage Tank
• B(a)P	Benzo(a)Pyrene
• BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
• CARE	Contamination Assessment and Remediation of the Environment
• COC	Chain Of Custody
• COPC	Contaminants Of Potential Concern
• CRC	Cooperative Research Centre
• DO	Dissolved Oxygen
• DQO	Data Quality Objective
• DNAPL	Dense Non-Aqueous Phase Liquid
• DSI	Detailed Site Investigation
• DTW	Depth to Water
• EC	Electrical Conductivity
• EIL	Ecological Investigation Level
• EM&C	Environmental Management & Consulting Pty Ltd
• ESA	Environmental Site Assessment
• ESL	Ecological Screening Level
• EPA	Environment Protection Authority
• HIL	Health Investigation Level
• HSL	Health Screening Level
• LNAPL	Light Non-Aqueous Phase Liquid
• LOR	Limit Of Reporting
• MAH	Monocyclic Aromatic Hydrocarbons
• mBGS	Metres Below Ground Surface
• mTOC	Metres below Top of Casing
• NEPM	National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013
• PAH	Polycyclic Aromatic Hydrocarbons
• Pb	Lead
• PH	Petroleum Hydrocarbon
• PID	Photo-Ionisation Detector
• PSI	Preliminary Site Investigation
• PVI	Petroleum Vapour Intrusion
• RPD	Relative Percentage Difference
• SAQP	Sample Analysis and Quality Plan
• TDS	Total Dissolved Solids
• TOC	Top Of Casing
• TPH/ TRH	Total Petroleum Hydrocarbons/ Total Recoverable Hydrocarbons
• UST	Underground Storage Tank
• VOC	Volatile Organic Compound
• QA/QC	Quality Assurance/ Quality Control

List of Abbreviated Measurement Units

m: metre	L: Litre	ppm: parts per million
km: kilometre	kL: kilolitre	ppb: parts per billion
mg/kg: milligram/ kilogram	mg/L: milligram/ litre	
µg/kg: microgram/ kilogram	µg/L: microgram/ litre	



1. INTRODUCTION

This Potentially Contaminated Land Code Environmental Site Assessment (PCLC ESA) report has been prepared by Environmental Management & Consulting Pty Ltd (EM&C) to enable the City of Hobart to assess the proposed development for 30 McRobies Road, South Hobart (the 'site') against the provisions of the Potentially Contaminated Land Code (PCLC) – E2.6.2 of the Hobart Interim Planning Scheme 2015. The location of the site within the suburb of South Hobart and state of Tasmania is shown on attached Figure 1.

A copy of the design drawings for the proposed development have been provided to EM&C for consideration and are included for reference within Appendix A. In summary, the development proposal will include:

- Removal of current asphalt surface
- Excavation of:
 - Underlying sub-base;
 - Earthen batter to eastern side of development area to enlarge trafficable area; and
 - Soil profile to to allow for the installation of a ~5,000L silt arrestor pit and 3,000L holding well.
- Installation/realignment of services;
- Concrete resurfacing
- Reinstatement of asphalt
- Construction of steel, open ended structure.

EM&C have designed this assessment based on the supplied design documentation provided by Johnstone McGee and Gandy Pty Ltd (JMG), specifically drawing number C03, included within Appendix A. During the proposed development, the planned excavation works are to be confined to the proposed truck was bay area, to the remainder of the site. As a result, this assessment area has been confined to the proposed development area. This approach is justified based on the purpose of the Potentially Contaminated Land Code (PCLC) provided within the Hobart Interim Planning Scheme 2015 as to:

Ensure that use or development of potentially contaminated land does not adversely impact on human health or the environment.

The area of proposed disturbance is shown in red hatched shading on attached Figure 2 and is also the area of investigation by this PCLC ESA report.

2. OBJECTIVE

This PCLC ESA has been designed to address the requirements provided within the PCLC, to determine if the proposed development *works involving excavation of potentially contaminated land... [will] ...adversely impact on health and the environment.*¹

¹ PCLC E2.6.2, Hobart Interim Planning Scheme 2015



The objectives of the completed PCLC ESA were to determine:

- Whether any site contamination presents a risk to workers involved in redevelopment of the site, or future users of the site, as a result of proposed excavation of the site.
- Whether any site contamination presents an environmental risk from excavation conducted during redevelopment of the site.
- Whether any specific remediation and/or protection measures are required to ensure the proposed excavation does not adversely impact human health or the environment before excavation commences.
- If offsite disposal of soil is required, classify the soil within the definitions provided within the Tasmanian EPA publication *Information Bulletin No. 105 Classification and Management of Contaminated Soil for Disposal*.

3. APPLICATION OF WORSCOPE TO PLANNING SCHEME

This assessment seeks to assess the condition of the site against the performance criteria supplied within the planning scheme.

The proposed excavation at the site triggers the application of the Potentially Contaminated Land Code. Section E2 of the HCC Interim Planning Scheme 2015 identifies where the PCLC applies:

E2.2.1

This Code applies to:

- (a) a use, on potentially contaminated land, that is a sensitive² use, or a use listed in a use class in Table E2.2.1 and is one of the uses specified as a qualification; or
- (b) development on potentially contaminated land.

Development is further defined within Section E2.6 to include either subdivision or excavation. The extent of excavation required to trigger the application of the PCLC through development is limited by Section E2.4.4, to only apply when the area of land disturbed by the development exceeds one square meter.

The code defines potentially contaminated land within Part E2.3.1:

...land that is, or adjoins land that the applicant or the planning authority:

- a. Knows to have been used for a potentially contaminating activity by reference to: -
 - i. A notice issued in accordance with Part 5A of the *Environmental Management and Pollution Control Act 1994*; or

² Sensitive means a residential use or a use involving the presence of people for extended periods except in the course of their employment, such as in a caravan park, childcare centre, dwelling, hospital or school. *Hobart Interim Planning Scheme 2015 - Administration*



- ii. A previous permit; or
- b. Ought reasonably to have known was used for a potentially contaminating activity.

A list of potentially contaminating activities is provided within the planning scheme within Table E2.2.

The requirement for assessment was triggered by:

- The proposed area of excavation for the new concrete slab, plus additional excavation for the following items, estimated³ to total 43 cubic meters:
 - Asphalt apron surrounding newly constructed slab
 - Retaining wall construction
 - Service connection
- The identification by JMG of the following potentially contaminating activity occurring within the site boundary, located at 30 McRobies Road, South Hobart. The JMG report is included as Appendix A.
 - Landfilling operations – the property was used as a landfill.
 - The use of a site as a landfill satisfies the requirements of defining the site as potentially contaminated under the PCLC.

4. ASSESSMENT FRAMEWORK

The assessment work scope and sampling and quality analysis plan was developed in accordance with *The National Environment Protection (Assessment of Site Contamination) Measure (NEPM) 1999 (2013 Amendment)*. This NEPM document has been adopted by the Tasmanian government as State Policy and can reasonably be referenced as the standard(s) of the EPA.

³ JMG Contamination Management Plan (April 2019)



5. SITE DESCRIPTION/SETTING

In accordance with the scope of this document, the following information is provided relative to the development/investigation area.

5.1. Site Identification Information

Table 5.1 Site Identification Information

Site Address	30 McRobies Road, South Hobart, 7004
Certificate of Title (CoT)	166085 Ref: www.thelist.tas.gov.au (30 July, 2019)
Property Identification Number (PID)	3273346 Ref: www.thelist.tas.gov.au (30 July 2019)
Approximate Location of Area Under Assessment	The approximated location of the site centroid is: E: 523876 N: 5251099 (GDA 94 MGA55) Ref: www.thelist.tas.gov.au (30 July 2019)

5.2. Land Use

Table 5.2.1 Site Land Use Information

Current Land Use	The property is classified as a commercial/industrial land use based on the definitions provided within Schedule B7 of the NEPM. The investigation area sits within an area currently covered by mostly asphalt, however a small cutting is to be made into the earthen embankment along the eastern edge of the investigation area.
Current Site Zoning	The site is zoned '28.0 Utilities' under the Hobart Interim Planning Scheme, 2015.
Surrounding Land Uses	<ul style="list-style-type: none"> • The land area to the west and south is predominately native bush land • To the north lies a recycling centre • To the east across McRobies road lie residential dwellings
Site Area	The investigation area has been limited to the area of development, which is approximately 150m ² .

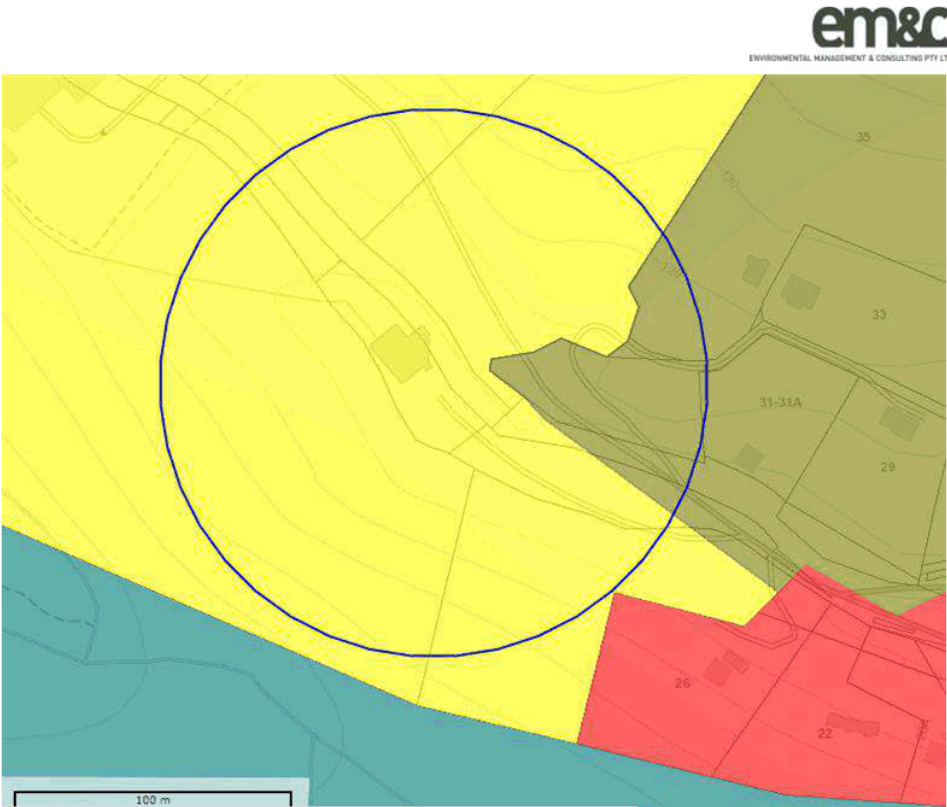


Figure 5.2. Local Area Land Zoning: The blue circle shows the area within a 100m radius of the approximate investigation area within the Site. Source: www.thelist.tas.gov.au. (July 2019). An explanation of the shading is provided within Table 5.2.2 below.

Table 5.2.2 Land Zoning Legend

Zoning Fill	Zoning ID	Zoning Description
	14.0	Environmental Living (Hobart Interim Planning Scheme 2015)
	10.0	General Residential (Hobart Interim Planning Scheme 2015)
	28.0	Utilities (Hobart Interim Planning Scheme 2015)
	29.0	Environmental Management (Hobart Interim Planning Scheme 2015)



5.3. Topography

Mapped regional topography is shown below in Figure 5.3 and identifies that the investigation area sits within McRobies Gully, between two hill spurs running approximately northwest to southeast. The fall within the gully is predominantly towards the southeast.

The elevation of the investigation area is approximately 100mAH, based on the topographic contours available from TheList (provided in Figure 5.3 below).

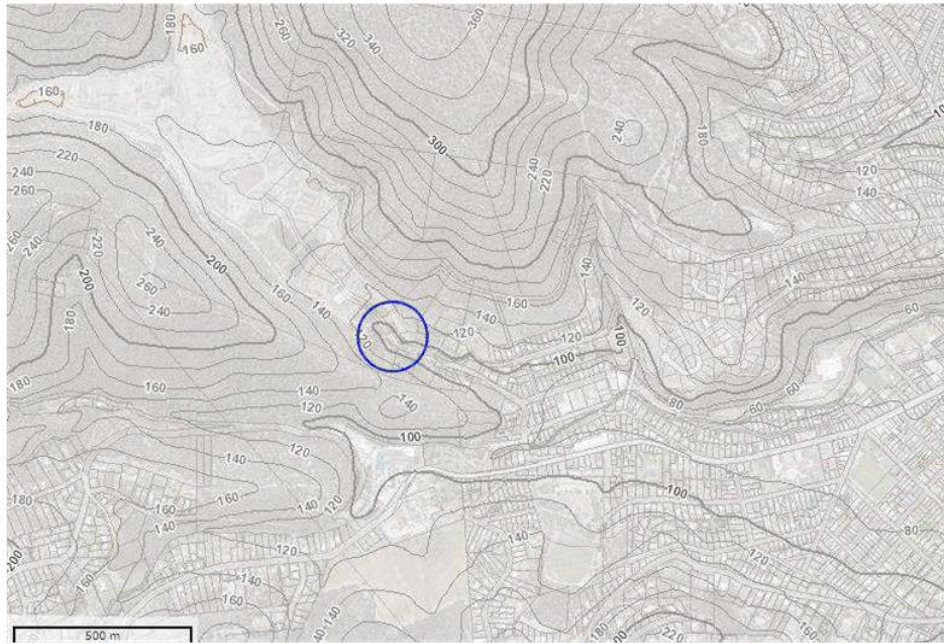


Figure 5.3. Local Area Topography: The blue circle shows the area within a 100m radius of the approximate investigation area within the Site. Source: www.thelist.tas.gov.au. (July 2019).



5.4. Hydrology

The nearest natural year-round surface water body down topographical gradient of the investigation area is Hobart Rivulet, located approximately 580m to the southeast. At this point along the river course the rivulet would be classified as a freshwater aquatic ecosystem.

It is assumed that historically a small, likely seasonal creek followed McRobies Gully. The development of a landfill within the gully however has caused significant disruption to natural stormwater flows. A leachate collection pond servicing the landfill lies approximately 15m upgradient of the investigation area, in addition stormwater pits are present within the asphalted area, diverting surface water flows into the constructed city stormwater system prior to discharging into the Hobart Rivulet. Figure 5.4 below identifies the local surface water bodies and their location relative to the investigation area.

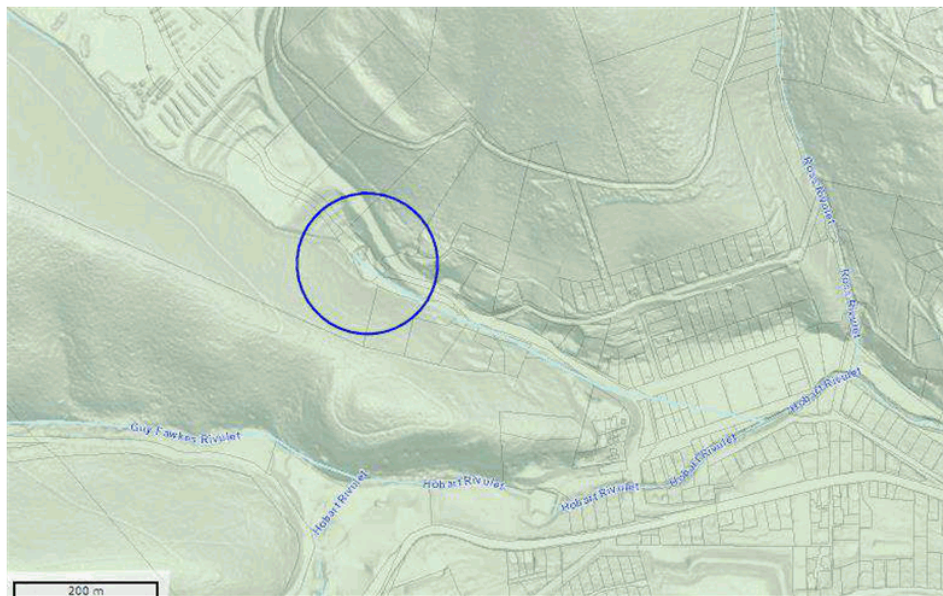


Figure 5.4. Local Area Hydrology: The blue circle shows the area within a 100m radius of the approximate investigation area within the Site. Source: www.thelist.tas.gov.au (July 2019).



5.5. Geology

The site is situated in a shallow valley in between Jurassic aged dolerite outcrops to the northeast and older Permian to Triassic sedimentary rock to the south and west. The mapped geology towards the northwest of the investigation area is cenozoic deposits, lining the gully floor. Due to the past history of landfilling within this area though, it is assumed that a significant depth of man-made waste overlies this unit.

Figure 5.5 below identifies the local area geological units, with Table 5.5 providing a description of each (source: www.thelist.tas.gov.au accessed July 2019).

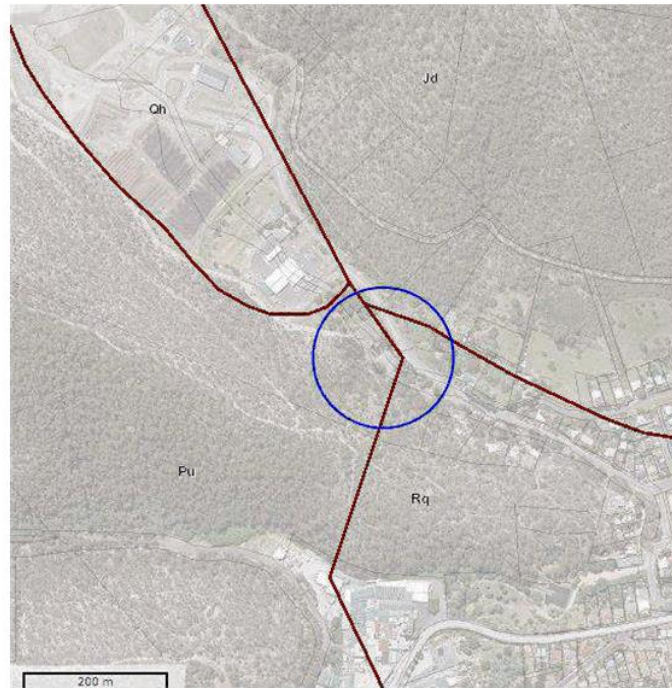


Figure 5.5 Local Area Geology, Source: www.thelist.tas.gov.au (July 2019)

Table 5.5 Local Geology Legend

Abbreviation	Unit Description
Qh	Cenozoic sand gravel and mud of alluvial, lacustrine and littoral origin. Inferred to be overlain by man-made deposits through landfilling activities.
Jd	Jurassic dolerite (tholeiitic) with locally developed granophyre.
Rq	Upper Fluvialacustrine Sequence - Quartz Sandstone Sequence, forming part of the Upper Parmeener Supergroup
Pu	Upper glaciomarine sequences of pebbly mudstone, pebbly sandstone and limestone, forming part of the Lower Parmeener Supergroup



The site's shallow geology/soil horizons were logged as follows during the onsite investigation:

0.0 to 0.05mBGS	Asphalt
0.0.5 to 0.9mBGS	Very coarse sandy Medium GRAVEL some medium to coarse sand.
0.9 to 2.0mBGS	Fine gravelly medium GRAVEL some coarse sand.
2.0 Onwards	Unknown, maximum extent of investigation limited to 2.0mBGS.

Broadly, the material encountered below the ground surface to the investigation extent of 2m below ground surface has been interpreted to be imported compacted gravels, laid out to level out the floor of the gully. This was likely done during the construction of either the leachate collection system or other works pertaining to the landfill operation.

5.6. Hydrogeology

EM&C completed a search of Water Resources Tasmania's (WRT) Groundwater Information Access Portal (GIAP) in August 2019. This search identified one groundwater well approximately 625m towards the south of the investigation area. A copy of the report provided by the portal is provided within Appendix F (Ref: wrt.tas.gov.au, 2019).

The bore log for the identified offsite well (feature ID 17284) did not include a detailed record of the screening interval, however it was reported during the installation that water was first encountered at 48 meters below ground surface (mBGS).

The Contamination Management Plan Prepared by JMG (April 2019) identifies the presence of additional onsite groundwater monitoring bores. The wells identified the presence of a possible perched water bearing zone, located at approximately 1-1.5 mBGS.

5.7. Identified Contaminating Industry/Activity

The investigation area is located within the boundary of the McRobies Gully Landfill, specifically adjacent to the leachate collection ponds at the southern, down gradient section of the site. The operation of a landfill is categorised as a potentially contaminating activity by:

- The Tasmanian EPA within the defined category: 'Landfill sites, including on-site waste disposal and refuse pits'.⁴
- City of Hobart within the defined category: 'Landfill sites, including on-site waste disposal and refuse pits'.⁵
- Australian Standard AS4482.1-2005 within the defined category: 'Landfill Sites'

⁴ Tasmanian EPA, 2019 Potentially Contaminating Activities, Industries and Land Uses

⁵ Hobart Interim Planning Scheme, 2015, Table E2.2 Potentially contaminating Activities



5.8. Contaminants of Potential Concern

The Contaminants of Potential Concern (COPC) associated with the onsite history include:

- Total Recoverable Hydrocarbons & Total Petroleum Hydrocarbons (TPH).
- Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene (BTEXN).
- Polycyclic Aromatic Hydrocarbons (PAH)
- Polychlorinated biphenyls (PCBs)
- Heavy metals

5.9. Conceptual Site Model

A Conceptual Site Model (CSM) organises site information in a clear structure to identify data gaps. A preliminary CSM includes identifying land use, past and current potential contamination sources, contaminants of potential concern, potential receptors and other site information available to simplify assessment planning and decisions. The CSM development is a dynamic process and the model should be reviewed and refined during all stages of an assessment (NEPC, 1999).

A graphic representation of the CSM for the investigation area within 30 McRobies Road is presented below in Figures 5.9a and 5.9b. The figures identify the current and proposed layout of the site in relation to the contaminating activities and the potential contamination pathways related to the source of contaminants. A summary of potential contamination sources, pathways and receptors are listed below the figures.

Purple shading indicates potentially contaminated imported fill.

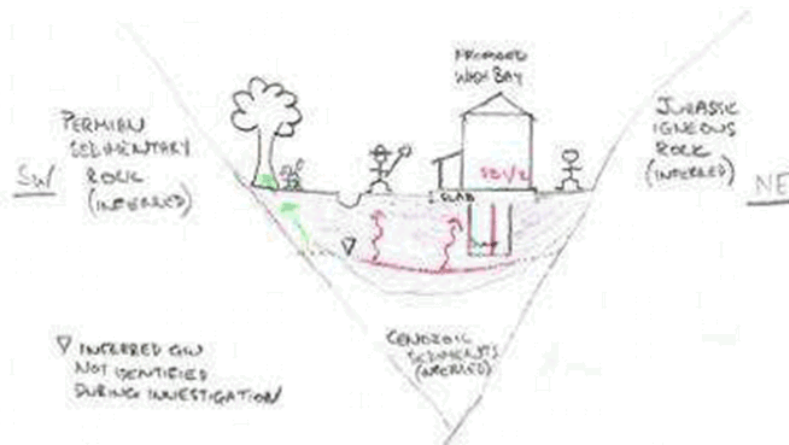


Figure 5.9a SW/NE Graphic Representation of Conceptual Site Model, 30 McRobies Road, South Hobart

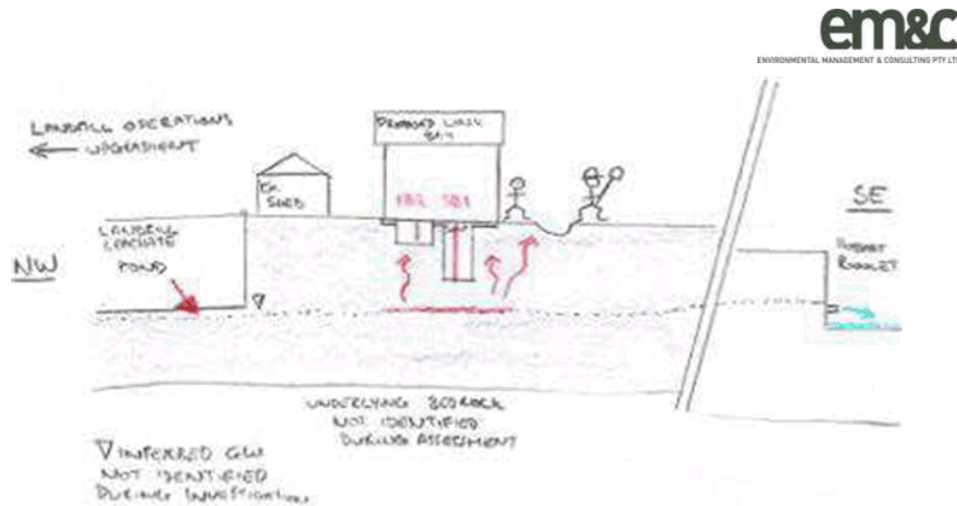


Figure 5.9b NW/SE Graphic Representation of Conceptual Site Model, 30 McRobies Road, South Hobart

Potential Contamination Sources/ Industry:

- Landfilling operations up topographical gradient. Landfill material may contain COPCs
- Landfill leachate detainment adjacent to development area. Leachate may contain COPCs
- Importation of potentially contaminated fill material into development area.
- Groundwater that may be potentially contaminated from the up gradient landfill or the adjacent leachate collection sump.

Potential Exposure Pathways

- Direct contact (dermal contact, inhalation of dust and ingestion of soil) with contaminated soil.
- Migration of contaminated soil and sediments offsite during development
- Migration of contaminated groundwater downgradient to groundwater and surface waters.
 - Not assessed as groundwater not encountered during assessment
- Migration of landfill leachate into groundwater.
 - Not assessed as groundwater not encountered during assessment
- Migration of vapour from soil contamination sources.
- Migration of vapour from groundwater contamination sources
 - Not assessed as no vapour accumulation area
- Excavation and transport of soil offsite
- Uptake of COPCs by ecological receptors

Potential Receptors

- Occupiers and visitors of the site.
- Subsurface workers, including services, maintenance and development works.
- Ecological receptors including flora and fauna
- Offsite soil receiving facilities (landfills).



6. SAMPLING AND ANALYSIS QUALITY PLAN

This Sampling and Analysis Quality Plan (SAQP) aims to provide sufficient supporting data to determine the contamination and waste categorisation status of the site and excavated material, relative to the nominated assessment criteria. It also aims to present all data with an acceptable level of confidence. The project SAQP is summarised in the table below. The location PCLC ESA sample locations are shown on attached Figure 2, Sample Location Plan.

Table 6.0 Sampling and Analysis Quality Plan Summary

Objective of assessment	<p>To assess the area identified for excavation/ground disturbance works for evidence of soil contamination, which may determine if the development will adversely impact on human health or the environment. Should such a finding be found, identify any specific remediation and/or protections measures required to be implemented before excavation commences.</p> <p>If offsite disposal of soil is required, classify the soil within the definitions provided within the Tasmanian EPA publication <i>Information Bulletin No. 105 Classification and Management of Contaminated Soil for Disposal</i>.</p>
Quality Control samples to be collected	<p>For soil media:</p> <ul style="list-style-type: none"> • 1 duplicate per 20 samples provided to laboratory. • 1 equipment rinsate per 20 samples. • 1 laboratory prepared trip blank per day sampling.
Media to be sampled	Soil.
Analytes to be tested for primary samples	<p>Soil: Total hydrocarbons, reported as TRH and TPH fractions, benzene, toluene, ethylbenzene, xylenes, naphthalene (BTEXN), Tasmanian IB105 regulatory suite (metals, cyanide, PCBs, OC pesticides, phenols and PAHs).</p>
Number of samples	<p>Soil: Two soil bores (SB1 – SB2) to be completed with laboratory analysis of 4 discrete soil samples.</p> <p>Sample density chosen to allow for in-situ soil classification for disposal at a density of > 1/25m³.</p> <p>Each soil bore to be screened for Volatile Organic Compounds ('VOC') as a minimum of every half meter.</p>
Sampling methods	<p>Soil: Samples for analysis to be taken from a clean decontaminated hand auger (rinsate blanks to confirm decontamination process). Where other methods of sampling are employed to obtain a sample, the method of collection should be clearly noted along with the sample results.</p>
Field Screening	<p>Soil: Screening for VOCs at a minimum of each half metre using a photo ionisation detector (PID).</p>
Laboratory to be used	NATA accredited laboratory: ALS Environmental



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Relevant Risk Assessment Criteria	<p>Environmental Management and Pollution Control Act 1994 (EMPCA)</p> <p>The National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (NEPM). The NEPM is state policy in Tasmania for the assessment of site contamination.</p> <p><i>CRC Care (2011)</i>, Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater. Technical Report No. 10, Part 2: Application Document.</p> <p>CRC Care (2013), Petroleum hydrocarbon vapour intrusion assessment: Australian guidance, Technical Report No.23, CRC for Contamination Assessment and Remediation of the Environment, Adelaide, Australia.</p> <p>Tasmanian EPA Information Bulletin 105 Classification and Management of Contaminated Soil for Disposal, November 2012.</p>
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7. ASSESSMENT CRITERIA

The adopted environmental assessment criteria are detailed in Table 7.0 below.

Table 7.0 Adopted Site Assessment Soil Investigation Levels

	Criteria	Land Use Scenario	Relevant for Assessment	Application
Soil	Health Based Investigation Levels			
	Health Investigation Levels	HIL A	No	Not applicable.
		HIL B	No	
		HIL C	No	
		HIL D	Yes	Investigation area lies within an area that can broadly be defined as commercial/industrial under the definitions provided within Schedule B7 of the NEPM
	Health Screening Levels for Vapour Intrusion	HSL A & HSL B	No	Not applicable: as above
		HSL C	No	
		HSL D	Yes	Assessment locations are situated within an area that can broadly be defined as commercial/industrial under the definitions provided within Schedule B7 of the NEPM
		IMW	Yes	It has been identified that intrusive maintenance works could foreseeably occur at the site within the investigation area. This screening level will also be appropriate for assessing the risk posed to construction workers during the proposed development excavation.
	Health Screening Levels for Direct Contact	HSL A	No	Not applicable
		HSL B	No	
		HSL C	No	
		HSL D	Yes	Investigation area lies within an area that can broadly be defined as commercial/industrial under the definitions provided within Schedule B7 of the NEPM
		IMW	Yes	It has been identified that intrusive maintenance works could foreseeably occur at the site within the investigation area. This screening level will also be appropriate for assessing the risk posed to construction workers during the proposed development excavation.
	Ecology Based Investigation Levels			
	Ecological Investigation and Screening Levels	Areas of ecological significance	No	Not applicable
		Urban residential and public open space	No	
		Commercial and industrial	No	Investigation area lies within an area that can broadly be defined as commercial/industrial under the definitions provided within Schedule B7 of the NEPM
	Management Limits and Aesthetic Investigation Levels			
	Soil Management Limits for Petroleum Hydrocarbons	Residential, parkland and public open space	No	Not applicable.
		Commercial and industrial	Yes	Considered due to on-going commercial use.
	Aesthetic Considerations	All	Yes	Applicable.
	Offsite Disposal Classification Criteria			
	Controlled Waste Disposal Criteria	-	Yes	In-situ soil may not be suitable for onsite reuse. To determine the suitability for offsite disposal and to categorise the waste, the soil should be assessed against the Controlled Waste Disposal Criteria.



8. ESA WORKSCOPE

The following work scope was completed to meet the assessment objective.

8.1.1. Soil Assessment

Mobilisation of two EM&C Environmental Consultants to site on 5 July 2019 to drill two soil bores, designated SB1 to SB2. All drilling locations are shown on attached Figure 2. The completed work scope comprised of:

- Logging of soil profile during and the field screening of soil samples collected from each completed soil bore at regular depth intervals and changes in soil type for the presence of VOCs using a photo ionisation detector (PID).
- The collection and laboratory analysis of four primary soil samples:
 - Screening and collection of samples at changes in soil type, areas of visible staining and diverse relative depths.
 - In order to identify hot spots, samples destined for analysis were selected based on where the level of contamination was expected to be the most significant.
 - The collection and laboratory analysis of the following field QA/QC sample:
 - One blind duplicate sample designated QCP_5/7/19, a duplicate of SB1_0.075-0.125.
 - Collection of samples into sterile glass jars and placement of these jars into a chilled and insulated esky.
 - Transportation of samples to a NATA-accredited laboratory for analysis of the schedule listed within the Sampling and Analysis Quality Plan (Section 6 above).
- The collection and analysis of additional QA/QA samples, an equipment rinsate blank and a trip blank soil sample.



9. RESULTS

The following section presents field observations, measurements and laboratory results. Laboratory results have been presented relative to:

- NEPM Tier 1 assessment criteria for identified potential receptors at the site.
- *Tasmanian EPA Information Bulletin 105 Classification and Management of Contaminated Soil for Disposal, November 2012* criteria for potential offsite disposal categorisation.

'Sand' has been selected as the soil texture group⁶ most representative of the site's confining geology. Assessment drill logs are included within Appendix E.

9.1. Soil Field Observations

No detectable concentrations of VOCs were detected through the screening of collected soil samples using a PID.

9.2. Soil Analytical Results v Land Use Criteria

Summarised soil sample results assessing Contaminants of Potential Concern (COPC) are presented below within Table 9.2 and in attached Table 1a and 1b. Laboratory certificates of analysis are included within Appendix C.

⁶ Reference to soil texture groups as defined by United States Department of Agriculture (USDA)



Table 9.2 Summary of Investigation Criteria Exceedances

Sample Location	Sample Depth (mBGS)	Residential					Recreational/ Public Open Space			Commercial / Industrial			Intrusive Maintenance Worker	
		HILA	HIL B	HSLA (Direct Contact)	HSL B (Direct Contact)	HSLA/B (Vapour Intrusion)	HIL C	HSL C (Direct Contact)	HSL C (Vapour Intrusion)	HIL D	HSL D (Direct Contact)	HSL D (Vapour Intrusion)	HSLIMW (Direct Contact)	HSLIMW (Vapour Intrusion)
SB1	0.075 - 0.125	NA	NA	NA	NA	NA	NA	NA	NA	NE	NE	NE	NE	NE
	1.0- 1.1	NA	NA	NA	NA	NA	NA	NA	NA	NE	NE	NE	NE	NE
	1.5- 1.6	NA	NA	NA	NA	NA	NA	NA	NA	NE	NE	NE	NE	NE
	0.5- 0.6	NA	NA	NA	NA	NA	NA	NA	NA	NE	NE	NE	NE	NE

Sample Location	Sample Depth (mBGS)	Soil Management Limits		Ecological Criteria						Soil Saturation Concentration (Csat)
		Residential, Parkland & Public Open Space	Commercial & Industrial	EIL (Areas of Ecological Significance)	ESL (Areas of Ecological Significance)	EIL (Urban Residential & Public Open Space)	ESL (Urban Residential & Public Open Space)	EIL (Commercial & Industrial)	ESL (Commercial & Industrial)	
SB1	0.075 - 0.125	NA	NE	NA	NA	NA	NA	NE	NE	NE
	1.0- 1.1	NA	NE	NA	NA	NA	NA	NE	NE	NE
	1.5- 1.6	NA	NE	NA	NA	NA	NA	NE	NE	NE
SB2	0.5- 0.6	NA	NE	NA	NA	NA	NA	NE	NE	NE

Table notes:

Highlighted values indicate an exceedance of the nominated criteria

NA: Indicates that investigation criteria not relevant for the specified sample point

NE: Indicates no exceedance of criteria



9.3. Soil Analytical Results v TAS Soil Disposal Guidelines (IB105)

Summarised soil sample results assessing COPCs against the Tasmanian Soil Disposal Guidelines⁷ is provided below within Table 9.3 and attached Table 2a and 2b. A laboratory prepared comparative analytical report of the same samples is included within Appendix C.

Table 9.3 Summary of Waste Disposal Criteria Exceedances

Sample Location	Sample Depth (mBGS)	Tasmanian Waste Disposal Guidelines					Classification
		Level 1 (Total Concentrations)	Level 2 (Total Concentrations)	Level 2 (Leachable Concentrations)	Level 3 (Total Concentrations)	Level 3 (Leachable Concentrations)	
SB1	0.075-0.125	Benzo(a)pyrene	NE	NA	NE	NA	Level 2
	1.0-1.1	NE	NE	NA	NE	NA	Level 1
	1.5-1.6	NE	NE	NA	NE	NA	Level 1
SB2	0.5-0.6	NE	NE	NA	NE	NA	Level 1

Table notes:

Highlighted values indicate an exceedance of the nominated criteria

NA: Indicates that investigation criteria not relevant for the specified sample point

NE: Indicates no exceedance of criteria

9.4. QA/QC Results

Field QA/QC analytical results are presented in attached Table 3. Copies of the NATA endorsed laboratory reports, including internal QA/QC results and chain-of-custody documentation for the primary laboratory are included within Appendix C.

The findings of the projects precision, accuracy, representativeness, comparability and completeness data quality indicators (DQIs) are summarised within this section. In addition, a DQI checklist has been attached in Appendix D.

9.4.1. Comparability

- An appropriately experienced person - in accordance with EM&C's Assessment Procedure detailed within the SAQP outlined in Section 6, collected all samples.
- The laboratory used was NATA-accredited for the requested analytes and provided documented methods of analysis.

⁷ Information Bulletin 105: Classification and Management of Contaminated Soil for Disposal (v3 2018)

**9.4.2. Precision**

Assessment of quality control data revealed:

- Soil field duplicates reported COPC concentrations within the assessment relative percentage difference (RPD) criteria⁸ for all duplicate samples taken.
- Non-conformity was observed within the following laboratory standards, calibration blanks and verifications. Internal Quality Control (QCI) reports are supplied within Appendix C and elaborated on further within the DQI checklist provided within Appendix D.

9.4.3. Accuracy

All field equipment was calibrated prior to use. See calibration certificates provided within Appendix E.

9.4.4. Representativeness

- All media identified in the project's SAQP in Section 6 have been sampled.
- All samples were put into containers provided by a NATA-accredited laboratory, stored in a chilled esky (soil) and transported to each laboratory within holding times. See Appendix C for laboratory sample receipt notices.
- Target analytes were not detected in trip blank or equipment rinsate blank samples.
- No inconsistencies were identified within the method of sample collection.
- No inconsistencies have been identified in laboratory methods.

9.4.5. Completeness

- All samples locations have been sampled in accordance with the SAQP.
- All samples were sent to each laboratory within technical holding times and with accurately completed documentation.
- EM&C considers the collected dataset sufficiently complete to be relied upon to support the assessments data quality objectives.

⁸ Which is calculated based on the primary result, relative to the primary laboratory LOR



10. CONCLUSIONS

At the completion of the Potentially Contaminated Land Code Environmental Site Assessment (PCLC ESA), undertaken to make an assessment of the proposed development, and subject to the assessment scope and statement of limitations (Section 11), EM&C conclude that:

- The assessed level of site contamination does **not** pose an unacceptable level of risk to workers involved in redevelopment of the site, or to future users of the site, as a result of proposed excavation.
- The assessed level of site contamination does **not** pose an unacceptable level of risk to either human health or the environment based on the proposed development and the scope of the assessment.
- Assessment of the material requiring excavation for the construction of the subterranean components of the development has found:
 - The material is suitable for onsite reuse as the reported level of contamination within the soil profile lies below the nominated investigation criteria for the investigation area.
 - The concentration of benzo(a)pyrene within the soil would presently see this material classified as Low Level Contaminated Soil/Level 2 under the Tasmanian waste classification guidelines IB105 if removed from the site.
 - Should the excavated material be removed from the investigation area, the soil is to be handled in accordance with Tasmanian Soil Disposal Guidelines⁹.

With consideration to the management methods identified within the *Contamination Management Plan* (April 2019) provided by IMG, EM&C provide the following advice:

- The risk controls proposed are a basic, well thought through default starting point for managing exposure risks on a site where little recent quantitative assessment has occurred.
- The recommendations relating to handling soil provided within Section 7 of the document, while potentially good industry practice, are largely unrequired.
 - EM&C endorse the preventative measures provided within Table 3 of the *Contamination Management Plan* (and listed below) with regard to:
 - Potential Risk of "Direct Contact with PCS" - Recommended measures:
 1. Personal Protective Equipment (PPE) to be worn by workers likely to come into contact with soil or equipment that is likely to come in contact with soil. PPE includes gloves, covered shoes, long pants and long sleeve shirts.
 2. Use PPE and avoid direct contact with soil
 3. Do not eat, drink or smoke in the work area
 4. Wash hands regularly and prior to eating and before leaving the site
 - Potential Risk of "Ingestion of PCS" - Recommended measures:
 1. Do not have direct contact with the soil.
 2. Wear gloves during works where there is a likelihood of contact with soil.
 3. Provide hand washing facilities for workers close by.
 4. Avoid eating in the work area and wash hands before eating or drinking.

⁹ Information Bulletin 105: Classification and Management of Contaminated Soil for Disposal (v3 2018)



- In addition to the above, adherence to Tasmanian Soil Disposal Guidelines is sufficient for risk mitigation based on the observed level of site contamination.

With reference to the Potentially Contaminated Land Code of the Hobart Interim Planning Scheme 2015, clause E2.6.2 Excavation (b), the completed environmental site assessment has established, based on the plans provided:

- The planned 'excavation **does not adversely impact on human health or the environment**';
- Site contamination **does not present an unacceptable risk to workers** involved in redevelopment of the site, or future users of the site, as a result of proposed excavation of the site; and
- Should offsite disposal of excavated material be necessary, '**specific remediation and protection measures**' are required to be implemented before excavation commences'
 - The measures required are identified within the Tasmanian Soil Disposal Guidelines (IB105), due to the identification of low level contaminated soil.

The report conclusions are made against both the existing and proposed future land use, as identified within the drafting plans (Appendix A). Further assessment may be required if a change to a more sensitive land use is proposed or the environmental condition of other areas of the site need to be assessed.



11. STATEMENT OF LIMITATIONS

This report has been prepared in accordance with the scope of services described in the contract or agreement between Environmental Management & Consulting Pty Ltd (EM&C) and the Client. The report relies upon data, surveys, measurements and results taken at or under the particular times and conditions specified herein. Any findings, conclusions or recommendations only apply to the aforementioned circumstances and no greater reliance should be assumed or drawn by the Client. Furthermore, the report has been prepared solely for use by the Client and EM&C accepts no responsibility for its use by other parties. The client agrees that EM&C's report or associated correspondence will not be used or reproduced in full or in part for promotional purposes and cannot be used or relied upon in any prospectus or offering.

No warranties express or implied are made. Subject to the Scope of Work, EM&C's assessment is limited strictly to identifying typical environmental conditions associated with the subject property and does not include evaluation of the structural conditions of any buildings on the subject property or any other issues. Additionally unless otherwise stated EM&C did not conduct soil, air, wastewater or other matrix analyses including asbestos or perform contaminated sampling of any kind. Nor did EM&C investigate any waste material from the property that may have been disposed of off the site, nor related waste management practices.

The results of this assessment are based upon site inspection conducted by EM&C personnel, information from interviews with people who have knowledge of site conditions and information provided by regulatory agencies. All conclusions and recommendations regarding the property are the professional opinions of the EM&C personnel involved with the project, subject to the qualifications made above.

While normal assessments of data reliability have been made, EM&C assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside of EM&C, or developments resulting from situations outside the scope of this project.

EM&C is not engaged in environmental auditing and/or reporting of any kind for the purpose of advertising sales promoting, or endorsement of any clients' interests, including raising investment capital, recommending investment decisions, or other publicity purposes. EM&C assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside of EM&C, or developments resulting from situations outside the scope of this project.

Information relating to soil, groundwater, waste, air or other matrix conditions in this document is considered to be accurate at the date of issue. Surface, subsurface and atmospheric conditions can vary across a particular site or region, which cannot be wholly defined by investigation. As a result, it is unlikely that the results and estimations presented in this report will represent the extremes of conditions within the site that may exist. Subsurface conditions including contaminant concentrations can change in a limited period of time and typically have a high level of spatial heterogeneity.

From a technical perspective, there is a high degree of uncertainty associated with the assessment of subsurface, aquatic and atmospheric environments. They are prone to be heterogeneous, complex environments, in which small subsurface features or changes in geologic conditions or other environmental anomalies can have substantial impact on water, air and chemical movement.

Major uncertainties can also occur with source characterization assessment of chemical fate and transport in the environment, assessment of exposure risks and health effects, and remedial action performance. These factors make uncertainty an inherent feature of potentially impacted sites. Technical uncertainties are characteristically several orders of magnitude greater at impacted sites than for other kinds of projects.

EM&C's professional opinions are based upon its professional judgment, experience, and training. These opinions are also based upon data derived from the limited testing and analysis described in this report. It is possible that additional testing and analysis might produce different results and/or different opinions or other opinions. EM&C has limited its investigation(s) to the scope agreed upon with its client. EM&C believes that its opinions are reasonably supported by the testing and analysis that has been undertaken (if any), and that those opinions have been developed according to the professional standard of care for the environmental consulting profession in this area at this time. Other opinions and interpretations may be possible. That standard of care may change and new methods and practices of exploration, testing and analysis may develop in the future, which might produce different results.

EM&C is not in the business of providing legal advice.



12. REFERENCES

Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand (2000) [Referenced as ANZECC 2000], Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 1.

CRC Care (2011), Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater, Technical Report No. 10, CRC for Contamination Assessment and Remediation of the Environment, Adelaide, Australia.

CRC Care (2013), Petroleum hydrocarbon vapour intrusion assessment: Australian guidance, Technical Report No.23, CRC for Contamination Assessment and Remediation of the Environment, Adelaide, Australia.

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NEPC, 2013, The National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013, National Environmental Protection Council, Adelaide, Australia.

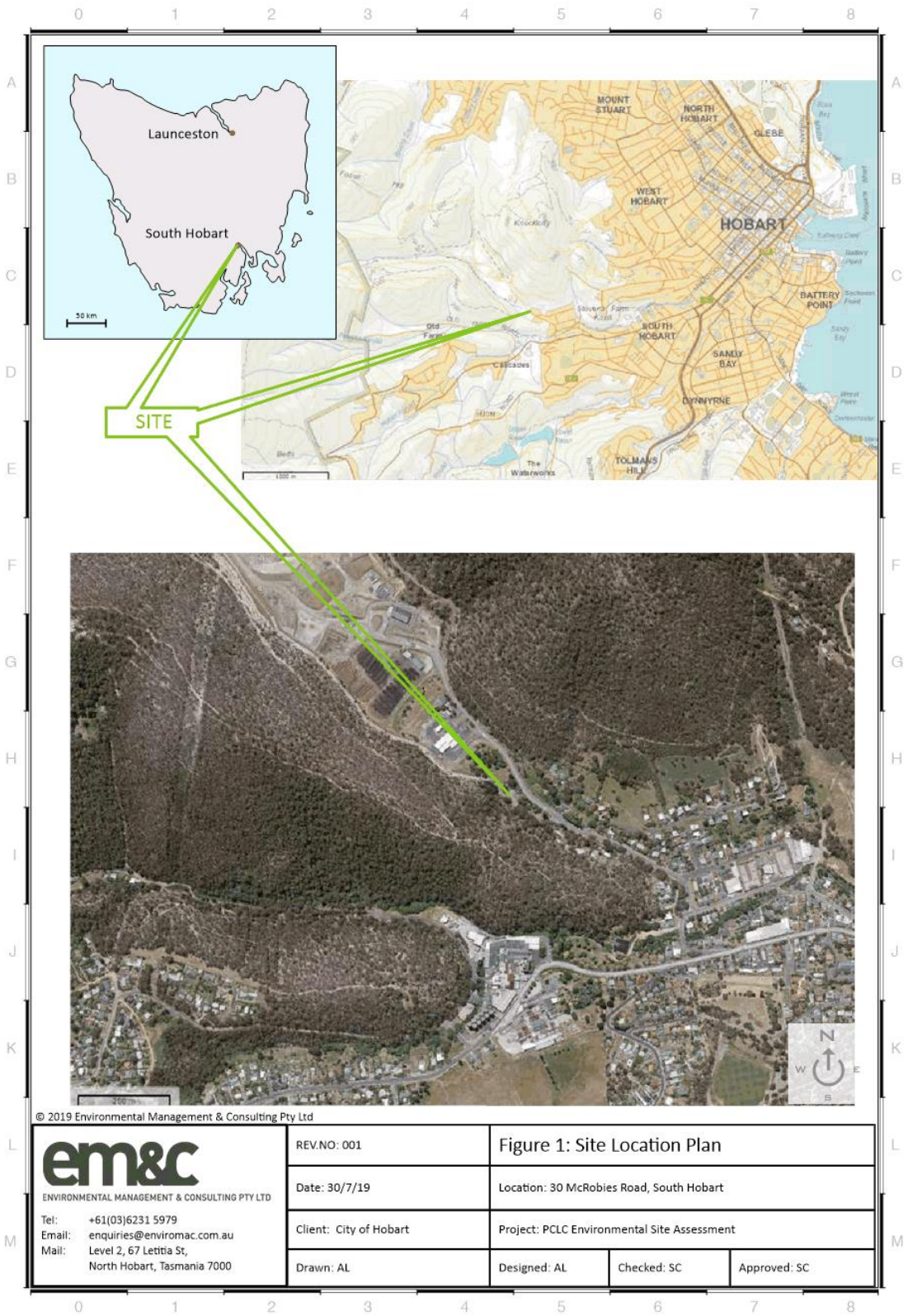
NHMRC (2011), Australian Drinking Water Guidelines Paper 6 National Water Quality Management Strategy. National Health and Medical Research Council, National Resource Management Ministerial Council, Commonwealth of Australia, Canberra.

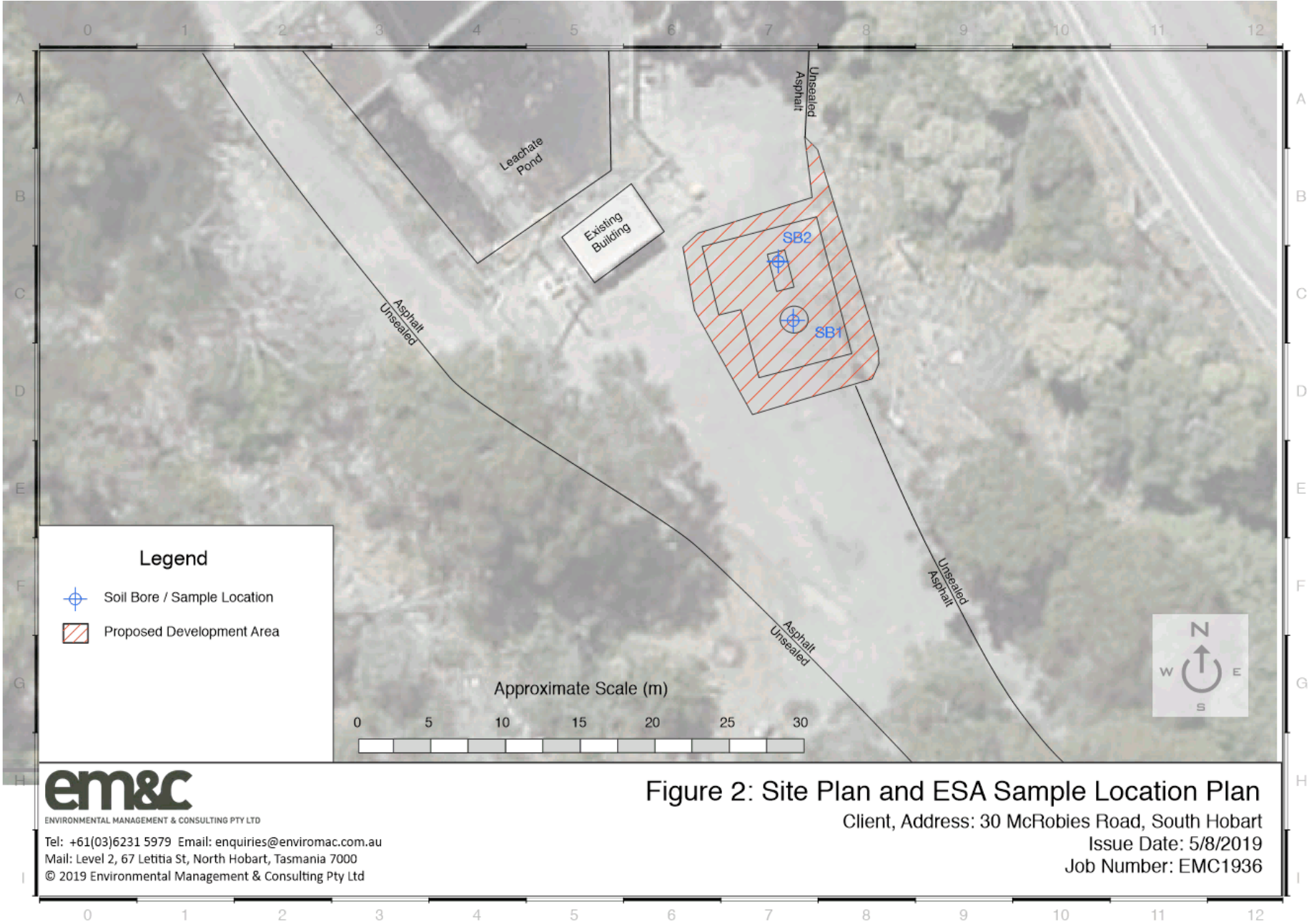
Tasmanian Environmental Protection Authority, 2018, Information Bulletin 105 (IB105), Classification and Management of Contaminated Soil for Disposal, Version 3 (2018).

Tasmanian Environmental Protection Authority, 2019: Potentially Contaminating Activities, Industries and Land Uses viewable at: <https://epa.tas.gov.au/regulation/contaminated-sites/identification-and-assessment-of-contaminated-land/potentially-contaminating-activities-industries-and-land-uses> Accessed by EM&C in August 2019.

The LIST, 2018, www.thelist.tas.gov.au, Land Information System Tasmania, accessed by EM&C in July/August 2019

FIGURES





TABLES



Table 1a

In-Situ Soil Validation Analytical Results v Land Use Criteria

Total Recoverable Hydrocarbons, Benzene, Toluene, Ethylbenzene, Xylenes, Naphthalene and Polycyclic Aromatic Hydrocarbons

Sample ID_Depth (m)	Sample Date	PID Results (ppm)	Soil Moisture Content	Land Use	Confining Geology (USDA Soil Texture Group)	Total Recoverable Hydrocarbons (mg/kg)						Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	Naphthalene ¹ (mg/kg)	Polycyclic Aromatic Hydrocarbons (mg/kg)			Carcinogenic PAHs as BaP TEQ ⁵ (mg/kg)
						C6 - C10	C6 - C10 less BTEX	>C10 - C16	>C10 - C16 less Naphthalene	F3 >C16 - C34	F4 >C34 - C40						Naphthalene ¹	Benzo(a)pyrene	Total PAHs	
In-Situ Soil Assessment 5 July 2019																				
SB1/0.075-0.125	05-Jul-19	0.0	4.7	Com. / Ind.	SAND: 0- < 1m	<10	<10	<50	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<1	<0.5	0.13	<0.5	0.6
SB1/1.0-1.1	05-Jul-19	0.0	23.3	Com. / Ind.	SAND: 1- < 2 m	<10	<10	<50	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<1	-	-	-	-
SB1/1.5-1.6	05-Jul-19	0.0	22.0	Com. / Ind.	SAND: 1- < 2 m	<10	<10	<50	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<1	-	-	-	-
SB2/0.5-0.6	05-Jul-19	0.0	18.4	Com. / Ind.	SAND: 0- < 1m	<10	<10	<50	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<1	-	-	-	-
Limit of Reporting Soil						10	10	50	50	100	100	0.2	0.5	0.5	0.5	1.0	0.5	0.5	0.5	0.6
NOMINATED GENERIC INVESTIGATION CRITERIA																				
⁽¹⁾ NEPM HIL 'D' - Commercial/ Industrial						-	-	-	-	-	-	-	-	-	-	-	-	-	4000	40
⁽¹⁾ NEPM Soil HSL 'D' for Vapour Intrusion - Commercial/ Industrial					SAND: 0- < 1m	-	260	-	NL	-	-	3	NL	NL	230	NL	-	-	-	-
⁽¹⁾ NEPM Soil HSL 'D' for Vapour Intrusion - Commercial/ Industrial					SAND: 1- < 2 m	-	370	-	NL	-	-	3	NL	NL	NL	NL	-	-	-	-
⁽²⁾ CRC CARE Soil HSL 'D' for Direct Contact - Commercial/ Industrial					-	-	26000	-	20000	27000	38000	430	99000	27000	81000	11000	-	-	-	-
⁽²⁾ CRC CARE Soil HSL 'IMW' for Vapour Intrusion - Intrusive Maintenance Worker					SAND: 0- < 2 m	-	NL	-	NL	NL	NL	77	NL	NL	NL	NL	-	-	-	-
⁽²⁾ CRC CARE Soil HSL 'IMW' for Direct contact - Intrusive Maintenance Worker					-	-	82000	-	85000	120000	1100	120000	85000	130000	29000	-	-	-	-	-
⁽¹⁾ NEPM EIL Commercial and Industrial					-	-	-	-	-	-	-	-	-	-	-	370	370	-	-	-
⁽¹⁻²⁾ NEPM ESL for Commercial and Industrial					COARSE SOIL	-	215	-	170	1700	3300	75	135	165	180	-	-	1.4	-	-
⁽¹⁻²⁾ NEPM Soil Management Limits - Commercial and industrial					COARSE SOIL	700	-	1000	-	3500	10000	-	-	-	-	-	-	-	-	-
⁽³⁾ Soil Saturation concentration					SAND	-	950	-	560	-	-	360	560	64	300	9	9	-	-	-

Tables Notes:

1) Assessment criteria are obtained from National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (NEPC, 1999)

2) Assessment criteria are obtained from CRC CARE Technical Report no. 10: Health screening levels for petroleum hydrocarbons in soil and groundwater (Friebe & Nadebaum 2011)

3) ESL criteria have been established for protection of plant root zones and are applicable in non-arid areas for assessment of soil within the 0-2mBG5 depth range.

4) Laboratory analysis of naphthalene is conducted using two separate methods, EPOB0: extracting sample for volatiles and EPO75(SIM)B: extracting sample for semi-volatiles. The naphthalene concentration from EPOB0 is used for F2 calculation.

5) HIL is based on the 8 carcinogenic PAHs and their TEQs (potency relative to BaP) adopted by CCME 2008 (refer Schedule B7). The BaP TEQ is calculated by multiplying the concentration of each carcinogenic PAH in the sample by its BaP TEQ and summing these products. TEQs have been calculated using half of the LOR result, where <LOR was reported.

"- " denotes analyte not tested by laboratory, or no criteria available.

Bold values are concentrations reported above laboratory limit of reporting

Highlighted values exceed nominated investigation criteria.

Table Abbreviations

NEPM: National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013
 CRC CARE: Cooperative Research Centre for Contamination Assessment and Remediation of the Environment
 HSL: Health Screening Level

HIL: Health Investigation Level
 ESL: Environmental Screening Level
 EIL: Environmental Investigation Level
 IMW: Intrusive Maintenance Worker
 PID: Photo-ionisation Detection



Table 1b
In-Situ Soil Validation Analytical Results v Land Use Criteria
Metals and Soil Properties

Sample ID_Depth (m)	Sample Date	Soil Moisture Content	Land Use	Confining Geology (USDA Soil Texture Group) ¹	Arsenic (mg/kg)	Beryllium (mg/kg)	Boron (mg/kg)	Cadmium (mg/kg)	Chromium (VI) (mg/kg)	Chromium (Total) (mg/kg)	Cobalt (mg/kg)	Copper (mg/kg)	Iron (%)	Lead (mg/kg)	Manganese (mg/kg)	Mercury (inorganic) (mg/kg)	Nickel (mg/kg)	Selenium (mg/kg)	Zinc (mg/kg)	Cation Exchange Capacity (meq/100g)	Organic Carbon (mg/kg)	pH	Clay Content
In-Situ Soil Assessment 5 July 2019																							
SB1/0.075-0.125	05-Jul-19	4.7	Com. / Ind.	SAND: 0- < 1m	<5	<1	-	<1	<0.5	5	9	72	-	<5	213	<0.1	11	<5	29	-	-	-	-
SB1/1.0-1.1	05-Jul-19	23.3	Com. / Ind.	SAND: 1- < 2 m	<5	1	<50	<1	-	19	11	15	2.24	8	145	<0.1	13	<5	37	20	<0.5	5.60	23%
SB1/1.5-1.6	05-Jul-19	22.0	Com. / Ind.	SAND: 1- < 2 m	<5	<1	<50	<1	-	12	16	14	-	7	116	<0.1	13	<5	29	-	-	-	-
SB2/0.5-0.6	05-Jul-19	18.4	Com. / Ind.	SAND: 0- < 1m	<5	<1	<50	<1	-	6	<2	6	-	6	46	<0.1	<2	<5	11	-	-	-	-
Limit of Reporting Soil					10	1	50	10	0.5	2	2	5	0.005	100	5	0.1	2	5	5	0.1	0.5	1.0	0.5
NOMINATED INVESTIGATION CRITERIA																							
⁽¹⁾ NEPM HIL 'D' - Commercial/ Industrial					3 000	500	300 000	900	3 600		4 000	240 000	-	1 500	60 000	730	6 000	10 000	400 000	-	-	-	-
⁽²⁾ CRC CARE Soil HSL 'D' for Direct Contact - Commercial/ Industrial																							
⁽³⁾ CRC CARE Soil HSL 'IMW' for Direct contact - Intrusive Maintenance Worker																							
⁽⁴⁾ NEPM EIL Commercial and Industrial					160			-	670**			110*	-	1 800			460*		500*	-	-	-	-

Tables Notes:

- 1) Assessment criteria are obtained from National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (NEPC, 1999)
- 2) Assessment criteria are obtained from CRC CARE Technical Report no. 10: Health screening levels for petroleum hydrocarbons in soil and groundwater (Friebel & Nadebaum 2011)
- 3) EIL criteria have been established for protection of plant root zones and are applicable in non-arid areas for assessment of soil within the 0-2mBGS depth range.
- "-" denotes analyte not tested by laboratory, or no criteria available.
- *EILs has been based on reported soil pH and cation exchange capacity reported in sample SB1/1.0-1.1
- **The EIL for chromium (III) has been adopted as a criteria for chromium (total) and is based on reported clay content in SB1/1.0-1.1
- Bold values are concentrations reported above laboratory limit of reporting
- Highlighted values exceed nominated investigation criteria.

Table Abbreviations

NEPM: National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013
 CRC CARE: Cooperative Research Centre for Contamination Assessment and Remediation of the Environment
 HSL: Health Screening Level

HIL: Health Investigation Level
 ESL: Environmental Screening Level
 EIL: Environmental Investigation Level

IMW: Intrusive Maintenance Worker



Table 2a

In-Situ Soil Validation Analytical Results v Waste Disposal Criteria

Total Petroleum Hydrocarbons, Benzene, Toluene, Ethylbenzene, Xylenes, Naphthalene, Polycyclic Aromatic Hydrocarbons, Cyanide, Fluoride and PCBs

Sample ID_Depth (m)	Sample Date	Total Petroleum Hydrocarbons (mg/kg)		Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	Naphthalene ² (mg/kg)	Polycyclic Aromatic Hydrocarbons (mg/kg)			Cyanide (Total) (mg/kg)	Fluoride (mg/kg)	Polychlorinated biphenyls (mg/kg)
		C6 - C9	C10 - C36						Naphthalene ²	Benzo(a)pyrene	Total PAHs			
In-Situ Soil Assessment 5 July 2019														
SB1/0.075-0.125	05-Jul-19	<10	<50	<0.2	<0.5	<0.5	<0.5	<1	<0.5	0.13	<0.5	<1	110	<0.1
SB1/1.0-1.1	05-Jul-19	<10	<50	<0.2	<0.5	<0.5	<0.5	<1	<0.5	-	-	-	-	-
SB1/1.5-1.6	05-Jul-19	<10	<50	<0.2	<0.5	<0.5	<0.5	<1	<0.5	-	-	-	-	-
SB2/0.5-0.6	05-Jul-19	<10	<50	<0.2	<0.5	<0.5	<0.5	<1	<0.5	-	-	-	-	-
Limit of Reporting Soil		10	50	0.2	0.5	0.5	0.5	1.0	0.5	0.1	0.5	1.0	40	0.1
Tasmanian EPA Information Bulletin 105 Classification and Management of Contaminated Soil for Disposal, 2018														
Fill Material - Level 1		65	1,000	1	1	3	14	-	-	0.08	20	32	300	2
Low Level Contaminated Soil - Level 2		650	5,000	5	100	100	180	-	-	2	40	1,000	3,000	20
Contaminated Soil - Level 3		1,000	10,000	50	1,000	1,080	1,800	-	-	20	200	2,500	10,000	50

Tables Notes:

1] Assessment criteria are obtained Tasmanian EPA Information Bulletin 105 Classification and Management of Contaminated Soil for Disposal, 2018

2] Laboratory analysis of naphthalene is conducted using two separate methods, EP080: extracting sample for volatiles and EP075(SIM)B: extracting sample for semi-volatiles. The naphthalene concentration from EP080 is used for F2 calculation.

"-/-" denotes analyte not tested by laboratory, or no criteria available.

Bold values are concentrations reported above laboratory limit of reporting

Highlighted values exceed nominated classification criteria.

Table Abbreviations



Table 2b
In-Situ Soil Validation Analytical Results v Waste Disposal Criteria
Metals

Sample ID_Depth (m)	Sample Date	Metals (mg/kg)																		
		Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium (VI)	Chromium (Total)	Cobalt	Copper	Lead	Manganese	Mercury (inorganic)	Molybdenum	Nickel	Selenium	Silver	Tin	Vanadium	Zinc
In-Situ Soil Assessment 5 July 2019																				
SB1/0.075-0.125	05-Jul-19	<5	40	<1	-	<1	<0.5	5.0	9.0	72.0	<5	213	<0.1	<2	11	<5	<2	<5	-	29
SB1/1.0-1.1	05-Jul-19	<5	90	1.0	<50	<1	-	19.0	11.0	15.0	8.0	145	<0.1	-	13	<5	-	-	62	37
SB1/1.5-1.6	05-Jul-19	<5	100	<1	<50	<1	-	12.0	16.0	14.0	7.0	116	<0.1	-	13	<5	-	-	53	29
SB2/0.5-0.6	05-Jul-19	<5	40	<1	<50	<1	-	6.0	<2	6.0	6.0	46	<0.1	-	<2	<5	-	-	23	11
Limit of Reporting Soil		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Tasmanian EPA Information Bulletin 105 Classification and Management of Contaminated Soil for Disposal, 2018																				
Fill Material - Level 1		20	300	2	-	3	1	50	100	100	300	500	1	10	60	10	10	50	-	200
Low Level Contaminated Soil - Level 2		200	3,000	40	-	40	200	500	200	2,000	1,200	5,000	30	1,000	600	50	180	500	-	14,000
Contaminated Soil - Level 3		750	30,000	400	-	400	2,000	5,000	1,000	7,500	3,000	25,000	110	4,000	3,000	200	720	900	-	50,000

Tables Notes:

1) Assessment criteria are obtained Tasmanian EPA Information Bulletin 105 Classification and Management of Contaminated Soil for Disposal, 2018

"-" denotes analyte not tested by laboratory, or no criteria available.

Bold values are concentrations reported above laboratory limit of reporting

Highlighted values exceed nominated classification criteria.

Table Abbreviations



Table 3
Soil Assessment QA/QC Results
Total Recoverable Hydrocarbons, Benzene, Toluene, Ethylbenzene and Xylenes

Sample ID /Depth (m)	Sample Date		Total Recoverable Hydrocarbons (mg/kg)				Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	Naphthalene ¹ (mg/kg)
			F1 C6 - C10 less BTEX	F2 >C10 - C16 less Naphthalene	F3 >C16 - C34	F4 >C34 - C40					
Duplicate Samples (all soil results in mg/kg)											
In-Situ Excavation Validation Soil Assessment											
S81/0.075-0.125	05-Jul-19		<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<1
QCP_5/7/19	Primary laboratory Duplicate of S81/0.075-0.125		<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<1
Relative % Difference	S81/0.075-0.125 and QCP_5/7/19		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
RPD criteria			NO LIMIT	NO LIMIT	NO LIMIT	NO LIMIT	NO LIMIT	NO LIMIT	NO LIMIT	NO LIMIT	NO LIMIT
Pass/Fail			Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Limit of Reporting (LOR) - Soil Samples (mg/kg)											
Limit of Reporting ALS (Primary)			10	50	100	100	0.2	0.5	0.5	0.5	1.0
Soil Assessment Trip Blank Samples (mg/kg)											
TB_5/7/19	05-Jul-19	Trip Blank	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<1
Soil Assessment Equipment Rinse Blank Samples (µg/l)											
RB_5/7/19	05-Jul-19	Rinse Blank	<20	<100	<100	<100	<1	<2	<2	<2	<5

Tables Notes:

1) Laboratory analysis of naphthalene is conducted using two separate methods, EP080: extracting sample for volatiles and EP075(SIM/B): extracting sample for semi-volatiles. The naphthalene concentration from EP080 is used for F2 calculation.

"-" denotes analyte not tested by laboratory, or no criteria available.

Bold values are concentrations reported above laboratory limit of reporting.

Highlighted values exceed nominated investigation criteria.

QC- Acceptance Criteria

RPD Duplicates: RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable, and have been adopted for this assessment:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Table Abbreviations

NEPM: National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013

CRC CARE: Cooperative Research Centre for Contamination Assessment and Remediation of the Environment

APPENDIX A

Design Documentation Provided by JMG

CONTAMINATION MANAGEMENT PLAN

For City of Hobart

Construction of a Truck Wash at McRobie's Landfill

April 2019

**Johnstone McGee and Gandy Pty Ltd**

incorporating Dale P Luck & Associates
(trading as JMG Engineers and Planners)
ABN 76 473 834 852 ACN 009 547 139

www.jmg.net.au

HOBART OFFICE
117 Harrington Street
Hobart TAS 7000
Phone (03) 6231 2555
Fax (03) 6231 1535
infohbt@jmg.net.au

LAUNCESTON OFFICE
49-51 Elizabeth Street
Launceston TAS 7250
Phone (03) 6334 5548
Fax (03) 6331 2954
infohbt@jmg.net.au

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Appendix A - Site Plan including Drawings CO2, CO3, SO3 and HO2

1. Executive Summary

There is the potential for soil and groundwater in the location of the proposed truck wash to be contaminated. Therefore, management controls and assessment of the site is required to ensure the construction workers, the public, visitors and the environment are protected. Recent groundwater or soil results were not available to assist with developing this Plan. A Geological Survey of the landfill completed in 2000-2002 has been used to estimate the likely groundwater/perched water and soil conditions at the site. The site is located on the outer edge of the operational (filled) areas and it is unlikely that the subject site (truck wash site) has been filled with landfill waste. It is proposed that a site assessment is completed in two parts with the first soil and groundwater collection to occur prior to the commencement of construction works. The second part of the environmental assessment will be completed during excavation of the pits and trenches and supervision of the soil and groundwater storage shall be completed by a suitably qualified environmental consultant. The environmental consultant will implement controls additional to this Plan to ensure that workers are not exposed to unacceptable risks and soil and groundwater is contained onsite and adequately sampled and assessed. At the conclusion of the assessment a report of the findings will be submitted to City of Hobart.

2. The Development Proposal

It is proposed to construct a truck wash downslope of the landfill leachate pond. It is proposed to relocate the pressure washer to the new truck wash and clean out the existing trench drains and constructed new shallow catch drain up to 150 mm depth above the truck wash. New water, stormwater and sewer services will be connected to the new truck wash. Service trenches will be excavated up to 1 metre below ground surface (mbgs) to allow for the installation of water, sewer and stormwater drains. Detailed plumbing plans will be made available to the environmental consultant prior to commencement.

As the development will be undertaken on potentially contaminated land any onsite works will need to be undertaken in a controlled manner as the presence of contaminated soils and/or water are likely. It is therefore necessary to protect the safety of onsite workers and offsite land users and the natural environment. This Plan will outline the potential risks and controls required to prevent risks to workers, the public and the environment.

Table 1: Summary of Relevant Activities

Proposed Construction	Construction of a Truck Wash on 0.15 m concrete slab. Excavation of 0.45 - 0.60 m concrete piles and 1.6 m deep silt trap, 2.4 m base for underground water holding tank.
Maximum Depth of Excavation From Existing Surface Level	2.4 metres (3,000 Litre underground tank); 1.6 metres silt trap (estimate); Footings 0.6 metres (estimate). *To be confirmed with engineering plans
Description of Excavation	Soil to be excavated and stockpiled in accordance with this plan. Areas to be excavated include leveling for slab construction, stormwater drainage, underground concrete holding well, silt trap, concrete footing pads
Estimate of Materials to be excavated/extracted	Total Soil = 43 cubic metres Total Water = Nil Depth of perched and/or permanent aquifer is not known.

3. Site Identification

The site is located at the lower end of the McRobies Landfill (refer Figure 2). The truck wash will be located on two titles Certificate of Title 166085/5 and 166085/3 and located below the leachate pond (refer Figure 3).

The site is located in the 'Utilities' zone of the Hobart Planning Scheme (refer Figure 4).

Figure 1: Site Identification

Certificate of Title	166085/5 and 166085/3
Address	30 McRobies Road
Surrounding Uses	The titles are immediately adjacent to land owned by City of Hobart ('HCC Disposal Area'). The nearest residential property is to the east at 35 McRobies (65 metres from the truck wash boundary to the property boundary) and to the south at 26 McRobies Road (76 metres from the site boundary).
Land Zoning	The two titles are located within the 'Utilities' zone and to the south is the 'Inner Residential' zone and to the east is the 'Environmental Living' zone. Refer Figure 4.

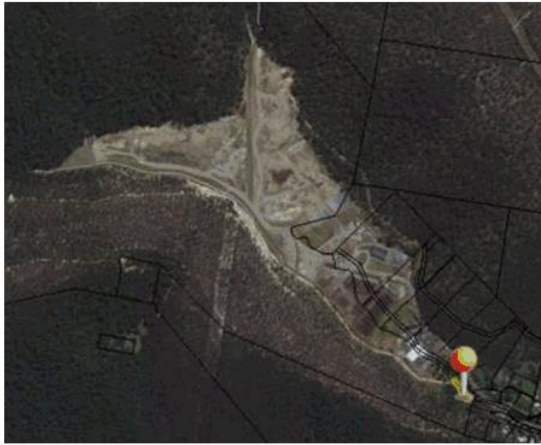


Figure 2: Location of the proposed Truck Wash



Figure 3: Truck Wash Location (approximately) (Image Google & ListMap)



Figure 4: Planning Scheme Zoning

4. Legislative Requirements

4.1 Hobart Interim Planning Scheme 2015

The site is considered a 'potentially contaminated site' under the *Hobart Interim Planning Scheme 2015* as the site is currently in use as a 'Landfill site including onsite waste disposal and refuse pit' which is an activity listed in Table E2.2 of the *E2.0 Potentially Contaminated Land Code*. Evidence that the excavation will not adversely impact on health and environment by either completing an environmental site assessment or developing a plan to manage the risk to human health and the plan must also include an environmental site assessment to address E2.6.2 Performance Criteria P1(b) (refer Figure 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.

Figure 5: Extract from Hobart Interim Planning Scheme 2015

This plan addresses the requirements of the planning scheme in the following ways;

- This Plan requires that a suitably qualified environmental consultant be engaged by the contractor to develop a Sampling and Assessment Plan to assess the risk to human health and the environment as a result of the construction works. Note this does not include a full detailed site assessment to assess the site in accordance with the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (NEP(ASC)M).
- This Plan requires the contractor to engage a suitably qualified environmental consultant to undertake the onsite assessment prior to the commencement of works, to supervise the excavation, stockpiling and management of potentially contaminated soil and groundwater and to complete a report which provides the findings of the assessment and any additional remediation or protection measures, not already included in this report, which are required to be implemented prior to excavation works commencing for the proposed construction works.
- The Plan requires that the environmental consultant prepare a report of the methodology and findings of the onsite assessment and submit the report to City of Hobart within 4 weeks of construction completion.
- This Plan provides some general safety requirements however the SAP will provide more specific details in terms of stockpiling of soils and management of groundwater on the site during excavation works.

4.2 Sampling and Assessment of Soil and Groundwater

The sampling and assessment of contaminated soils should be undertaken in accordance with the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (as amended) (NEP(ASC)M) and relevant Australian and International Standards. The sampling strategy will however be based on judgmental sampling and will not include random based sampling due to the need to align sampling points with the excavation locations of the concrete piles, pit, underground tank and drainage lines which are the potential exposure points for onsite workers.

The selection of soil and water analytes will be determined using the NEP(ASC)M and the NSW EPA (2012) *Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases*. Assessment and review of the results will be completed against the NEP(ASC)M and in the absence of guidance in the NEP(ASC)M other relevant and justified national or international guidelines relevant to the construction exposure scenario.

The scope of the CMP is to protect the workers and the public from risks arising from the excavation works and does not include the ongoing use of the site for its future intended use. Therefore, it is not the intention of this Plan that a Preliminary or Detailed Site Assessment of the site be undertaken in accordance with the NEP(ASC)M for future site use.

5. Geological and Hydrological Features

Soil and hydrological characteristics of the site will be confirmed by the onsite assessment. Soil mapping on List Map (DPIPWE Tas) has defined the dominant soil type as

“Podzol and podzolic soils on sandstone

Undefined soil developed on Triassic sandstone and colluvium”

(refer Figure 6)

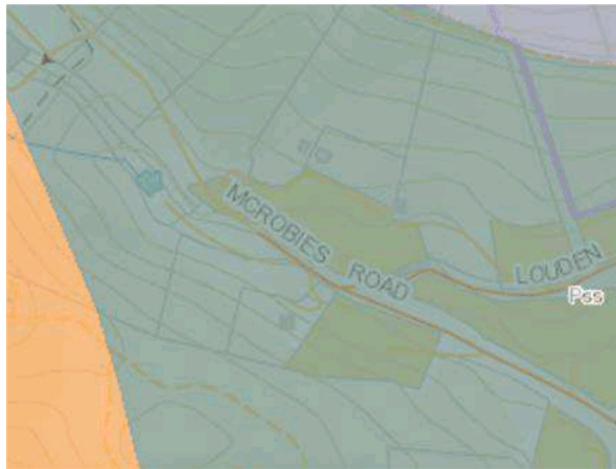


Figure 6: Soil Type

2002 Geological Survey by MRT, 2002¹ provide background detail of the likely groundwater depth and soil type in the area above and below the proposed truck wash site. The survey

¹ Mineral Resources Tasmania, 2002, *The Effects of Waste Disposal on Groundwater Quality in Tasmania, McRobies Gully Waste Depot South Hobart, Geological Survey 2002/16*.

shows two groundwater bores (MG2000/3 and MG2000/4) on the outer edge of the landfill area which is located just above the leachate pond and also a groundwater bore (MG1996/3) located downslope of the leachate pond (refer Figure 7). The leachate pond is located on the outer edge of the landfill footprint. A review of the borehole logs for the two groundwater wells located upslope of the leachate pond reveals the following;

- Possible perched water between 1.0 m and 1.5m
- Depth of landfilling in this lower area appears shallow and up to 1.2 mbgs although this requires confirmation.
- Permian sediments from 1.5 mbgs - sandstone and interbedded siltstone, mudstone and sandstone are dominant up to 12 mbgs.
- Sandstone (bedrock was encountered from 1.5 mbgs)
- Bores MG2000/3 and MG2000/4 may be located on the Cascades Fault Zone

Borehole log was not available for the groundwater bore located downslope of the leachate pond. However, groundwater depth (standing water level) was reported for this location (Refer Table 2).

Table 2: Groundwater Depth (Standing Water Level) MRT 2002¹

Groundwater Bore Ref from MRT 2002 Report ¹	Standing Water Level metres below the ground surface
MG1996/3	5.5
MG2000/3	2.0
MG2000/4	1.5 - 2.0

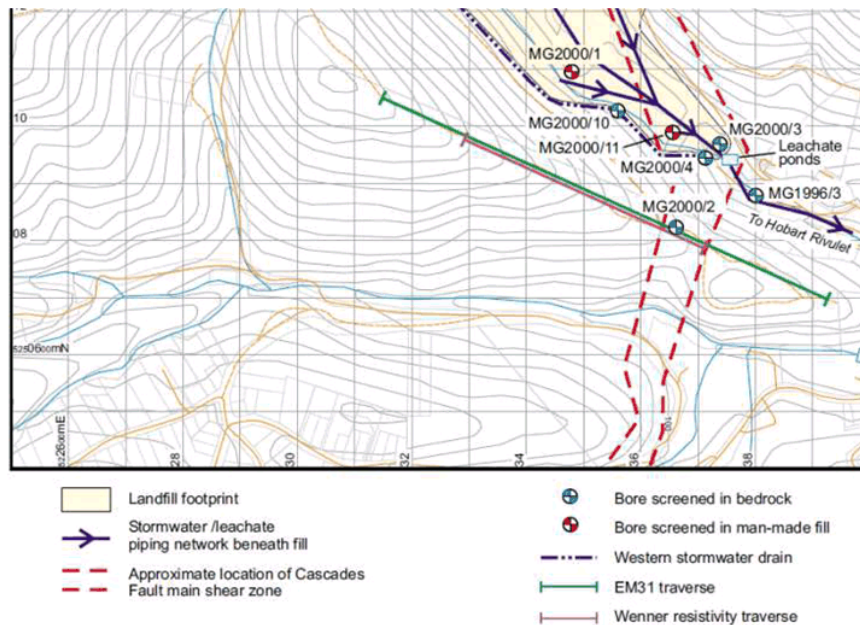


Figure 4

Locations of monitoring bores installed at the McRobies Gully waste depot with respect to the landfill footprint and key infrastructure.

Figure 7: Extract from MRT 2002¹ (p.7)

6. Risk Assessment

The preliminary conceptual site model indicates that there is potential for direct contact with contaminated soils and groundwater during the excavation works and management of soil and groundwater. The leachate pond collects most of the leachate from the McRobies landfill and there is potential for soils and groundwater in this area to be contaminated from leachate water. In addition, there is potential for inhalation of hazardous gases such as methane, ammonia and petroleum hydrocarbons. The preliminary conceptual site model reveals the following risk factors;

- The potential to encounter perched groundwater/leachate seepage/landfill water at shallow depths from 0.5 to 2.0 mbgs during excavation works.
- The potential to encounter contaminated surface water
- The potential to encounter the permanent aquifer/contaminated groundwater from 2.0 mbgs
- Residential properties are located downslope of the subject site. Potential migration or discharge of contaminated soil and groundwater needs to be controlled and prevented (refer Figure 8)
- The potential to encounter contaminated soil and landfill water during excavation
- The potential to encounter highly contaminated surface and perched groundwater. The water in this southern area was reported to contain the highest concentrations of contaminants¹ and high concentrations of ammonia were reported in this area in 2002. However, the quality of surface, perched and permanent groundwater is likely to have changed since the report was completed in 2002. Current data is not available to further inform the risk assessment.



Figure 8: Nearest residential property downslope of the site

6.1 Receptors

The works have the potential to expose the following human receptors;

- Construction workers

- Site supervisors
- Site visitors (including the general public)
- Residents downslope of the site if there is uncontrolled release of soil or groundwater

The works have the potential to impact the following ecological receptors;

- Disturbance of groundwater under the site
- Disturbance of soil and release of contaminants into groundwater
- Soil and aquatic flora and fauna on the site due to the movement or uncontrolled release of contaminants

6.2 Exposure Routes

The works have the potential to exposure the human receptors to contaminants by the following exposure routes;

Direct Contact

- Direct contact with contaminated soil
- Direct contact with contaminated surface, perched and permanent groundwater

Inhalation

- Inhalation of volatile compounds including methane, ammonia and petroleum hydrocarbons released from contaminated soil or groundwater

Ingestion

- Ingestion of contaminated soil and groundwater

These risks will be controlled through work practices and procedures recommended in this Plan and by the environmental consultant.

7. Health Risk Controls

7.1 Site Access

As a private property, only the occupants and those persons engaged to complete work on the site will be permitted to enter the work site. Unaccompanied and unauthorised visitors will not be permitted to enter the work site area.

7.2 Protection of Workers

This plan does not replace Workplace Standards Tasmania Codes applicable to excavation, demolition and construction works generally.

Additional protection must be provided to protect workers from exposure to vapours and exposure to contaminated soil through inhalation, ingestion and direct contact.

The following measures are recommended to ensure workers are protected from exposure to potentially contaminated soil, vapour and groundwater, although additional measures shall be implemented once the preliminary environmental site assessment and analytical results have been reviewed by the environmental consultant.

Table 3: Onsite Controls and Screening During Excavation Works

Potential Risks	References/Limits	Preventative Measures
Direct Contact with PCS	NEPM (RES A)	<ol style="list-style-type: none"> 1. Personal Protective Equipment (PPE) to be worn by workers likely to come into contact with soil or equipment that is likely to come in contact with soil. PPE includes gloves, covered shoes, long pants and long sleeve shirts. 2. Use PPE and avoid direct contact with soil 3. Do not eat, drink or smoke in the work area 4. Wash hands regularly and prior to eating and before leaving the site
Vapour Inhalation	*900mg/m ³ (Aust. Govt) *100mg/m ³ (TWA) (USA, OSHA) *USA, ATSDR	<ol style="list-style-type: none"> 1. Suitably qualified environmental consultant must be onsite prior to the commencement of excavation works. 2. Gas levels in the soil are most accurately monitored upon commencement of excavation and screened using a PID. Any delay in vapour screening may result in low/ false readings. 3. Stop work if PID readings exceed 300 part per million (ppm) and stand upwind. Return to the work site when PID readings are not greater than 200ppm.
Explosion		<ol style="list-style-type: none"> 1. Not likely - however no smoking onsite or exposed naked flames. 2. If operating in a confined space monitor the area with lower explosive limit (LEL) detector and stop work if LEL is greater than 2%. Recommence work when LEL drops below 2% and monitor continuously.
Ingestion of PCS		<ol style="list-style-type: none"> 1. Do not have direct contact with the soil. 2. Wear gloves during works where there is a likelihood of contact with soil. 3. Provide hand washing facilities for workers close by. 4. Avoid eating in the work area and wash hands before eating or drinking.

7.3 Excavation and Soil Management Procedure

All excavation work must comply with the following procedure;

1. The contractor will work directly with the environmental consultant to plan the works prior to commencement. Planning will include implementation of a short term onsite banded/sealed storage for potentially contaminated soil and water.
2. A suitably qualified environmental consultant must be present when the excavation commences to ensure gas detection and observations for potentially contaminated

soil/groundwater are carried out and excavated soil is managed in accordance with EPA Tasmania requirements.

3. Excavated soil must be treated as potentially contaminated and temporarily stored onsite in an appropriately bunded area until laboratory results and approval for disposal has been received in accordance with EPA Tasmania: Bulletin 105.
4. No soil or water will be removed from the work site without clearance from the environmental consultant based on laboratory testing of the soil. Suitable disposal or reuse of the soil and water will be determined based on laboratory testing results.
5. Potentially contaminated stockpiled soil will be contained to prevent runoff from the stockpile during rain events and covered during high wind and rain periods.
6. All workers engaged in excavation works must wear appropriate clothing - long pants and long sleeve shirt, covered safety work boots and gloves to prevent dermal contact with the soil.
7. If during excavation works the PID readings completed by the environmental consultant are greater than 300ppm then work must cease temporarily and all persons will be direct to either temporarily move upwind of the source or move offsite. When levels have dropped below 200ppm work can recommence. If consistent readings are found above 40ppm then regular stop work breaks should be introduced to allow source vapours to reduce to acceptable levels so that a daily TWA of 300ppm² is not exceeded. Maximum short-term exposure must not exceed 1000ppm¹ at any time.

7.4 Onsite Containment of Soil

Excavated soil will be reused onsite or stockpiled onsite ready for offsite disposal. Soil will be segregated into 'clean' and 'dirty' piles. Stockpiled soil will be bunded and covered to prevent escape of soil and contaminants including the influence of wind and rain. A suitable location for stockpile/s will be determined prior to commencement of works.

7.5 Sampling Strategy

The environmental consultant will develop the Sampling and Assessment Plan (SAP).

The SAP will be required to achieve the main objective of this CMP which is to;

1. Design a SAP which will identify the potential contaminants in the soil and groundwater which may pose a risk to onsite workers, off site receptors and the environment.
2. Groundwater will only be tested if groundwater is encountered in test pits to the maximum anticipated depth of excavation.
3. The SAP will be commenced prior to the commencement of construction on the site and the results will be used to drive decisions regarding effective controls required to prevent the exposure to workers and the public to identified contaminants.

It will not be the objective of the SAP to complete a full and Detailed Site Assessment (DSI) of the site under the NEP(ASC)M.

7.6 Soil Disposal / Reuse

Any soil which is later declared uncontaminated or of a sufficient quality to be disposed onsite based on testing results may be disposed of on the site or back into the landfill on advice from the environmental consultant.

² USA, Agency for Toxic Substances and Disease Registry, CAS#86290-81-5 & 8006-61-9

7.6.1 Soil Sampling and Analysis

Potentially contaminated soil will be sampled and disposed of in accordance with *EPA Tasmania: Bulletin 105*. Laboratory analysis of soil samples will be completed by a NATA accredited laboratory. A primary and secondary NATA accredited laboratory will be used for the analysis of soil samples.

7.7 Groundwater and Surface Water Disposal

Groundwater which is encountered during excavation works which is sufficiently prevalent to require extraction or diversion to facilitate below ground construction works will be removed and stored on the work site awaiting confirmation of laboratory results prior to onsite or offsite disposal. It is preferable not to extract or store any surface or groundwater however depending on the volume of groundwater encountered during excavation it may be necessary to extract groundwater or perched water to facilitate excavation and construction works.

Groundwater will be held in sealed sturdy containers with tight fitting lids such as 200 L pelican containers.

Groundwater samples will be collected and laboratory analysis will be in accordance with the NEP(ASC)M.

7.7.1 Groundwater Sampling and Analysis

If groundwater is encountered in the excavation test hole sampling shall be completed in accordance with NEP(ASC)M and NSW Landfill Guidelines³.

A primary and secondary NATA accredited laboratory will be used for the analysis of groundwater samples.

8. Workflow

In order to more fully assess the potential risks to workers, the public and the environment it is suggested that tasks are completed in the following order;

1. The contractor will mark out the location of piers, the silt trap pit, underground tank and service trenches
2. The environmental consultant will undertake soil sampling and gas screening at selected locations prior to the commencement of onsite excavation works
3. The environmental consultant will review the results and additional controls will be implemented as determined necessary to protect workers, the public and the environment.
4. The environmental consultant will attend the site immediately prior to the commencement of excavation works and will be onsite during all excavation works. Excavation works shall not commence until the environmental consultant is in attendance and ready to screen the soil.
5. The environmental consultant will advise the contractor as soon as possible or in the case of an imminent threat to the health or safety of onsite workers or visitors of an unacceptable risk to onsite workers or the public in relation to contaminated soil or groundwater.
6. The contractor shall take action as necessary to protect workers from exposure to contaminants as is reasonably practicable.

³ NSW EPA (2012) *Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases*

9. Protection of Waterways and Services

Sandbags or similar materials will be placed around stormwater drains to prevent runoff from the worksite into Councils stormwater system. Contaminated soil runoff will not be allowed to enter Councils stormwater system.

10. Legal Reporting Obligations

The Contractor shall notify Council within 24 hours if any of the following occurs during the contractors work on the site;

- The escape of soil or liquid from the site or into stormwater drains
- Damage to onsite infrastructure
- The occurrence of fire on the site or the presence of a fire hazard

The Contractor shall notify EPA Tasmania if any of the following occurs;

- A pollutant is released from the site in air, water or soil which is likely to cause environmental harm or environmental nuisance.

11. Conclusion & Recommendations

The following recommendations are made;

1. The land owner of the site, engage a suitably qualified environmental consultant prior to the commencement of works to plan and supervise the preliminary screening of soil and gas and soil excavation and management onsite;
2. The environmental consultant will be required to attend site prior to the commencement of excavation and excavation must not commence until the environmental consultant is in attendance.
3. The sampling plan for soil, water and gas will be determined by the suitably qualified consultant with the objective to determine the end disposal /use of any soil and water and assess risks to onsite workers, the public and visitors to the work site.
4. The environmental consultant shall provide all laboratory reports, field log sheets and an environmental assessment report to the City of Hobart within 30 days of the cessation of the onsite works.

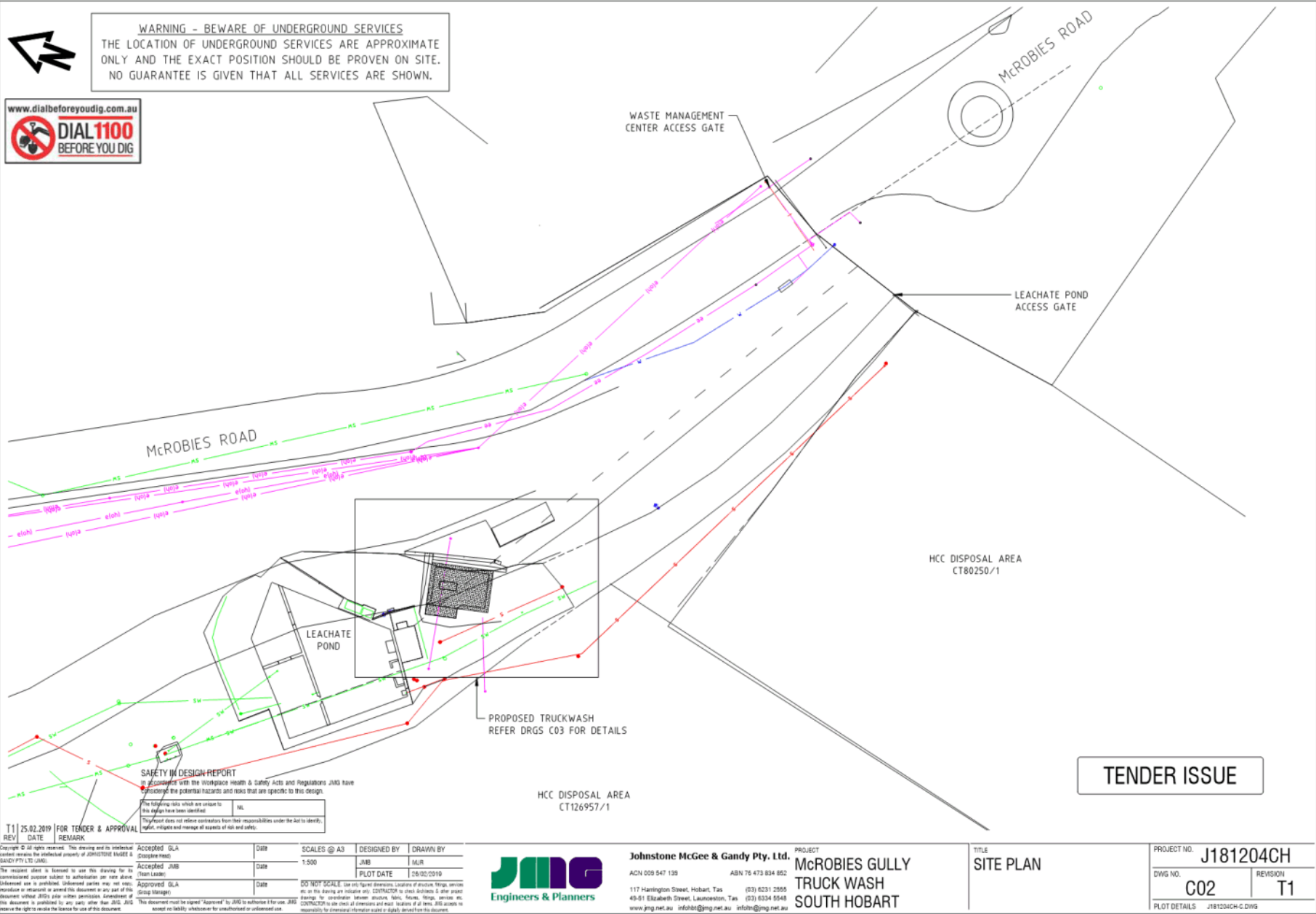
Signed
JOHNSTONE MCGEE AND GANDY

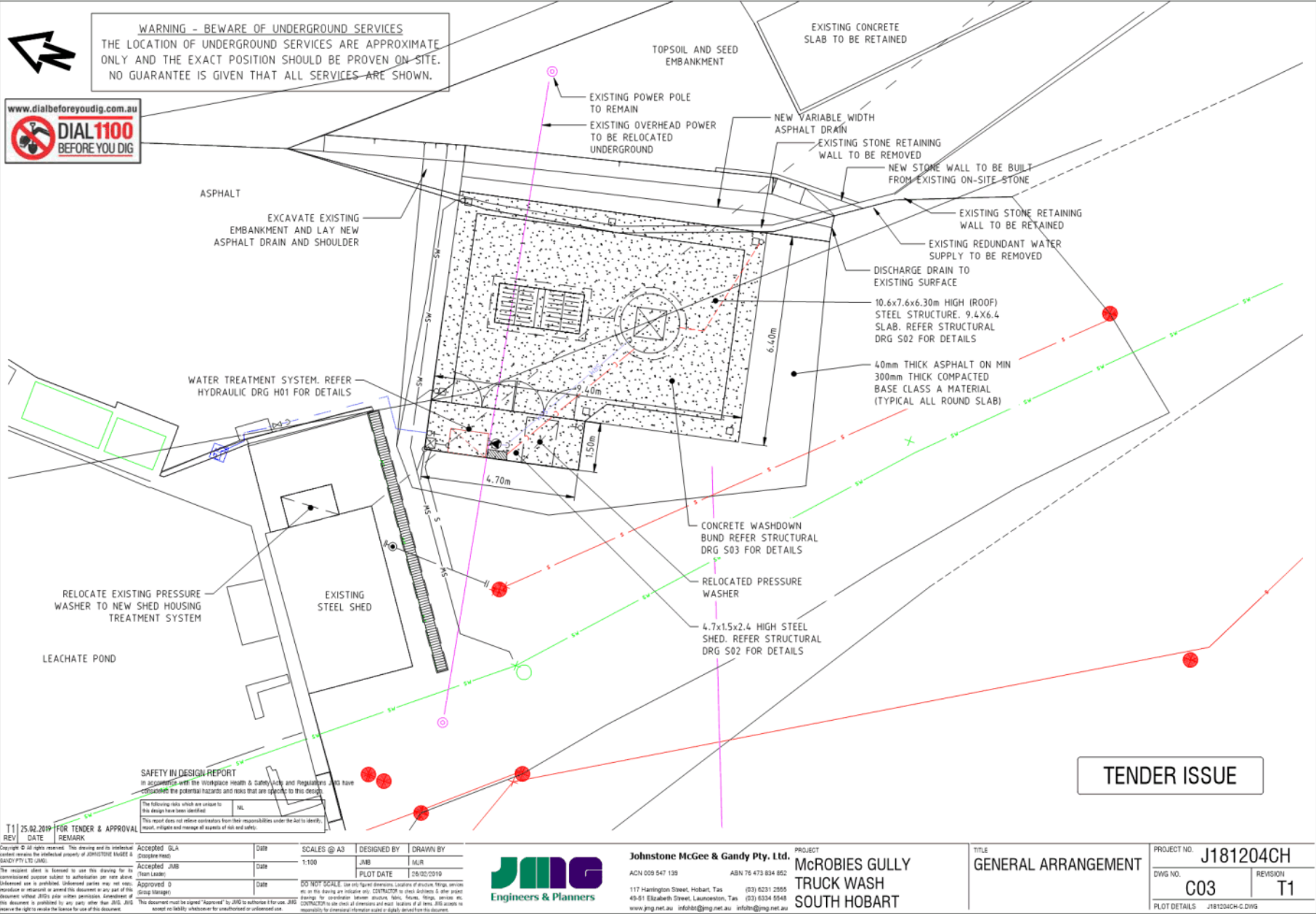


Carmel Parker BSc. App, MEnvMgmt
SENIOR ENVIRONMENTAL SCIENTIST

APPENDIX A

**Site Plan including Drawings CO2, CO3, SO3
and HO2**

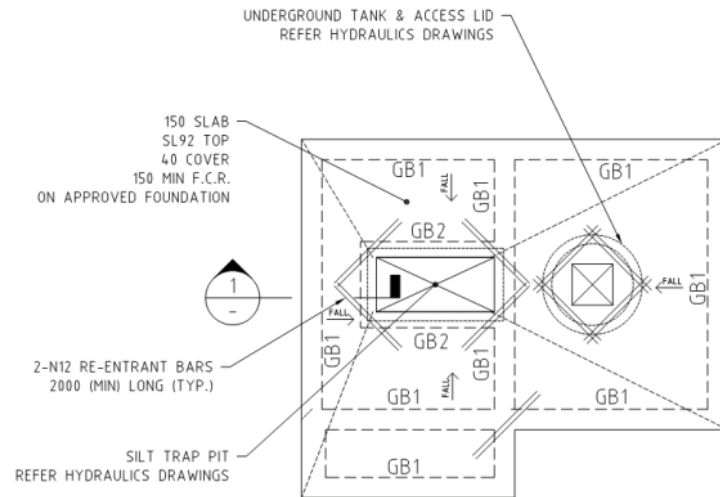




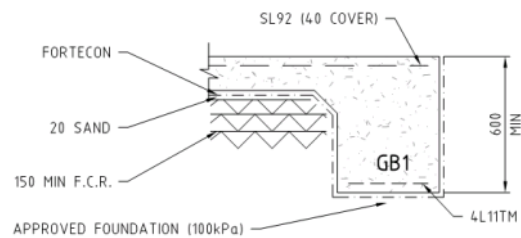
SAFETY IN DESIGN REPORT

In accordance with the Workplace Health & Safety Acts and Regulations JMG have considered the potential hazards and risks that are specific to this design.

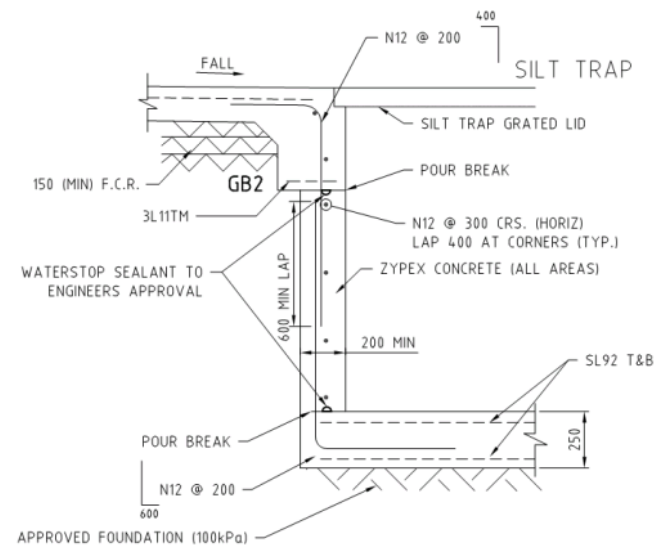
The following risks, which are unique to this design have been identified:	Nil.
This report does not relieve contractors from their responsibilities under the Act to identify, report, mitigate and manage all aspects of risk and safety.	



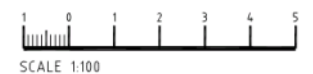
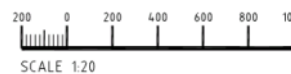
SLAB PLAN
SCALE 1:100



GB1 DETAIL (GB2 SIMILAR)
SCALE 1:20



SECTION 1
SCALE 1:20
REFER HYDRAULICS DRAWINGS FOR



TENDER ISSUE

T1	26.02.19	TENDER ISSUE
REV	DATE	REMARK

<p>Contract is an offer to purchase. This drawing and its related content represent the intellectual property of JENKINS+MILNER & GARDY PCTV LTD (JMG).</p> <p>The recipient shall be licensed to use this drawing for its commercial purposes subject to a satisfaction pay per use. Information use is prohibited. Unlimited copies may not copy, reproduce or transmit in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without prior written permission from JMG.</p> <p>This drawing is the property of JMG and shall remain the property of JMG. It is not to be used for any other purpose without the prior written permission of JMG.</p> <p>This document must be signed "Approved" by JMG to authorize the use and cannot be liability withdrawn or unapproved or substituted.</p>		<p>Accepted GLA (Accepted HSE)</p> <p>Accepted JMB (Team Lead)</p> <p>Approved GLA (Group Manager)</p>	<p>Date</p> <p>Date</p> <p>Date</p>	<p>SCALES @ A3</p> <p>1:100</p> <p>DESIGNED BY</p> <p>JMB</p> <p>DRAWN BY</p> <p>AJP</p> <p>PLOT DATE</p> <p>26/02/2019</p>	<p>DO NOT SCALE</p> <p>This drawing is not to be scaled. Check all dimensions. If there are any changes on drawing, only CONTRACTOR is liable of making changes. The contractor is responsible for coordination between structure, beam, column, beams and other components. The contractor is responsible for the design and construction of the structure. The contractor is responsible for the design and construction of the structure. The contractor is responsible for the design and construction of the structure.</p>
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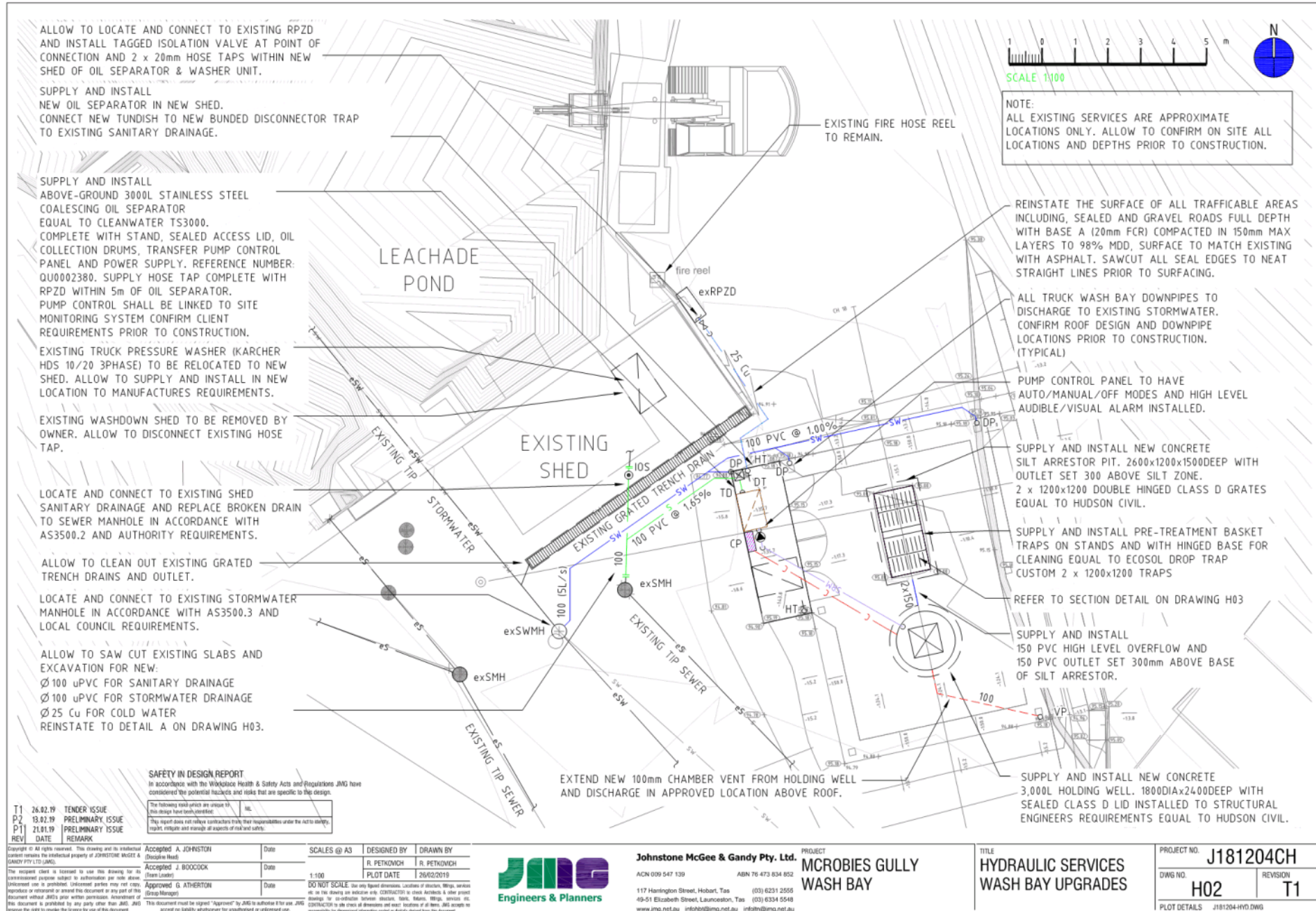
Johnstone McGee & Gandy Pty. Ltd.
ACN 009 547 139 ABN 76 473 834 852
117 Harrington Street, Hobart, Tas (03) 6231 2555
49-51 Elizabeth Street, Launceston, Tas (03) 6334 5548
www.jmg.net.au info@jmg.net.au info@jmg.net.au

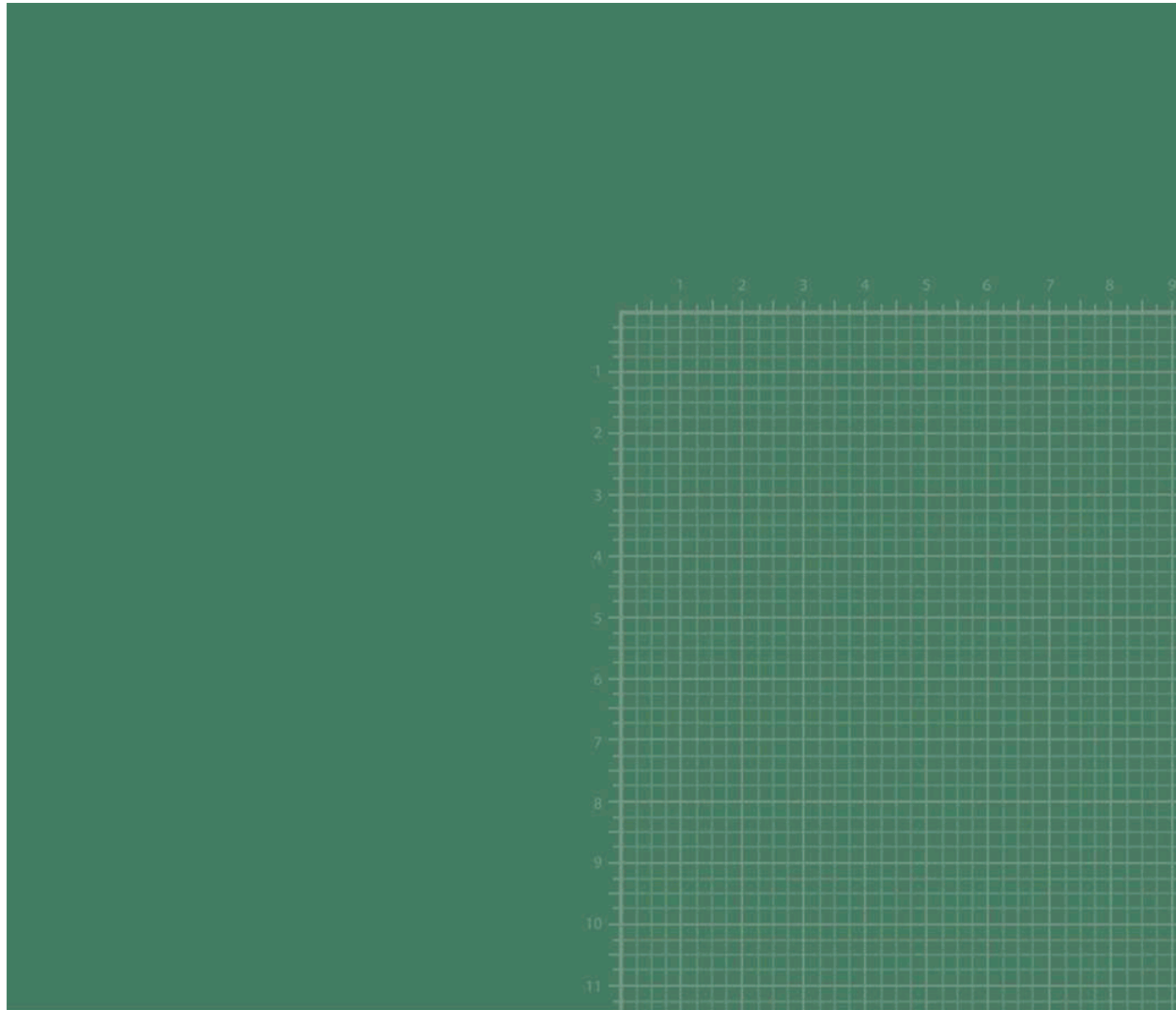
PROJECT
McROBIES GULLY
TRUCK WASH
SOUTH HOBART

TITLE
SLAB PLAN & DETAILS

PROJECT NO.		J181204CH	
DWG NO.		REVISION	
S03		T1	
PLOT DETAILS J181204CH STRUCT MICROBES W			

PLOT DETAILS J181204CH_STRUCT_MICROBIES WASH BAY.DWG



**Johnstone McGee and Gandy Pty Ltd**

incorporating Dale P Luck & Associates
(trading as JMG Engineers and Planners)
ABN 76 473 834 852 ACN 009 547 139

www.jmg.net.au

HOBART OFFICE
117 Harrington Street
Hobart TAS 7000
Phone (03) 6231 2555
Fax (03) 6231 1535
infohbt@jmg.net.au

LAUNCESTON OFFICE
49-51 Elizabeth Street
Launceston TAS 7250
Phone (03) 6334 5548
Fax (03) 6331 2954
infohbn@jmg.net.au



Engineers & Planners
Your Vision is Our Mission

APPENDIX B

Ecological Investigation Levels – Site Specific



Ecological Investigation Level Calculation Spreadsheet

Developed by CSIRO for the National Environment Protection Council

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This work has been prepared in good faith exercising due care and attention. However, no representation or warranty, express or implied, is made as to the relevance, accuracy, completeness or fitness for purpose of this work in respect to any particular user's circumstances. Users of this work should satisfy themselves concerning its application to, and where necessary seek expert advice about, their situation. The Environment Protection and Heritage Council, the National Environment Protection Council and the NEPC Service Corporation shall not be liable to any persons or entity with respect to liability, loss or damage caused or alleged to have been caused directly or indirectly by this work.

Background information on the EIL Calculation Spreadsheet

This spreadsheet is to be used to calculate the Ecological Investigation Levels (EILs) that are to be used in the National Environment Protection (Assessment of Site Contamination) Measure when assessing a contaminated site. The EILs are numerical limits that are designed to protect soil and terrestrial flora and fauna (including pets and wildlife) and soil microbial processes from experiencing substantial deleterious effects caused by contaminants. Ecological Investigation Levels are the ecological equivalents of the investigation levels that aim to protect human health (HILs) and groundwater (GILs). Measured concentrations of contaminants in the soil at a site are compared to the appropriate EILs and if they exceed the EILs then further investigation in the form of an ecological risk assessment that conforms to Schedule B5a (NEPC, 2011) should be conducted.

This spreadsheet uses the methodology set out in Heemsbergen et al. (2008) and Schedule B(5)b (NEPC, 2011) to calculate EILs for contaminated sites that have three land-uses: (1) national parks and areas of high conservation value; (2) urban residential and open public space; and (3) commercial and industrial land.

The toxicity data used and the actual calculations of the EILs for arsenic, chromium III, copper, DDT, lead, naphthalene, nickel and zinc are presented in Warne et al (2009) and Schedule B(5)c (NEPC, 2010). However, it should be noted that the example EIL values presented in Warne et al. (2009) have been rounded off during their calculation and therefore the values presented in that report will not match exactly with those derived by the EIL calculation spreadsheet. The EIL values calculated by the spreadsheet ALWAYS take precedence over those presented in Warne et al. (2009).

The method for deriving the EILs was developed in order to overcome all of the major limitations of the previous EILs (NEPM, 1999). The exact method used to calculate each EIL varied according to

(1) the physicochemical properties of the contaminant – which modified the key exposure pathways that were considered;

(2) whether the toxicity data could be expressed in terms of added contaminant concentrations (obtained by subtracting the background concentration from the total contaminant concentration). When such data were available a limit of how much contaminant could be added to soil before ecotoxicological effects commenced was determined – termed the Added Contaminant Level (ACL). Either a measured or predicted ambient background concentration (ABC) was then added to the ACL to obtain the EIL (see below)

$$\text{EIL} = \text{ACL} + \text{ABC}$$

The advantage of this 'added risk' method is that the EILs can never be less than the ambient background concentration.

When the toxicity data could not be expressed in terms of added concentration then the EIL was expressed as a total concentration, and it does not consider the ambient background concentration at the site.

(3) whether high quality empirical relationships were available that could predict the toxicity of contaminants using soil physicochemical properties. When these were available soil-specific EILs could be derived (where soils with different properties will have their own unique EIL). When these relationships were not available generic EILs (where a single numerical EIL applies to all Australian soils of a particular land-use) were derived.

(4) whether an ageing leaching factor (ALF) was available. The vast majority of toxicity data is derived from laboratory-based experiments that use freshly spiked contaminants. The two characteristics that differ between such laboratory experiments and field-based experiments are ageing and leaching of contaminants. Toxicity data from laboratory-based experiments were used to derive EILs for fresh contamination (i.e. when the contaminant has been present in the soil for less than 2 years). When ALFs were available they were used to adjust laboratory-based toxicity data to field-based data that was combined with actual field data to derive EILs for aged contamination (i.e. where the contaminant has been present in the soil for 2 or more years).

References

Heemsbergen D, Warne MSJ, McLaughlin MJ, Kookana R. 2008. A Proposed Australian Methodology to Derive Ecological Investigation Levels in Contaminated Soils. CLW Science Report. Prepared for the NEPM Review Team. 76p.

NEPC (National Environment Protection Council). 1999. National Environment Protection (Assessment of Site Contamination) Measure 1999. Schedule B(1) Guideline on the Investigation Levels for Soil and Groundwater. NEPC, Adelaide, Australia. 16p.

NEPC (National Environment Protection Council). 2011. National Environment Protection (Assessment of Site Contamination) Measure. Schedule B(5)a. Guideline on Risk Assessment. National Environment Protection Council, Adelaide, South Australia. 42p.

NEPC (National Environment Protection Council). 2011. National Environment Protection (Assessment of Site Contamination) Measure. Schedule B(5)b. Guidelines on the Australian methodology to derive Ecological Investigation Levels in contaminated soils. National Environment Protection Council, Adelaide, South Australia. 85p.

NEPC (National Environment Protection Council). 2011. National Environment Protection (Assessment of Site Contamination) Measure. Schedule B(5)c. Soil quality guidelines for arsenic, chromium III, copper, DDT, lead, naphthalene, nickel and zinc. National Environment Protection Council, Adelaide, South Australia. 185p.

Background information on the EIL Calculation Spreadsheet

Warne MSTJ, Heemsbergen DA, McLaughlin MJ, Kookana RS. 2009. Proposed soil quality guidelines for arsenic, chromium (III), copper, DDT, lead, naphthalene, nickel and zinc. CSIRO Land and Water Science Report 44/09. 195p.



Inputs
Select contaminant from list below
Cu
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
20
Enter soil pH (calcium chloride method) (values from 1 to 14)
5.6
Enter organic carbon content (%OC) (values from 0 to 50%)
0.5
10
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
2.24
or for aged ABCs only
Enter State (or closest State)
VIC
Enter traffic volume (high or low)
low

Outputs		
Land use	Cu soil-specific EILs	
	(mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	30	35
Urban residential and open public spaces	45	80
Commercial and industrial	65	110



Inputs
Select contaminant from list below
Cr III
Below needed to calculate fresh and aged ACLs
20
5.6
0.5
Enter % clay (values from 0 to 100%)
10
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
2.24
or for aged ABCs only
Enter State (or closest State)
VIC
Enter traffic volume (high or low)
low

Outputs		
Land use	Cr III soil-specific EILs	
	(mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	85	140
Urban residential and open public spaces	190	410
Commercial and industrial	300	670



Inputs
Select contaminant from list below
Ni
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
20
5.6
0.5
10
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
2.24
or for aged ABCs only
Enter State (or closest State)
VIC
Enter traffic volume (high or low)
low

Outputs		
Land use	Ni soil-specific EILs	
	(mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	25	50
Urban residential and open public spaces	95	270
Commercial and industrial	180	460



Inputs
Select contaminant from list below
Zn
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
20
Enter soil pH (calcium chloride method) (values from 1 to 14)
5.6
0.5
10
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
2.24
or for aged ABCs only
Enter State (or closest State)
VIC
Enter traffic volume (high or low)
low

Outputs		
Land use	Zn soil-specific EILs	
	(mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	45	100
Urban residential and open public spaces	130	330
Commercial and industrial	200	500

APPENDIX C

Laboratory Certificates of Analysis

Telephone : + 61-3-8549 9600



Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EM1910802

Client	: ENVIRONMENTAL MANAGEMENT & CONSULTING P/L	Laboratory	: Environmental Division Melbourne
Contact	: MR SIMON CHISLETT	Contact	: Customer Services EM
Address	: LEVEL 2 BIGGENS BUILDING 67 LETITIA STREET NORTH HOBART TASMANIA, AUSTRALIA 7000	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: simon@enviromac.com.au	E-mail	: ALSEnviro.Melbourne@alsglobal.com
Telephone	: +61 0408 391 738	Telephone	: +61-3-8549 9600
Facsimile	: +61 03 6231 5979	Facsimile	: +61-3-8549 9626
Project	: EMC1927	Page	: 1 of 3
Order number	: ----	Quote number	: EB2017ENVMANCON0001 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: McRobbies Waste Transfer Station		
Sampler	: ALEX LOVIBOND		

Dates

Date Samples Received	: 09-Jul-2019 14:35	Issue Date	: 09-Jul-2019
Client Requested Due Date	: 16-Jul-2019	Scheduled Reporting Date	: 17-Jul-2019

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 1.2°C - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 7 / 7

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **The scheduled reporting date has been extended due to analytical testing conducted by ALS interstate laboratories. Please refer to your quotation for further information.**
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale & ALS Newcastle.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Issue Date : 09-Jul-2019
 Page : 2 of 3
 Work Order : EM1910802 Amendment 0
 Client : ENVIRONMENTAL MANAGEMENT & CONSULTING P/L



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA055-103 Moisture Content	SOIL - P-201 TAS EPA 105 (no TBT)	SOIL - P-22 (Meib) Soil Characterisation Package	SOIL - S-03 15 Metals (NEPM 2013 Suite - incl. Digestion)	SOIL - S-04 TR-HBTEXN	SOIL - S-18 TRH(C6-C9)HBTEXN
EM1910802-001	05-Jul-2019 00:00	SB1/0.075-0.125	✓	✓				
EM1910802-002	05-Jul-2019 00:00	SB1/1.0-1.1	✓		✓	✓	✓	
EM1910802-003	05-Jul-2019 00:00	SB1/1.5-1.6	✓			✓	✓	
EM1910802-004	05-Jul-2019 00:00	SB2/0.5-06	✓			✓	✓	
EM1910802-005	05-Jul-2019 00:00	QCP_5/7/19	✓				✓	
EM1910802-007	05-Jul-2019 00:00	TB_5/7/19	✓					✓

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - W-04 TR-HBTEXN
EM1910802-006	05-Jul-2019 00:00	RB_5/7/19	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Issue Date : 09-Jul-2019
 Page : 3 of 3
 Work Order : EM1910802 Amendment 0
 Client : ENVIRONMENTAL MANAGEMENT & CONSULTING P/L



Requested Deliverables

ALEX LOVIBOND

- *AU Certificate of Analysis - NATA (COA)	Email	alex@enviromac.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	alex@enviromac.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	alex@enviromac.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	alex@enviromac.com.au
- Attachment - Report (SUBCO)	Email	alex@enviromac.com.au
- Chain of Custody (CoC) (COC)	Email	alex@enviromac.com.au
- EDI Format - ENMRG (ENMRG)	Email	alex@enviromac.com.au
- EDI Format - XTab (XTAB)	Email	alex@enviromac.com.au
- EPA Waste Classification & Categorisation Guideline Report (COA_GL_EPA_WASTE)	Email	alex@enviromac.com.au

ALL INVOICES

- A4 - AU Tax Invoice (INV)	Email	admin@enviromac.com.au
-----------------------------	-------	------------------------

SIMON CHISLETT

- *AU Certificate of Analysis - NATA (COA)	Email	simon@enviromac.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	simon@enviromac.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	simon@enviromac.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	simon@enviromac.com.au
- Attachment - Report (SUBCO)	Email	simon@enviromac.com.au
- Chain of Custody (CoC) (COC)	Email	simon@enviromac.com.au
- EDI Format - ENMRG (ENMRG)	Email	simon@enviromac.com.au
- EDI Format - XTab (XTAB)	Email	simon@enviromac.com.au
- EPA Waste Classification & Categorisation Guideline Report (COA_GL_EPA_WASTE)	Email	simon@enviromac.com.au



CERTIFICATE OF ANALYSIS

Work Order	: EM1910802	Page	: 1 of 10
Client	: ENVIRONMENTAL MANAGEMENT & CONSULTING P/L	Laboratory	: Environmental Division Melbourne
Contact	: MR SIMON CHISLETT	Contact	: Customer Services EM
Address	: LEVEL 2 BIGGENS BUILDING 67 LETITIA STREET NORTH HOBART TASMANIA, AUSTRALIA 7000	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 0408 391 738	Telephone	: +61-3-8549 9600
Project	: EMC1927	Date Samples Received	: 09-Jul-2019 14:35
Order number	: ---	Date Analysis Commenced	: 11-Jul-2019
C-O-C number	: ---	Issue Date	: 18-Jul-2019 18:53
Sampler	: ALEX LOVIBOND		
Site	: McRobbies Waste Transfer Station		
Quote number	: EN/222		
No. of samples received	: 7		
No. of samples analysed	: 7		



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
Arenie Vijayaratham	Non-metals prep supervisor	Melbourne Inorganics, Springvale, VIC
Dianne Blane	Laboratory Coordinator (2IC)	Newcastle - Inorganics, Mayfield West, NSW
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

Page : 2 of 10
Work Order : EM1910802
Client : ENVIRONMENTAL MANAGEMENT & CONSULTING P/L
Project : EMC1927



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.

- ALS is not NATA accredited for the analysis of Exchangeable Cations on Alkaline Soils when performed under ALS Method ED006.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) 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.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity ($H^+ + Al^{3+}$).

Page : 3 of 10
 Work Order : EM1910802
 Client : ENVIRONMENTAL MANAGEMENT & CONSULTING P/L
 Project : EMC1927



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB1/0.075-0.125	SB1/1.0-1.1	SB1/1.5-1.6	SB2/0.5-06	QCP_5/7/19
Client sampling date / time					05-Jul-2019 00:00	05-Jul-2019 00:00	05-Jul-2019 00:00	05-Jul-2019 00:00	05-Jul-2019 00:00
Compound	CAS Number	LOR	Unit		EM1910802-001	EM1910802-002	EM1910802-003	EM1910802-004	EM1910802-005
				Result	Result	Result	Result	Result	Result
EA001: pH in soil using 0.01M CaCl extract									
pH (CaCl2)	----	0.1	pH Unit	----	5.6	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	4.7	23.3	22.0	18.4	5.1	
EA150: Soil Classification based on Particle Size									
Clay (<2 µm)	----	1	%	----	23	----	----	----	----
EA152: Soil Particle Density									
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	----	2.70	----	----	----	----
ED007: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g	----	8.5	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	----	10.4	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	----	0.2	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	----	0.8	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	----	20.0	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5	----
Barium	7440-39-3	10	mg/kg	40	90	100	40	----	----
Beryllium	7440-41-7	1	mg/kg	<1	1	<1	<1	<1	----
Boron	7440-42-8	50	mg/kg	----	<50	<50	<50	<50	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1	----
Chromium	7440-47-3	2	mg/kg	5	19	12	6	----	----
Cobalt	7440-48-4	2	mg/kg	9	11	16	<2	----	----
Copper	7440-50-8	5	mg/kg	72	15	14	6	----	----
Iron	7439-89-6	0.005	%	----	2.24	----	----	----	----
Lead	7439-92-1	5	mg/kg	<5	8	7	6	----	----
Manganese	7439-96-5	5	mg/kg	213	145	116	46	----	----
Molybdenum	7439-98-7	2	mg/kg	<2	----	----	----	----	----
Nickel	7440-02-0	2	mg/kg	11	13	13	<2	----	----
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	----	----
Silver	7440-22-4	2	mg/kg	<2	----	----	----	----	----
Tin	7440-31-5	5	mg/kg	<5	----	----	----	----	----
Vanadium	7440-62-2	5	mg/kg	----	62	53	23	----	----
Zinc	7440-66-6	5	mg/kg	29	37	29	11	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	----

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 Work Order : EM1910802
 Client : ENVIRONMENTAL MANAGEMENT & CONSULTING P/L
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Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB1/0.075-0.125	SB1/1.0-1.1	SB1/1.5-1.6	SB2/0.5-06	QCP_5/7/19
Client sampling date / time					05-Jul-2019 00:00	05-Jul-2019 00:00	05-Jul-2019 00:00	05-Jul-2019 00:00	05-Jul-2019 00:00
Compound	CAS Number	LOR	Unit		EM1910802-001	EM1910802-002	EM1910802-003	EM1910802-004	EM1910802-005
				Result	Result	Result	Result	Result	Result
EG048: Hexavalent Chromium (Alkaline Digest)									
Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	----	----	----	----	----
EK026SF: Total CN by Segmented Flow Analyser									
Total Cyanide	57-12-5	1	mg/kg	<1	----	----	----	----	----
EK040T: Fluoride Total									
Fluoride	16984-48-8	40	mg/kg	110	----	----	----	----	----
EP004: Organic Matter									
Organic Matter	----	0.5	%	----	<0.5	----	----	----	----
Total Organic Carbon	----	0.5	%	----	<0.5	----	----	----	----
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	----	----	----	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	----	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	----	----	----	----	----
beta-BHC	319-85-7	0.05	mg/kg	<0.05	----	----	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	----	----	----	----	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	----	----	----	----	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	----	----	----	----	----
Aldrin	309-00-2	0.05	mg/kg	<0.05	----	----	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	----	----	----	----	----
[^] Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	----	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	----	----	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	----	----	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	----	----	----	----	----
Dieldrin	60-57-1	0.05	mg/kg	<0.05	----	----	----	----	----
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	----	----	----	----	----
Endrin	72-20-8	0.05	mg/kg	<0.05	----	----	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	----	----	----	----	----
[^] Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	----	----	----	----
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	----	----	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	----	----	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	----	----	----	----	----
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	----	----	----	----	----
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	----	----	----	----	----
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	----	----	----	----	----

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Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB1/0.075-0.125	SB1/1.0-1.1	SB1/1.5-1.6	SB2/0.5-06	QCP_5/7/19
Client sampling date / time					05-Jul-2019 00:00	05-Jul-2019 00:00	05-Jul-2019 00:00	05-Jul-2019 00:00	05-Jul-2019 00:00
Compound	CAS Number	LOR	Unit		EM1910802-001	EM1910802-002	EM1910802-003	EM1910802-004	EM1910802-005
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		<0.05	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.05	mg/kg		<0.05	----	----	----	----
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	0.5	mg/kg		<0.5	----	----	----	----
2-Chlorophenol	95-57-8	0.5	mg/kg		<0.5	----	----	----	----
2-Methylphenol	95-48-7	0.5	mg/kg		<0.5	----	----	----	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg		<1	----	----	----	----
2-Nitrophenol	88-75-5	0.5	mg/kg		<0.5	----	----	----	----
2,4-Dimethylphenol	105-67-9	0.5	mg/kg		<0.5	----	----	----	----
2,4-Dichlorophenol	120-83-2	0.5	mg/kg		<0.5	----	----	----	----
2,6-Dichlorophenol	87-65-0	0.5	mg/kg		<0.5	----	----	----	----
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg		<0.5	----	----	----	----
2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg		<0.5	----	----	----	----
2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg		<0.5	----	----	----	----
Pentachlorophenol	87-86-5	2	mg/kg		<2	----	----	----	----
^ Sum of Phenols	----	0.5	mg/kg		<0.5	----	----	----	----
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	----	----	----	----
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	----	----	----	----
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	----	----	----	----



Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB1/0.075-0.125	SB1/1.0-1.1	SB1/1.5-1.6	SB2/0.5-06	QCP_ 5/7/19
Client sampling date / time				05-Jul-2019 00:00	05-Jul-2019 00:00	05-Jul-2019 00:00	05-Jul-2019 00:00	05-Jul-2019 00:00	
Compound	CAS Number	LOR	Unit	EM1910802-001	EM1910802-002	EM1910802-003	EM1910802-004	EM1910802-005	
				Result	Result	Result	Result	Result	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	----	----	----	----	
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	----	----	----	----	
EP075B: Polynuclear Aromatic Hydrocarbons									
Benzo(a)pyrene	50-32-8	0.05	mg/kg	0.13	----	----	----	----	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10	
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50	
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100	
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100	
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10	
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50	
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100	
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100	
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50	
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50	
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1	
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%	94.0	----	----	----	----	
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%	88.1	----	----	----	----	
EP068T: Organophosphorus Pesticide Surrogate									

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Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB1/0.075-0.125	SB1/1.0-1.1	SB1/1.5-1.6	SB2/0.5-06	QCP_5/7/19
Client sampling date / time					05-Jul-2019 00:00	05-Jul-2019 00:00	05-Jul-2019 00:00	05-Jul-2019 00:00	05-Jul-2019 00:00
Compound	CAS Number	LOR	Unit		EM1910802-001	EM1910802-002	EM1910802-003	EM1910802-004	EM1910802-005
				Result	Result	Result	Result	Result	Result
EP068T: Organophosphorus Pesticide Surrogate - Continued									
DEF	78-48-8	0.05	%		95.3	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		89.7	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		92.5	----	----	----	----
2,4,6-Tribromophenol	118-79-6	0.5	%		75.1	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		104	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%		123	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		110	----	----	----	----
EP075T: Base/Neutral Extractable Surrogates									
2-Fluorobiphenyl	321-60-8	0.025	%		116	----	----	----	----
Anthracene-d10	1719-06-8	0.025	%		116	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.025	%		116	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		96.2	97.8	77.4	66.3	94.9
Toluene-D8	2037-26-5	0.2	%		104	93.9	80.0	64.6	95.8
4-Bromofluorobenzene	460-00-4	0.2	%		122	114	93.6	78.6	108

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Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TB_5/7/19	----	----	----	----
			Client sampling date / time	05-Jul-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM1910802-007	-----	-----	-----	-----
				Result	---	---	---	---
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	<1.0	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	----	----	----	----
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	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	----	----	----
[^] Sum of BTEX	----	0.2	mg/kg	<0.2	----	----	----	----
[^] Total Xylenes	----	0.5	mg/kg	<0.5	----	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.2	%	78.5	----	----	----	----
Toluene-D8	2037-26-5	0.2	%	78.0	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	89.7	----	----	----	----

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Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	RB_5/7/19	----	----	----	----
Client sampling date / time					05-Jul-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM1910802-006	-----	-----	-----	-----
				Result	---	---	---	---	---
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	----	----	----	----
Toluene	108-88-3	2	µg/L		<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ Total Xylenes	----	2	µg/L		<2	----	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		98.2	----	----	----	----
Toluene-D8	2037-26-5	2	%		92.2	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		91.1	----	----	----	----



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Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	36	140
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	38	128
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	33	139
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
EP075T: Base/Neutral Extractable Surrogates			
2-Fluorobiphenyl	321-60-8	35	126
Anthracene-d10	1719-06-8	40	135
4-Terphenyl-d14	1718-51-0	42	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	Low	High
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



QUALITY CONTROL REPORT

Work Order	: EM1910802	Page	: 1 of 15
Client	: ENVIRONMENTAL MANAGEMENT & CONSULTING P/L	Laboratory	: Environmental Division Melbourne
Contact	: MR SIMON CHISLETT	Contact	: Customer Services EM
Address	: LEVEL 2 BIGGENS BUILDING 67 LETITIA STREET NORTH HOBART TASMANIA, AUSTRALIA 7000	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 0408 391 738	Telephone	: +61-3-8549 9600
Project	: EMC1927	Date Samples Received	: 09-Jul-2019
Order number	: ----	Date Analysis Commenced	: 11-Jul-2019
C-O-C number	: ----	Issue Date	: 18-Jul-2019
Sampler	: ALEX LOVIBOND		
Site	: McRobbies Waste Transfer Station		
Quote number	: EN/222		
No. of samples received	: 7		
No. of samples analysed	: 7		



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
Arenie Vijayaratham	Non-metals prep supervisor	Melbourne Inorganics, Springvale, VIC
Dianne Blane	Laboratory Coordinator (2IC)	Newcastle - Inorganics, Mayfield West, NSW
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC



Page : 2 of 15
 Work Order : EM1910802
 Client : ENVIRONMENTAL MANAGEMENT & CONSULTING P/L
 Project : EMC1927

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 (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2467114)									
EM1910802-001	SB1/0.075-0.125	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	40	40	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	5	6	0.00	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	9	10	10.8	No Limit
		EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	11	12	12.4	No Limit
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	72	81	11.3	0% - 50%
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	213	247	14.9	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Tin	7440-31-5	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	43	45	3.94	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	29	31	7.19	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
		EG005T: Iron	7439-89-6	50	mg/kg	21400	24400	13.0	0% - 20%
EM1910874-006	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	20	30	42.6	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	11	11	0.00	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	3	4	0.00	No Limit
		EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	11	10	11.3	No Limit



Page : 3 of 15
 Work Order : EM1910802
 Client : ENVIRONMENTAL MANAGEMENT & CONSULTING P/L
 Project : EMC1927

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 (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2467114) - continued									
EM1910874-006	Anonymous	EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	6	6	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	6	10	42.6	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	68	72	5.65	0% - 50%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Tin	7440-31-5	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	11	12	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	19	20	6.24	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EG005T: Iron	7439-89-6	50	mg/kg	7220	6950	3.80	0% - 20%		
EA001: pH in soil using 0.01M CaCl extract (QC Lot: 2460331)									
EM1910773-003	Anonymous	EA001: pH (CaCl2)	----	0.1	pH Unit	8.0	8.1	1.24	0% - 20%
EM1910810-005	Anonymous	EA001: pH (CaCl2)	----	0.1	pH Unit	6.2	6.3	1.60	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2464751)									
EB1917962-003	Anonymous	EA055: Moisture Content	----	0.1	%	17.9	20.9	15.6	0% - 20%
EM1910840-003	Anonymous	EA055: Moisture Content	----	0.1	%	3.4	3.9	13.8	0% - 20%
ED007: Exchangeable Cations (QC Lot: 2465447)									
EM1910802-002	SB1/1.0-1.1	ED007: Exchangeable Calcium	----	0.1	meq/100g	8.5	8.5	0.00	0% - 20%
		ED007: Exchangeable Magnesium	----	0.1	meq/100g	10.4	10.0	2.99	0% - 20%
		ED007: Exchangeable Potassium	----	0.1	meq/100g	0.2	0.2	0.00	No Limit
		ED007: Exchangeable Sodium	----	0.1	meq/100g	0.8	0.8	0.00	No Limit
		ED007: Cation Exchange Capacity	----	0.1	meq/100g	20.0	19.6	1.67	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2467113)									
EM1910802-001	SB1/0.075-0.125	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EM1910874-006	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EG048: Hexavalent Chromium (Alkaline Digest) (QC Lot: 2465129)									
EM1910547-029	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EM1910898-017	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EK026SF: Total CN by Segmented Flow Analyser (QC Lot: 2468422)									
EM1910547-029	Anonymous	EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	<1	0.00	No Limit
EM1910716-003	Anonymous	EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	<1	0.00	No Limit
EK040T: Fluoride Total (QC Lot: 2465112)									
EM1910802-001	SB1/0.075-0.125	EK040T: Fluoride	16984-48-8	40	mg/kg	110	120	0.00	No Limit
EM1910878-002	Anonymous	EK040T: Fluoride	16984-48-8	40	mg/kg	740	820	11.3	0% - 20%
EP004: Organic Matter (QC Lot: 2465321)									
EM1910802-002	SB1/1.0-1.1	EP004: Organic Matter	----	0.5	%	<0.5	<0.5	0.00	No Limit
		EP004: Total Organic Carbon	----	0.5	%	<0.5	<0.5	0.00	No Limit



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 Work Order : EM1910802
 Client : ENVIRONMENTAL MANAGEMENT & CONSULTING P/L
 Project : EMC1927

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 (%)
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 2467590)									
EM1910802-001	SB1/0.075-0.125	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 2467589)									
EM1910802-001	SB1/0.075-0.125	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EP075(SIM)A: Phenolic Compounds (QC Lot: 2467591)									
EM1910912-019	Anonymous	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<1.1	<1.1	0.00	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<1.1	<1.1	0.00	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<1.1	<1.1	0.00	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<1.1	<1.1	0.00	No Limit
		EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.5	mg/kg	<1.1	<1.1	0.00	No Limit
		EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.5	mg/kg	<1.1	<1.1	0.00	No Limit
		EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.5	mg/kg	<1.1	<1.1	0.00	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<1.1	<1.1	0.00	No Limit
		EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg	<1.1	<1.1	0.00	No Limit
		EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg	<1.1	<1.1	0.00	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<2	<2	0.00	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.00	No Limit
EM1910802-001	SB1/0.075-0.125	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit



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 Work Order : EM1910802
 Client : ENVIRONMENTAL MANAGEMENT & CONSULTING P/L
 Project : EMC1927

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)A: Phenolic Compounds (QC Lot: 2467591) - continued									
EM1910802-001	SB1/0.075-0.125	EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.00	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2467591)									
EM1910912-019	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<1.1	<1.1	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<1.1	<1.1	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<1.1	<1.1	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<1.1	<1.1	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<1.1	<1.1	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<1.1	<1.1	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<1.1	<1.1	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<1.1	<1.1	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<1.1	<1.1	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<1.1	<1.1	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<1.1	<1.1	0.00	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<1.1	<1.1	0.00	No Limit
		EP075(SIM): Indeno(1,2,3.cd)pyrene	193-39-5	0.5	mg/kg	<1.1	<1.1	0.00	No Limit
		EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<1.1	<1.1	0.00	No Limit
		EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<1.1	<1.1	0.00	No Limit
EM1910802-001	SB1/0.075-0.125	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	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	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



Page : 6 of 15
 Work Order : EM1910802
 Client : ENVIRONMENTAL MANAGEMENT & CONSULTING P/L
 Project : EMC1927

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: 2467591) - continued									
EM1910802-001	SB1/0.075-0.125	EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP075B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2467397)									
EM1910802-001	SB1/0.075-0.125	EP075-TAS: Benzo(a)pyrene	50-32-8	0.05	mg/kg	0.13	0.12	10.8	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2463005)									
EM1910802-001	SB1/0.075-0.125	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EM1910965-058	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2467592)									
EM1910802-001	SB1/0.075-0.125	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
EM1910912-019	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	180	230	24.6	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	180	230	24.4	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2467601)									
EM1910965-058	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
EM1910965-048	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2463005)									
EM1910802-001	SB1/0.075-0.125	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EM1910965-058	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2467592)									
EM1910802-001	SB1/0.075-0.125	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
EM1910912-019	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	120	160	26.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	270	350	24.4	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	390	510	26.7	0% - 50%
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2467601)									
EM1910965-058	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



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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: 2467601) - continued									
EM1910965-058	Anonymous	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
EM1910965-048	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EP080: BTEXN (QC Lot: 2463005)									
EM1910802-001	SB1/0.075-0.125	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	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			106-42-3						
		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
EM1910965-058	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	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			106-42-3						
		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 (%)
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2457173)									
EM1910713-002	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: 2464230)									
EM1910830-005	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EM1910890-002	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2457173)									
EM1910713-002	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: 2464230)									
EM1910830-005	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EM1910890-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2464230)									
EM1910830-005	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit

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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: BTEXN (QC Lot: 2464230) - continued									
EM1910830-005	Anonymous	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	2	µg/L	<2	<2	0.00	No Limit
		106-42-3							
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
EM1910890-002	Anonymous	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
		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	2	µg/L	<2	<2	0.00	No Limit
		106-42-3							
		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

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2467114)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	89.0	78	107
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	98.5	76	110
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	101	84	113
EG005T: Boron	7440-42-8	50	mg/kg	<50	33.2 mg/kg	102	84	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	85.7	76	108
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	92.1	78	110
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	90.9	78	112
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	91.7	78	108
EG005T: Iron	7439-89-6	50	mg/kg	<50	8400 mg/kg	88.2	84	112
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	89.5	78	106
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	99.5	81	110
EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	7.9 mg/kg	102	78	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	96.4	80	109
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	99.5	92	110
EG005T: Silver	7440-22-4	2	mg/kg	<2	2.1 mg/kg	93.7	80	108
EG005T: Tin	7440-31-5	5	mg/kg	<5	5.2 mg/kg	104	78	117
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	90.9	78	106
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	94.7	79	110
ED007: Exchangeable Cations (QCLot: 2465447)								
ED007: Exchangeable Calcium	----	0.1	meq/100g	<0.1	24.13 meq/100g	82.3	80	120
ED007: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.96 meq/100g	101	64	137
ED007: Exchangeable Potassium	----	0.1	meq/100g	<0.1	1.01 meq/100g	109	59	141
ED007: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.86 meq/100g	118	66	134
ED007: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2467113)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	88.7	77	104
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 2465129)								
EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	40 mg/kg	80.2	75	112
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 2468422)								
EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	20 mg/kg	127	70	130
EK040T: Fluoride Total (QCLot: 2465112)								
EK040T: Fluoride	16984-48-8	40	mg/kg	<40	400 mg/kg	87.8	75	110
EP004: Organic Matter (QCLot: 2465321)								



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Sub-Matrix: SOIL

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP004: Organic Matter (QCLot: 2465321) - continued								
EP004: Organic Matter	----	0.5	%	<0.5	77 %	79.2	71	109
EP004: Total Organic Carbon	----	0.5	%	<0.5	43.5 %	81.3	73	111
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 2467590)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	103	63	115
EP068A: Organochlorine Pesticides (OC) (QCLot: 2467589)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	93.4	69	122
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	95.4	71	122
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	93.4	72	121
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	117	66	124
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	94.2	60	120
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	92.7	62	120
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	96.0	70	122
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	90.2	70	121
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	109	68	124
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	75.8	71	124
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	98.9	71	122
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	92.6	65	123
EP068: 4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	100	71	121
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	95.9	63	129
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	100	70	122
EP068: 4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	99.4	69	128
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	77.4	69	129
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	81.2	64	129
EP068: 4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	73.9	62	129
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	77.4	76	123
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	76.4	58	129
EP075(SIM)A: Phenolic Compounds (QCLot: 2467591)								
EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	3 mg/kg	96.3	77	125
EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	3 mg/kg	97.9	78	126
EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	3 mg/kg	104	77	125
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	6 mg/kg	106	76	130
EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	3 mg/kg	100	53	118
EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	3 mg/kg	104	71	128
EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	3 mg/kg	103	73	126
EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	3 mg/kg	99.7	73	128
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	3 mg/kg	94.6	69	123
EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	3 mg/kg	86.3	64	122
EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	3 mg/kg	97.7	70	128



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Sub-Matrix: SOIL

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP075(SIM)A: Phenolic Compounds (QCLot: 2467591) - continued								
EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	6 mg/kg	59.8	20	113
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2467591)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	104	77	129
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	105	74	130
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	103	78	129
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	99.0	78	128
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	103	83	130
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	109	76	129
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	108	79	134
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	113	84	135
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	102	72	125
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	110	76	135
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	3 mg/kg	94.4	69	123
	205-82-3							
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	106	77	131
EP075(SIM): Indeno(1,2,3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	103	65	124
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	103	66	127
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	106	65	124
EP075B: Polynuclear Aromatic Hydrocarbons (QCLot: 2467397)								
EP075-TAS: Benzo(a)pyrene	50-32-8	0.05	mg/kg	<0.05	2 mg/kg	95.3	75	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2463005)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	36 mg/kg	110	61	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2467592)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	688 mg/kg	106	72	122
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3100 mg/kg	110	84	123
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	1490 mg/kg	102	79	119
EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2467601)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	688 mg/kg	115	72	122
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3100 mg/kg	105	84	123
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	1490 mg/kg	102	79	119
EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2463005)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	110	60	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2467592)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	1050 mg/kg	105	77	121
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	3960 mg/kg	103	83	121
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	280 mg/kg	114	65	123



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 Client : ENVIRONMENTAL MANAGEMENT & CONSULTING P/L
 Project : EMC1927

Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%)	
							Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2467592) - continued								
EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2467601)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	1050 mg/kg	106	77	121
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	3960 mg/kg	103	83	121
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	280 mg/kg	107	65	123
EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080: BTEXN (QCLot: 2463005)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	93.5	63	119
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	100	67	126
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	96.7	66	124
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	4 mg/kg	102	68	128
	106-42-3							
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	104	73	128
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	100	61	123

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
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2457173)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	4030 µg/L	95.4	50	129
EP071: C15 - C28 Fraction	----	100	µg/L	<100	15600 µg/L	98.3	55	132
EP071: C29 - C36 Fraction	----	50	µg/L	<50	7820 µg/L	94.3	55	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2464230)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	114	65	126
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2457173)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	5960 µg/L	92.0	53	129
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	20700 µg/L	93.8	56	131
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1520 µg/L	98.6	53	136
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2464230)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	118	64	124
EP080: BTEXN (QCLot: 2464230)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	102	69	123
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	103	73	124
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	102	71	125
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	40 µg/L	109	72	129
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	112	76	129
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	114	70	125

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Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery(%) MS	Recovery Limits (%)	
						Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2467114)							
EM1910802-002	SB1/1.0-1.1	EG005T: Manganese	7439-96-5	50 mg/kg	87.5	68	136
EM1910802-002	SB1/1.0-1.1	EG005T: Arsenic	7440-38-2	50 mg/kg	83.3	78	124
		EG005T: Barium	7440-39-3	50 mg/kg	98.0	71	135
		EG005T: Beryllium	7440-41-7	50 mg/kg	93.7	85	125
		EG005T: Cadmium	7440-43-9	50 mg/kg	85.1	84	116
		EG005T: Chromium	7440-47-3	50 mg/kg	86.2	79	121
		EG005T: Copper	7440-50-8	50 mg/kg	89.0	82	124
		EG005T: Lead	7439-92-1	50 mg/kg	86.6	76	124
		EG005T: Molybdenum	7439-98-7	50 mg/kg	96.6	79	117
		EG005T: Nickel	7440-02-0	50 mg/kg	94.8	78	120
		EG005T: Selenium	7782-49-2	50 mg/kg	80.9	71	125
		EG005T: Vanadium	7440-62-2	50 mg/kg	82.6	76	124
		EG005T: Zinc	7440-66-6	50 mg/kg	91.8	74	128
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2467113)							
EM1910802-002	SB1/1.0-1.1	EG035T: Mercury	7439-97-6	0.5 mg/kg	102	76	116
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 2465129)							
EM1910682-007	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	40 mg/kg	66.1	58	114
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 2468422)							
EM1910682-007	Anonymous	EK026SF: Total Cyanide	57-12-5	20 mg/kg	91.6	70	130
EK040T: Fluoride Total (QCLot: 2465112)							
EM1910874-001	Anonymous	EK040T: Fluoride	16984-48-8	400 mg/kg	86.8	70	130
EP004: Organic Matter (QCLot: 2465321)							
EM1910912-019	Anonymous	EP004: Organic Matter	----	1.2406 %	71.0	70	120
		EP004: Total Organic Carbon	----	0.71954 %	70.9	70	120
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 2467590)							
EM1910879-025	Anonymous	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	142	44	144
EP068A: Organochlorine Pesticides (OC) (QCLot: 2467589)							
EM1910912-001	Anonymous	EP068: gamma-BHC	58-89-9	0.5 mg/kg	93.8	22	139
		EP068: Heptachlor	76-44-8	0.5 mg/kg	92.1	18	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	103	23	136
		EP068: Dieldrin	60-57-1	0.5 mg/kg	100	42	136
		EP068: Endrin	72-20-8	0.5 mg/kg	92.7	23	146



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Sub-Matrix: SOIL

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
EP068A: Organochlorine Pesticides (OC) (QCLot: 2467589) - continued							
EM1910912-001	Anonymous	EP068: 4,4'-DDT	50-29-3	0.5 mg/kg	40.2	20	133
EP075(SIM)A: Phenolic Compounds (QCLot: 2467591)							
EM1910882-001	Anonymous	EP075(SIM): Phenol	108-95-2	3 mg/kg	98.0	63	117
		EP075(SIM): 2-Chlorophenol	95-57-8	3 mg/kg	97.8	65	123
		EP075(SIM): 2-Nitrophenol	88-75-5	3 mg/kg	93.8	40	134
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	3 mg/kg	63.0	56	122
		EP075(SIM): Pentachlorophenol	87-86-5	3 mg/kg	49.6	15	139
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2467591)							
EM1910882-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	101	67	117
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	112	52	148
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2463005)							
EM1910802-002	SB1/1.0-1.1	EP080: C6 - C9 Fraction	----	28 mg/kg	68.7	42	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2467592)							
EM1910879-024	Anonymous	EP071: C10 - C14 Fraction	----	688 mg/kg	90.2	53	123
		EP071: C15 - C28 Fraction	----	3100 mg/kg	99.8	70	124
		EP071: C29 - C36 Fraction	----	1490 mg/kg	98.0	64	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2467601)							
EM1910802-003	SB1/1.5-1.6	EP071: C10 - C14 Fraction	----	688 mg/kg	116	53	123
		EP071: C15 - C28 Fraction	----	3100 mg/kg	106	70	124
		EP071: C29 - C36 Fraction	----	1490 mg/kg	103	64	118
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2463005)							
EM1910802-002	SB1/1.0-1.1	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	65.5	39	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2467592)							
EM1910879-024	Anonymous	EP071: >C10 - C16 Fraction	----	1050 mg/kg	97.2	65	123
		EP071: >C16 - C34 Fraction	----	3960 mg/kg	97.6	67	121
		EP071: >C34 - C40 Fraction	----	280 mg/kg	97.6	44	126
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2467601)							
EM1910802-003	SB1/1.5-1.6	EP071: >C10 - C16 Fraction	----	1050 mg/kg	107	65	123
		EP071: >C16 - C34 Fraction	----	3960 mg/kg	104	67	121
		EP071: >C34 - C40 Fraction	----	280 mg/kg	108	44	126
EP080: BTEXN (QCLot: 2463005)							
EM1910802-002	SB1/1.0-1.1	EP080: Benzene	71-43-2	2 mg/kg	82.6	50	136
		EP080: Toluene	108-88-3	2 mg/kg	84.7	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

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Sub-Matrix: WATER

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2457173)							
EM1910713-003	Anonymous	EP071: C10 - C14 Fraction	----	4331 µg/L	92.3	50	130
		EP071: C15 - C28 Fraction	----	16952 µg/L	90.4	54	136
		EP071: C29 - C36 Fraction	----	8695 µg/L	84.6	50	142
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2464230)							
EM1910890-001	Anonymous	EP080: C6 - C9 Fraction	----	280 µg/L	85.8	43	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2457173)							
EM1910713-003	Anonymous	EP071: >C10 - C16 Fraction	----	6292 µg/L	89.0	50	128
		EP071: >C16 - C34 Fraction	----	22143 µg/L	87.5	50	150
		EP071: >C34 - C40 Fraction	----	1677 µg/L	89.2	51	159
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2464230)							
EM1910890-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	78.9	44	122
EP080: BTEXN (QCLot: 2464230)							
EM1910890-001	Anonymous	EP080: Benzene	71-43-2	20 µg/L	94.1	68	130
		EP080: Toluene	108-88-3	20 µg/L	98.3	72	132



QA/QC Compliance Assessment to assist with Quality Review

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Client	: ENVIRONMENTAL MANAGEMENT & CONSULTING P/L	Laboratory	: Environmental Division Melbourne
Contact	: MR SIMON CHISLETT	Telephone	: +61-3-8549 9600
Project	: EMC1927	Date Samples Received	: 09-Jul-2019
Site	: McRobbies Waste Transfer Station	Issue Date	: 18-Jul-2019
Sampler	: ALEX LOVIBOND	No. of samples received	: 7
Order number	: ----	No. of samples analysed	: 7

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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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)					
TRH - Semivolatile Fraction	1	14	7.14	10.00	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
EA001: pH in soil using 0.01M CaCl extract							
Soil Glass Jar - Unpreserved (EA001) SB1/1.0-1.1	05-Jul-2019	12-Jul-2019	12-Jul-2019	✓	12-Jul-2019	12-Jul-2019	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055) SB1/0.075-0.125, SB1/1.5-1.6, QCP_5/7/19,	05-Jul-2019	----	----	----	15-Jul-2019	19-Jul-2019	✓
SB1/1.0-1.1, SB2/0.5-06, TB_5/7/19							
EA150: Soil Classification based on Particle Size							
Snap Lock Bag (EA150H) SB1/1.0-1.1	05-Jul-2019	----	----	----	17-Jul-2019	01-Jan-2020	✓
EA152: Soil Particle Density							
Snap Lock Bag (EA152) SB1/1.0-1.1	05-Jul-2019	----	----	----	17-Jul-2019	01-Jan-2020	✓
ED006: Exchangeable Cations on Alkaline Soils							
Soil Glass Jar - Unpreserved (ED006) SB1/1.0-1.1	05-Jul-2019	15-Jul-2019	02-Aug-2019	✓	17-Jul-2019	02-Aug-2019	✓
ED007: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED007) SB1/1.0-1.1	05-Jul-2019	15-Jul-2019	02-Aug-2019	✓	17-Jul-2019	02-Aug-2019	✓
ED008: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED008) SB1/1.0-1.1	05-Jul-2019	15-Jul-2019	02-Aug-2019	✓	17-Jul-2019	02-Aug-2019	✓



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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	
EG005(ED093)T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T) SB1/0.075-0.125, SB1/1.5-1.6,	SB1/1.0-1.1, SB2/0.5-06	05-Jul-2019	16-Jul-2019	01-Jan-2020	✓	16-Jul-2019	01-Jan-2020	✓
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T) SB1/0.075-0.125, SB1/1.5-1.6,	SB1/1.0-1.1, SB2/0.5-06	05-Jul-2019	16-Jul-2019	02-Aug-2019	✓	16-Jul-2019	02-Aug-2019	✓
EG048: Hexavalent Chromium (Alkaline Digest)								
Soil Glass Jar - Unpreserved (EG048G) SB1/0.075-0.125		05-Jul-2019	16-Jul-2019	02-Aug-2019	✓	16-Jul-2019	23-Jul-2019	✓
EK026SF: Total CN by Segmented Flow Analyser								
Soil Glass Jar - Unpreserved (EK026SF) SB1/0.075-0.125		05-Jul-2019	16-Jul-2019	19-Jul-2019	✓	17-Jul-2019	30-Jul-2019	✓
EK040T: Fluoride Total								
Soil Glass Jar - Unpreserved (EK040T) SB1/0.075-0.125		05-Jul-2019	16-Jul-2019	02-Aug-2019	✓	17-Jul-2019	02-Aug-2019	✓
EP004: Organic Matter								
Soil Glass Jar - Unpreserved (EP004) SB1/1.0-1.1		05-Jul-2019	17-Jul-2019	02-Aug-2019	✓	17-Jul-2019	02-Aug-2019	✓
EP066: Polychlorinated Biphenyls (PCB)								
Soil Glass Jar - Unpreserved (EP066) SB1/0.075-0.125		05-Jul-2019	16-Jul-2019	19-Jul-2019	✓	17-Jul-2019	25-Aug-2019	✓
EP068A: Organochlorine Pesticides (OC)								
Soil Glass Jar - Unpreserved (EP068) SB1/0.075-0.125		05-Jul-2019	16-Jul-2019	19-Jul-2019	✓	17-Jul-2019	25-Aug-2019	✓
EP075(SIM)A: Phenolic Compounds								
Soil Glass Jar - Unpreserved (EP075(SIM)) SB1/0.075-0.125		05-Jul-2019	16-Jul-2019	19-Jul-2019	✓	17-Jul-2019	25-Aug-2019	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM)) SB1/0.075-0.125		05-Jul-2019	16-Jul-2019	19-Jul-2019	✓	17-Jul-2019	25-Aug-2019	✓
EP075B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075-TAS) SB1/0.075-0.125		05-Jul-2019	16-Jul-2019	19-Jul-2019	✓	16-Jul-2019	25-Aug-2019	✓

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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	
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080) SB1/0.075-0.125, SB1/1.5-1.6, QCP_5/7/19, SB1/1.0-1.1, SB2/0.5-06,	SB1/1.0-1.1, SB2/0.5-06, TB_5/7/19	05-Jul-2019	15-Jul-2019	19-Jul-2019	✔	16-Jul-2019	19-Jul-2019	✔
Soil Glass Jar - Unpreserved (EP071) SB1/0.075-0.125		05-Jul-2019	16-Jul-2019	19-Jul-2019	✔	17-Jul-2019	25-Aug-2019	✔
Soil Glass Jar - Unpreserved (EP071) SB1/1.0-1.1, SB2/0.5-06,	SB1/1.5-1.6, QCP_5/7/19	05-Jul-2019	17-Jul-2019	19-Jul-2019	✔	17-Jul-2019	26-Aug-2019	✔
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP080) SB1/0.075-0.125, SB1/1.5-1.6, QCP_5/7/19, SB1/1.0-1.1, SB2/0.5-06,	SB1/1.0-1.1, SB2/0.5-06, TB_5/7/19	05-Jul-2019	15-Jul-2019	19-Jul-2019	✔	16-Jul-2019	19-Jul-2019	✔
Soil Glass Jar - Unpreserved (EP071) SB1/0.075-0.125		05-Jul-2019	16-Jul-2019	19-Jul-2019	✔	17-Jul-2019	25-Aug-2019	✔
Soil Glass Jar - Unpreserved (EP071) SB1/1.0-1.1, SB2/0.5-06,	SB1/1.5-1.6, QCP_5/7/19	05-Jul-2019	17-Jul-2019	19-Jul-2019	✔	17-Jul-2019	26-Aug-2019	✔
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080) SB1/0.075-0.125, SB1/1.5-1.6, QCP_5/7/19,	SB1/1.0-1.1, SB2/0.5-06, TB_5/7/19	05-Jul-2019	15-Jul-2019	19-Jul-2019	✔	16-Jul-2019	19-Jul-2019	✔

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
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) RB_5/7/19	05-Jul-2019	12-Jul-2019	12-Jul-2019	✔	15-Jul-2019	21-Aug-2019	✔
Amber VOC Vial - Sulfuric Acid (EP080) RB_5/7/19	05-Jul-2019	16-Jul-2019	19-Jul-2019	✔	16-Jul-2019	19-Jul-2019	✔
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) RB_5/7/19	05-Jul-2019	12-Jul-2019	12-Jul-2019	✔	15-Jul-2019	21-Aug-2019	✔
Amber VOC Vial - Sulfuric Acid (EP080) RB_5/7/19	05-Jul-2019	16-Jul-2019	19-Jul-2019	✔	16-Jul-2019	19-Jul-2019	✔
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) RB_5/7/19	05-Jul-2019	16-Jul-2019	19-Jul-2019	✔	16-Jul-2019	19-Jul-2019	✔

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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)							
Benzo(a)pyrene- Waste Classification (TAS requirements)	EP075-TAS	1	1	100.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	1	100.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	3	33.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	13	15.38	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	5	20.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
pH in soil using a 0.01M CaCl2 extract	EA001	2	12	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	9	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	4	29	13.79	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)							
Benzo(a)pyrene- Waste Classification (TAS requirements)	EP075-TAS	1	1	100.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	1	100.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	3	33.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	9	11.11	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	29	6.90	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)							
Benzo(a)pyrene- Waste Classification (TAS requirements)	EP075-TAS	1	1	100.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	1	100.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard



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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	
Method Blanks (MB) - Continued							
Organic Matter	EP004	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	29	6.90	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)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	29	6.90	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: 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)							
TRH - Semivolatile Fraction	EP071	1	14	7.14	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)							
TRH - Semivolatile Fraction	EP071	1	14	7.14	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)							
TRH - Semivolatile Fraction	EP071	1	14	7.14	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)							
TRH - Semivolatile Fraction	EP071	1	14	7.14	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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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
pH in soil using a 0.01M CaCl ₂ extract	EA001	SOIL	In house: Referenced to Rayment and Lyons (2011) 4B3 (mod.) or 4B4 (mod.) 10 g of soil is mixed with 50 mL of 0.01M CaCl ₂ and tumbled end over end for 1 hour. pH is measured from the continuous suspension. This method is compliant with NEPM (2013) Schedule B(3)
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).
Particle Size Analysis by Hydrometer	EA150H	SOIL	Particle Size Analysis by Hydrometer according to AS1289.3.6.3 - 2003
Soil Particle Density	EA152	SOIL	Soil Particle Density by AS 1289.3.5.1-2006 : Methods of testing soils for engineering purposes - Soil classification tests - Determination of the soil particle density of a soil - Standard method
Exchangeable Cations on Alkaline Soils	* ED006	SOIL	In house: Referenced to Soil Survey Test Method C5. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with alcoholic ammonium chloride at pH 8.5. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil.
Exchangeable Cations	ED007	SOIL	In house: Referenced to Rayment & Lyons (2011) Method 15A1. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM (2013) Schedule B(3) (Method 301)
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Higginson (2011) Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM (2013) Schedule B(3) (Method 301)
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 (SnCl ₂) (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 SnCl ₂ 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)
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	SOIL	In house: Referenced to USEPA SW846, Method 3060A. Hexavalent chromium is extracted by alkaline digestion. The digest is determined by photometrically by automatic discrete analyser, following pH adjustment. The instrument uses colour development using diphenylcarbazide. Each run of samples is measured against a five-point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)



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Analytical Methods	Method	Matrix	Method Descriptions
Total Cyanide by Segmented Flow Analyser	EK026SF	SOIL	In house: Referenced to APHA 4500-CN C / ASTM D7511. Caustic leachates of soil samples are introduced into an automated segmented flow analyser. Complex bound cyanide is decomposed in a continuously flowing stream, at a pH of 3.8, by the effect of UV light. A UV-B lamp (312 nm) and a decomposition spiral of borosilicate glass are used to filter out UV light with a wavelength of less than 290 nm thus preventing the conversion of thiocyanate into cyanide. The hydrogen cyanide present at a pH of 3.8 is separated by gas dialysis. The hydrogen cyanide is then determined photometrically, based on the reaction of cyanide with chloramine-T to form cyanogen chloride. This then reacts with 4-pyridine carboxylic acid and 1,3-dimethylbarbituric acid to give a red colour which is measured at 600 nm. This method is compliant with NEPM (2013) Schedule B(3)
Total Fluoride	EK040T	SOIL	(In-house) Total fluoride is determined by ion specific electrode (ISE) in a solution obtained after a Sodium Carbonate / Potassium Carbonate fusion dissolution.
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1 - 1997. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM (2013) Schedule B(3).
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 504)
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013) Schedule B(3) (Method 504,505)
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)
Benzo(a)pyrene- Waste Classification (TAS requirements)	EP075-TAS	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013) Schedule B(3) (Method 502)
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.
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
NaOH leach for CN in Soils	CN-PR	SOIL	In house: APHA 4500 CN. Samples are extracted by end-over-end tumbling with NaOH.
pH in soil using a 0.01M CaCl ₂ extract	EA001-PR	SOIL	In house: Referenced to Rayment and Higginson 4B1, 10 g of soil is mixed with 50 mL of 0.01M CaCl ₂ and tumbled end over end for 1 hour. pH is measured from the continuous suspension. This method is compliant with NEPM (2013) Schedule B(3) (Method 103)

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Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method (Alkaline Soils)	ED006PR	SOIL	In house: Referenced to Rayment and Lyons 2011 method 15C1.
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Higginson (1992) method 15A1. A 1M NH ₄ Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
Alkaline digestion for Hexavalent Chromium	EG048PR	SOIL	In house: Referenced to USEPA SW846, Method 3060A.
Total Fluoride	EK040T-PR	SOIL	In house: Samples are fused with Sodium Carbonate / Potassium Carbonate flux.
1:5 solid / water leach following drying at 40°C	EN34-AD	SOIL	10 g of 40°C dried soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
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)
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1 - 1997. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM (2013) Schedule B(3) (Method 105)
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, Na ₂ SO ₄ 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.
Tumbler Extraction of Solids - VIC EPA Screen	ORG17-EM	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na ₂ SO ₄ and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 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.



Automated Guideline Comparison Report

EPA Tasmania Information Bulletin No. 105 - Table 2: Soil Hazard Categorisation

Work Order	: EM1910802	Page	: 1 of 8
Client	: ENVIRONMENTAL MANAGEMENT & CONSULTING P/L	Laboratory	: Environmental Division Melbourne
Contact	: MR SIMON CHISLETT		
Address	: LEVEL 2 BIGGENS BUILDING 67 LETITIA STREET NORTH HOBART TASMANIA, AUSTRALIA 7000	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: simon@enviromac.com.au	E-mail	: ALSEnviro.Melbourne@alsglobal.com
Telephone	: +61 0408 391 738	Telephone	: +61-3-8549 9600
Facsimile	: +61 03 6231 5979	Facsimile	: +61-3-8549 9626
Project	: EMC1927	Date Received	: 09-Jul-2019 14:35
Order number	: ----	Date Analysed	: 11-Jul-2019
C-O-C number	: ----	Date Issued	: 18-Jul-2019 18:29
No. of samples received	: 7		
No. of samples analysed	: 7	Quote number	: EN/222

General Comments

This guideline comparison report **only** provides comparison of reported result against limit thresholds for the 'Fill Material', 'Low Level Contaminated Soil', and 'Contaminated Soil' categories in Table 2 of EPA Tasmania Information Bulletin No. 105.

This guideline comparison report is **NOT** a compliance report. Classification of soils requires consideration of a number of other factors including preliminary site investigation, sampling density and statistical calculations and measurement uncertainty.

This guideline comparison report only provides comparison data for parameters, specifically listed within Table2 of the EPA Tasmania Information Bulletin No. 105, that are analysed by ALS.

Take into account measurement uncertainty. Where a result is required to meet compliance limits, the associated uncertainty **must be** considered. Refer to the ALS Contract

Only results in the 'Analytical Results' section have been compared to the guideline.

Additional information pertinent to this report will be found in the following separate attachments: Certificate of Analysis, Quality Control Report, QA/QC Compliance Assessment to Assist with Quality Review and Sample Receipt Notification.

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**Summary of Thresholds Reached or Exceeded****TAS EPA Bulletin No. 105 (2012)****Table 2: Maximum Total Concentration: Fill Material - Level 1**

Client Sample ID	ALS Sample ID	Compound	Method	LOR	Limits	Result
SB1/0.075-0.125	EM1910802-001	Benzo(a)pyrene	EP075-TAS	0.05	< 0.08 mg/kg	0.13 mg/kg

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Analytical Results

Classification and Management of Contaminated Soil for Disposal

Table 2 Maximum total conc. - Contaminated Soil: Table 2: Maximum Total Concentration: Contaminated Soil - Level 3

Sub-Matrix: SOIL

Sub-Matrix: SOIL				Client sample ID	Guideline	Guideline	SB1/0.075-0.1 25		----	----	----	----
				Sampling date/time			05-Jul-2019 15:00	----	----	----	----	
Compound	Method	LOR	Unit	Lower Limit			Upper Limit	EM1910802-001 MU				
EG005(ED093)T: Total Metals by ICP-AES												
Arsenic	EG005T	5	mg/kg	----	750	<5	..	----	----	----	----	
Barium	EG005T	10	mg/kg	----	30000	40	± 4	----	----	----	----	
Beryllium	EG005T	1	mg/kg	----	400	<1	..	----	----	----	----	
Cadmium	EG005T	1	mg/kg	----	400	<1	..	----	----	----	----	
Chromium	EG005T	2	mg/kg	----	5000	5	± 0.7	----	----	----	----	
Cobalt	EG005T	2	mg/kg	----	1000	9	± 1	----	----	----	----	
Copper	EG005T	5	mg/kg	----	7500	72	± 9	----	----	----	----	
Lead	EG005T	5	mg/kg	----	3000	<5	..	----	----	----	----	
Manganese	EG005T	5	mg/kg	----	25000	213	± 21	----	----	----	----	
Molybdenum	EG005T	2	mg/kg	----	4000	<2	..	----	----	----	----	
Nickel	EG005T	2	mg/kg	----	3000	11	± 1	----	----	----	----	
Selenium	EG005T	5	mg/kg	----	200	<5	..	----	----	----	----	
Silver	EG005T	2	mg/kg	----	720	<2	..	----	----	----	----	
Tin	EG005T	5	mg/kg	----	900	<5	..	----	----	----	----	
Zinc	EG005T	5	mg/kg	----	50000	29	± 4	----	----	----	----	
EG035T: Total Recoverable Mercury by FIMS												
Mercury	EG035T	0.1	mg/kg	----	110	<0.1	..	----	----	----	----	
EG048: Hexavalent Chromium (Alkaline Digest)												
Hexavalent Chromium	EG048G	0.5	mg/kg	----	2000	<0.5		----	----	----	----	
EK026SF: Total CN by Segmented Flow Analyser												
Total Cyanide	EK026SF	1	mg/kg	----	2500	<1		----	----	----	----	
EK040T: Fluoride Total												
Fluoride	EK040T	40	mg/kg	----	10000	110	± 30	----	----	----	----	
EP066: Polychlorinated Biphenyls (PCB)												
Total Polychlorinated biphenyls	EP066	0.1	mg/kg	----	50	<0.1		----	----	----	----	
EP068A: Organochlorine Pesticides (OC)												
Sum of Aldrin + Dieldrin	EP068	0.05	mg/kg	----	50	<0.05		----	----	----	----	
Sum of DDD + DDE + DDT	EP068	0.05	mg/kg	----	1000	<0.05		----	----	----	----	
EP075(SIM)A: Phenolic Compounds												
Sum of Phenols	EP075(SIM)	0.5	mg/kg	----	2000	<0.5		----	----	----	----	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons												
Sum of polycyclic aromatic hydrocarbons	EP075(SIM)	0.5	mg/kg	----	200	<0.5		----	----	----	----	



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Classification and Management of Contaminated Soil for Disposal
Table 2 Maximum total conc. - Contaminated Soil: Table 2: Maximum Total Concentration: Contaminated Soil - Level 3

Sub-Matrix: SOIL

				Client sample ID							
				Sampling date/time	Guideline Lower Limit	Guideline Upper Limit	SB1/0.075-0.1 25	----	----	----	----
							05-Jul-2019 15:00	----	----	----	----
Compound	Method	LOR	Unit				EM1910802-001 MU				
EP075B: Polynuclear Aromatic Hydrocarbons											
Benzo(a)pyrene	EP075-TAS	0.05	mg/kg		----	20	0.13	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons											
C6 - C9 Fraction	EP080	10	mg/kg		----	1000	<10 ..	----	----	----	----
C10 - C36 Fraction (sum)	EP071	50	mg/kg		----	10000	<50	----	----	----	----
EP080: BTEXN											
Benzene	EP080	0.2	mg/kg		----	50	<0.2 ..	----	----	----	----
Toluene	EP080	0.5	mg/kg		----	1000	<0.5 ..	----	----	----	----
Ethylbenzene	EP080	0.5	mg/kg		----	1080	<0.5 ..	----	----	----	----
Total Xylenes	EP080	0.5	mg/kg		----	1800	<0.5 ..	----	----	----	----

Page : 5 of 8
Work Order : EM1910802
Client : ENVIRONMENTAL MANAGEMENT & CONSULTING P/L
Project : EMC1927



Classification and Management of Contaminated Soil for Disposal

Table 2 Maximum total conc. - Fill Material: Table 2: Maximum Total Concentration: Fill Material - Level 1

Sub-Matrix: SOIL

Sub-Matrix: SOIL				Client sample ID		SB1/0.075-0.1 25		----	----	----	----
Sampling date/time				Guideline	Guideline	05-Jul-2019 15:00	----	----	----	----	
Compound	Method	LOR	Unit	Lower Limit	Upper Limit	EM1910802-001 MU					
EG005(ED093)T: Total Metals by ICP-AES											
Arsenic	EG005T	5	mg/kg	----	20	<5 ..	----	----	----	----	
Barium	EG005T	10	mg/kg	----	300	40 ± 4	----	----	----	----	
Beryllium	EG005T	1	mg/kg	----	2	<1 ..	----	----	----	----	
Cadmium	EG005T	1	mg/kg	----	3	<1 ..	----	----	----	----	
Chromium	EG005T	2	mg/kg	----	50	5 ± 0.7	----	----	----	----	
Cobalt	EG005T	2	mg/kg	----	100	9 ± 1	----	----	----	----	
Copper	EG005T	5	mg/kg	----	100	72 ± 9	----	----	----	----	
Lead	EG005T	5	mg/kg	----	300	<5 ..	----	----	----	----	
Manganese	EG005T	5	mg/kg	----	500	213 ± 21	----	----	----	----	
Molybdenum	EG005T	2	mg/kg	----	10	<2 ..	----	----	----	----	
Nickel	EG005T	2	mg/kg	----	60	11 ± 1	----	----	----	----	
Selenium	EG005T	5	mg/kg	----	10	<5 ..	----	----	----	----	
Silver	EG005T	2	mg/kg	----	10	<2 ..	----	----	----	----	
Tin	EG005T	5	mg/kg	----	50	<5 ..	----	----	----	----	
Zinc	EG005T	5	mg/kg	----	200	29 ± 4	----	----	----	----	
EG035T: Total Recoverable Mercury by FIMS											
Mercury	EG035T	0.1	mg/kg	----	1	<0.1 ..	----	----	----	----	
EG048: Hexavalent Chromium (Alkaline Digest)											
Hexavalent Chromium	EG048G	0.5	mg/kg	----	1	<0.5	----	----	----	----	
EK026SF: Total CN by Segmented Flow Analyser											
Total Cyanide	EK026SF	1	mg/kg	----	32	<1	----	----	----	----	
EK040T: Fluoride Total											
Fluoride	EK040T	40	mg/kg	----	300	110 ± 30	----	----	----	----	
EP066: Polychlorinated Biphenyls (PCB)											
Total Polychlorinated biphenyls	EP066	0.1	mg/kg	----	2	<0.1	----	----	----	----	
EP068A: Organochlorine Pesticides (OC)											
Sum of Aldrin + Dieldrin	EP068	0.05	mg/kg	----	2	<0.05	----	----	----	----	
Sum of DDD + DDE + DDT	EP068	0.05	mg/kg	----	2	<0.05	----	----	----	----	
EP075(SIM)A: Phenolic Compounds											
Sum of Phenols	EP075(SIM)	0.5	mg/kg	----	25	<0.5	----	----	----	----	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons											
Sum of polycyclic aromatic hydrocarbons	EP075(SIM)	0.5	mg/kg	----	20	<0.5	----	----	----	----	
EP075B: Polynuclear Aromatic Hydrocarbons											



Page : 6 of 8
 Work Order : EM1910802
 Client : ENVIRONMENTAL MANAGEMENT & CONSULTING P/L
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Classification and Management of Contaminated Soil for Disposal
Table 2 Maximum total conc. - Fill Material: Table 2: Maximum Total Concentration: Fill Material - Level 1

Sub-Matrix: SOIL

				Client sample ID							
				Sampling date/time	Guideline	Guideline	SB1/0.075-0.1 25	----	----	----	----
					Lower Limit	Upper Limit	05-Jul-2019 15:00	----	----	----	----
Compound	Method	LOR	Unit				EM1910802-001 MU				
EP075B: Polynuclear Aromatic Hydrocarbons - Continued											
Benzo(a)pyrene	EP075-TAS	0.05	mg/kg		----	0.08	0.13	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons											
C6 - C9 Fraction	EP080	10	mg/kg		----	65	<10 ..	----	----	----	----
C10 - C36 Fraction (sum)	EP071	50	mg/kg		----	1000	<50	----	----	----	----
EP080: BTEXN											
Benzene	EP080	0.2	mg/kg		----	1	<0.2 ..	----	----	----	----
Toluene	EP080	0.5	mg/kg		----	1	<0.5 ..	----	----	----	----
Ethylbenzene	EP080	0.5	mg/kg		----	3	<0.5 ..	----	----	----	----
Total Xylenes	EP080	0.5	mg/kg		----	14	<0.5 ..	----	----	----	----



Sub-Matrix: SOIL				Client sample ID	Guideline Lower Limit	Guideline Upper Limit	SB1/0.075-0.1 25	----	----	----	----
				Sampling date/time			05-Jul-2019 15:00	----	----	----	----
Compound	Method	LOR	Unit				EM1910802-001 MU				
EG005(ED093)T: Total Metals by ICP-AES											
Arsenic	EG005T	5	mg/kg	----	200	<5	..	----	----	----	----
Barium	EG005T	10	mg/kg	----	3000	40	± 4	----	----	----	----
Beryllium	EG005T	1	mg/kg	----	40	<1	..	----	----	----	----
Cadmium	EG005T	1	mg/kg	----	40	<1	..	----	----	----	----
Chromium	EG005T	2	mg/kg	----	500	5	± 0.7	----	----	----	----
Cobalt	EG005T	2	mg/kg	----	200	9	± 1	----	----	----	----
Copper	EG005T	5	mg/kg	----	2000	72	± 9	----	----	----	----
Lead	EG005T	5	mg/kg	----	1200	<5	..	----	----	----	----
Manganese	EG005T	5	mg/kg	----	5000	213	± 21	----	----	----	----
Molybdenum	EG005T	2	mg/kg	----	1000	<2	..	----	----	----	----
Nickel	EG005T	2	mg/kg	----	600	11	± 1	----	----	----	----
Selenium	EG005T	5	mg/kg	----	50	<5	..	----	----	----	----
Silver	EG005T	2	mg/kg	----	180	<2	..	----	----	----	----
Tin	EG005T	5	mg/kg	----	500	<5	..	----	----	----	----
Zinc	EG005T	5	mg/kg	----	14000	29	± 4	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS											
Mercury	EG035T	0.1	mg/kg	----	30	<0.1	..	----	----	----	----
EG048: Hexavalent Chromium (Alkaline Digest)											
Hexavalent Chromium	EG048G	0.5	mg/kg	----	200	<0.5		----	----	----	----
EK026SF: Total CN by Segmented Flow Analyser											
Total Cyanide	EK026SF	1	mg/kg	----	1000	<1		----	----	----	----
EK040T: Fluoride Total											
Fluoride	EK040T	40	mg/kg	----	3000	110	± 30	----	----	----	----
EP066: Polychlorinated Biphenyls (PCB)											
Total Polychlorinated biphenyls	EP066	0.1	mg/kg	----	20	<0.1		----	----	----	----
EP068A: Organochlorine Pesticides (OC)											
Sum of Aldrin + Dieldrin	EP068	0.05	mg/kg	----	20	<0.05		----	----	----	----
Sum of DDD + DDE + DDT	EP068	0.05	mg/kg	----	200	<0.05		----	----	----	----
EP075(SIM)A: Phenolic Compounds											
Sum of Phenols	EP075(SIM)	0.5	mg/kg	----	500	<0.5		----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons											
Sum of polycyclic aromatic hydrocarbons	EP075(SIM)	0.5	mg/kg	----	40	<0.5		----	----	----	----
EP075B: Polynuclear Aromatic Hydrocarbons											

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 Work Order : EM1910802
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 Project : EMC1927

**Classification and Management of Contaminated Soil for Disposal****Table 2 Maximum total conc. - Low Level Contaminated Soil: Table 2: Maximum Total Concentration: Low Level Contaminated Soil - Level 2**

Sub-Matrix: SOIL

				Client sample ID			SB1/0.075-0.1 25	----	----	----	----
				Sampling date/time	Guideline	Guideline	05-Jul-2019 15:00	----	----	----	----
Compound	Method	LOR	Unit	Lower Limit	Upper Limit	EM1910802-001 MU					
EP075B: Polynuclear Aromatic Hydrocarbons - Continued											
Benzo(a)pyrene	EP075-TAS	0.05	mg/kg	----	2	0.13	----	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons											
C6 - C9 Fraction	EP080	10	mg/kg	----	650	<10	--	----	----	----	----
C10 - C36 Fraction (sum)	EP071	50	mg/kg	----	5000	<50		----	----	----	----
EP080: BTEXN											
Benzene	EP080	0.2	mg/kg	----	5	<0.2	--	----	----	----	----
Toluene	EP080	0.5	mg/kg	----	100	<0.5	--	----	----	----	----
Ethylbenzene	EP080	0.5	mg/kg	----	100	<0.5	--	----	----	----	----
Total Xylenes	EP080	0.5	mg/kg	----	180	<0.5	--	----	----	----	----

Appendix D

Assessment Data Quality Indicator (DQI) Checklist

Data Quality Indicators Checklist



List the laboratory batch numbers in the reporting period to which this DQI checklist relates			
Report ID	Report Description	Report Issue Date	
EM1910802	Soil assessment	18/7/19	
		Yes	No
Are all laboratory reports included within EM&C report as an appendix?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Comments: SRN, CoA, QC, QCI and CoC supplied			
Comparability (the confident expressed qualitatively that data may be considered to be equivalent for each sampling and analytical event)			
		Yes	No
Was the EM&C Standard Operating Procedure for sampling used?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Comments:			
Were consistent sample types collected according to SAQP?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Comments:			
Who was conducting the sampling?			
Comments: Soil sampling was conducted by Alex Lovibond & Simon Chislett.			
Was the same laboratory and laboratory method used?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Comments:			
Have the same units of measurement been used?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Comments:			
Were climate conditions recorded? (if relevant)		<input type="checkbox"/>	<input checked="" type="checkbox"/>
Comments:			

Data Quality Indicators Checklist



Precision (a quantitative measure of the variability (or reproducibility) of data)								
						Yes	No	NA
Is the blind duplicate/split ID generic and does it not reveal the reference sample ID?						<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:								
Is RPD within 0-50% for samples with concentrations >10*LOR and within 100% for samples with concentration <10*LOR:						<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments: See Table 3 for full RPD analysis								
Has the Primary laboratory QA/QC reported any anomalies?						<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments: Where outliers exist, comments will be provided below the report ID								
	Intra Lab QCS					Analysis Holding Time	Frequency of Intra Lab QC Samples	
Report ID	Lab Method Blank	Lab Control	Matrix Spike	Lab Duplicate	Surrogate Recovery	Holding Time breach	Frequency Breach	Report Issue Date
EM1910802	No	No	No	No	No	No	Yes	18/7/19
<p>Frequency of Intra Lab QC Samples: EP071: TRH - Semivolatile Fraction: Intra Lab Quality Control Sample Frequency Outliers exist. Not enough duplicate sample bottles provided for intra lab duplicate and/or QC matrix spike testing. This result may be due to standard laboratory practice of running samples through in 'analytical lots'. This practise may involve splitting EM&Cs submitted samples over multiple analytical lots. EM&C have no control over the number of intra lab duplicates in which their samples are analysed, other than providing additional sample bottles at the specified frequency. Even when this practice is observed, the splitting of EM&Cs sample bottles over multiple 'analytical lots' may result in a non compliance, due to a lack of frequency of quality control samples provided to the laboratory. EM&C do not consider this to reduce the reliability of the dataset.</p>								

Accuracy (a quantitative measure of the closeness of the reported data to the true value)					
			Yes	No	NA
Was the field equipment calibrated?			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments: See Calibration Certificates Attached in Appendix E					
Have trip, field and rinsate samples been collected?			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments: Rinsate and trip blanks were utilised. A field blank sample was deemed to be unrequired by EM&C.					

Representativeness (the confidence expressed qualitatively that are representative of each media type present on the site under investigation)					
			Yes	No	NA
Has the appropriate media been sampled and analysed in accordance with the SAQP?			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:					
Has all media identified in the SAQP been sampled?			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:					
Have Chain of Custodies been completed?			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:					
Have the samples been collected in the appropriate containers?			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:					
Have the samples been stored, preserved and handled appropriately and received at the laboratory at acceptable temperature?			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:					

Data Quality Indicators Checklist



Has any contamination been identified in blank samples?	ENVIRONMENTAL MANAGEMENT & CONSULTING PTY LTD	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Comments:				
Have any uncertainties been identified in:				
Sampling methods		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Comments:				
Laboratory Methods		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Comments:				
Groundwater well integrity or network		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Comments:				
Soil vapour bore integrity		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Comments:				

Completeness (a measure of the amount of usable data contributing to the entire data set)			
	Yes	No	NA
Have all critical site locations been sampled in accordance with the SAQP?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:			
Has the Technical Holding Times been met?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:			
Is field and laboratory documentation correct, legible and authorised by signature and date?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:			

<input checked="" type="checkbox"/>	Acceptable
<input type="checkbox"/>	Acceptable, irregularities has been noted
<input type="checkbox"/>	Not acceptable

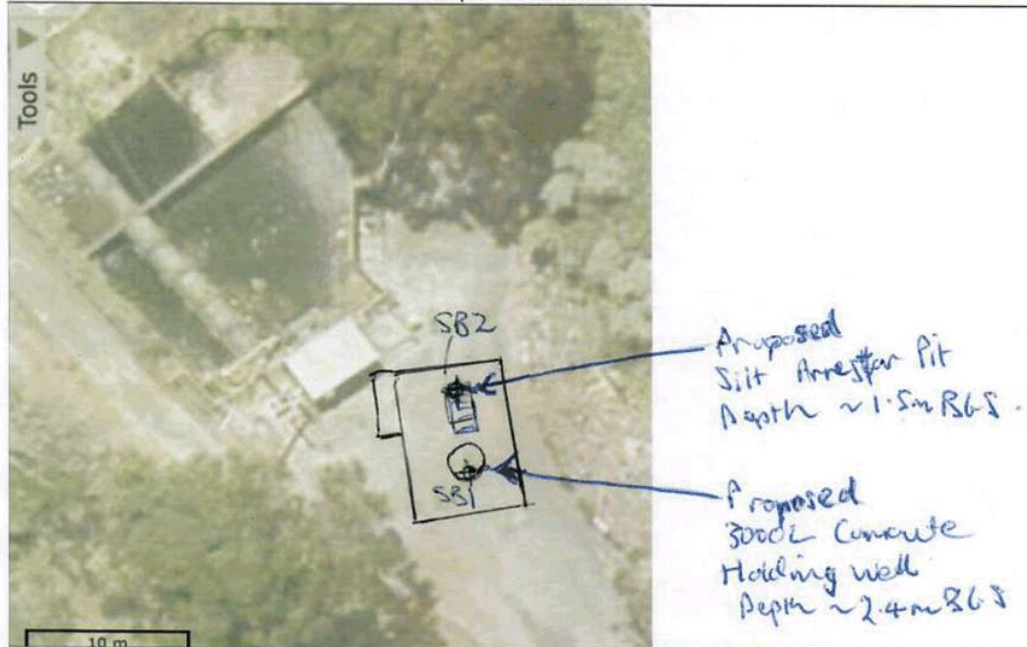
Appendix E

Assessment Field Logs and Calibration Certificates

SCREENING OF SOILS - FIELD LOG


Site Name:	McRobies Landfill	Logged by:	SC	Date:	5/7/19
Site Address:	South Hobart				
Job No:	EMC1927				


Sample location sketch







Sample ID	Soil Type	(N/F)	PID	LAB	Sample ID	Soil Type	(N/F)	PID	LAB

Duplicate / Split Samples ID	duplicate of
	duplicate of
Equipment rinsate ID	rinsate of
	rinsate of
Field blank ID	
Trip blank ID	
Rinsate water # for	Semi volatile:
	Volatile:

Soil Bore ID: SB 1		Site Name: McRobies Land		 <small>ENVIRONMENTAL MANAGEMENT & CONSULTING PTY LTD</small>																							
Site Address: South Hobart		Job No: EMC1927																									
Drilling Method		Ø(mm)		Depth (mBGS)		Method of abandoning soil bore				<div style="display: flex; justify-content: space-between;"> <div> DG Dark Grey G Grey LG Light Grey DB Dark Brown B Brown LB Light Brown O Orange </div> <div> Plasticity Range of Liquid Limit Low <35% Medium >35% - <50% High >50% </div> </div>		Partide Characteristics (Sand and Gravel Only) W Well Graded P Poorly Graded G Gap Graded U Uniform		Moisture Content Dry Moist Wet		Core/Bagged PID Water Level mBGS Graphical Well Construction											
<input checked="" type="checkbox"/> Hand Auger <input checked="" type="checkbox"/> NDD <input type="checkbox"/> Hollow Auger <input type="checkbox"/> Concrete Saw <input type="checkbox"/>		80 3000		0-0.5 0.5-2.0		<input type="checkbox"/> Backfill with drill cuttings and compact <input type="checkbox"/> Resurface with concrete <input type="checkbox"/> Install monitoring well <input type="checkbox"/> Install soil vapour point <input type="checkbox"/> Backfilled with virgin material <input checked="" type="checkbox"/> Backfilled with Gravel Sipping HCC																					
Depth (mBGS)		Soil Classification				USCS Group letters		Plactisity/ Particle (USDA) characteristics		Colour		Moisture (see field guide)		Consistency		Sample ID		Bagged PID		Analysed/ QC sample ID		Well Development					
From To		Dominant soil component		Descriptive soil component		Other minor soil component																By: Date: Method: Initial DTW: Purge Volume: Post purge DTW: Estimated recharge rate:					
0.0 0.05		B-TUMEN														0.075-0.125		0.0		4/ACP		<div>Well Construction Details</div> Concrete: Bentonite: Sand: Screen Interval:					
0.05 0.9		M.GRAVEL U.Sand		M-C Sand		SW		WG		G		wet*				0.5-0.6		0.0		NO							
0.9 2.0		M.GRAVEL F.GRAVEL		C-Sand		SW		WG		G		wet*				1.0-1.1		0.0		4							
																1.5-1.6		0.0		4							
Notes: mBGS: metres below ground surface Ø(mm): diameter in millimetres NDD: non destructive drilling				Comments: Fuel due to NDD cutting method SOIL NOT ASSESSABLE BEYOND 1.6, NDD ADVANCEMENT REMOVED SOIL MATRIX, LEAVING ONLY GRAVEL.																		Notes: Concrete Bentonite Sand Well casing				DTW: Depth to Water mBTOC: metres below top of well casing	
USDA		FINE EARTH				SAND						GRAVEL				COBBLES		STONES		BOULDERS							
		CLAY		SILT																							
		Fine Coarse		Fine Coarse		V.fine		Fine		Med		Coarse		V.Coarse		Fine		Medium		Coarse							
Max particle Size (mm)		0.0002 0.002		0.02 0.05		0.1		0.25		0.5		1		2		5		20		76		250 600					

Soil Bore ID: SB2		Site Name: McRobies Landfill		 ENVIRONMENTAL MANAGEMENT & CONSULTING PTY LTD															
Site Address: South Hobart		Job No: EMC1927																	
Drilling Method		Ø(mm)	Depth (mBGS)	Method of abandoning soil bore				DG	Dark Grey	Plasticity Range of Liquid Limit	Particle Characteristics (Sand and Gravel Only)		Moisture Content	Core/ Bagged PID	Water Level	mBGS	Graphical Well Construction		
<input type="checkbox"/> Hand Auger <input type="checkbox"/> NDD <input type="checkbox"/> Hollow Auger <input type="checkbox"/> Concrete Saw <input checked="" type="checkbox"/> NDD		300mm	0-1.0m	<input type="checkbox"/> Backfill with drill cuttings and compact <input type="checkbox"/> Resurface with concrete <input type="checkbox"/> Install monitoring well <input type="checkbox"/> Install soil vapour point <input checked="" type="checkbox"/> Backfilled with virgin material <input checked="" type="checkbox"/> Backfill with Gravel Supp. H.C.				G	Grey		Low	<35%	W					Well Graded	Dry
								LG	Light Grey		Medium	>35% - <50%	P					Poorly Graded	Moist
								DB	Dark Brown		High	>50%	G					Gap Graded	Wet
								B	Brown				U					Uniform	
								LB	Light Brown										
								O	Orange										

Depth (mBGS)		Soil Classification			USCS Group letters	Plasticity/ Particle (USDA) characteristics	Colour	Moisture (see field guide)	Consistency	Sample ID	Bagged PID (P.P.M.)	Analysed/ QC sample ID	Well Development
From	To	Dominant soil component	Descriptive soil component	Other minor soil component									
0	0.05	B.T.V. MEN.											
0.05	0.5	M.GRAVEL	VC Sand	M-C Sand	SW	W.G.	G	wet*					
0.5	0.6	C.SAND	M-F Sand	Silt	SW	W.G.	B	wet*					
0.6	0.9	M.GRAVEL	R.GRAVEL	C.Sand	SW	W.G.	G	wet*					
		EOB @ 0.9 Refusal to NDD											

Notes: mBGS: metres below ground surface Ø(mm): diameter in millimetres NDD: non destructive drilling		Comments: REFUSAL @ 0.9m * wet due to NDD Drilling gravel between 0.6-0.9 difficult to assess as NDD cutting washed away soil matrix.										Notes:  Concrete  Bentonite  Sand  Well casing		DTW: Depth to Water mBTC: metres below top of well casing	
---	--	---	--	--	--	--	--	--	--	--	--	---	--	---	--

USDA	CLAY		SILT		FINE EARTH					SAND			GRAVEL			Rock Fragments		
	Fine	Coarse	Fine	Coarse	V.fine	Fine	Med	Coarse	V.Coarse	Fine	Medium	Coarse	COBBLES	STONES	BOULDERS			
Max particle Size (mm)	0.0002	0.002	0.02	0.05	0.1	0.25	0.5	1	2	5	20	76	250	600	N/A			



ENVIRONMENTAL MANAGEMENT & CONSULTING PTY LTD

CALIBRATION CERTIFICATE

Make: Honeywell	Calibration Date: 1/2/19
Model: Impact Pro	Machine Reading: Calibration Due in 180 days
Serial No: ZEL1201176	Next Calibration Date: 31/7/19
Calibration Gas Supplier:	Honeywell
Calibration Gas ID:	Lot 206598
Calibration Gas Expiry Date:	September 2020
Calibration Gas Composition:	ISOBUTYLENE 100 ppm C ₄ H ₈

Calibration Method

Unit calibrated in accordance with MiniRAE Operating Instructions and Maintenance Manual (the 'user manual').

Method of calibration: Per section 4.4 of the user manual

Post calibration bump test reading of Calibration Gas

Isobutylene	Expected	Result
	100	100

Calibration completed by:

Simon Chislett

Competency: Gas Test Atmosphere, Course Code: MSAPMOHS217A

A handwritten signature in blue ink, appearing to be 'Simon Chislett', written over a horizontal line.

Signature

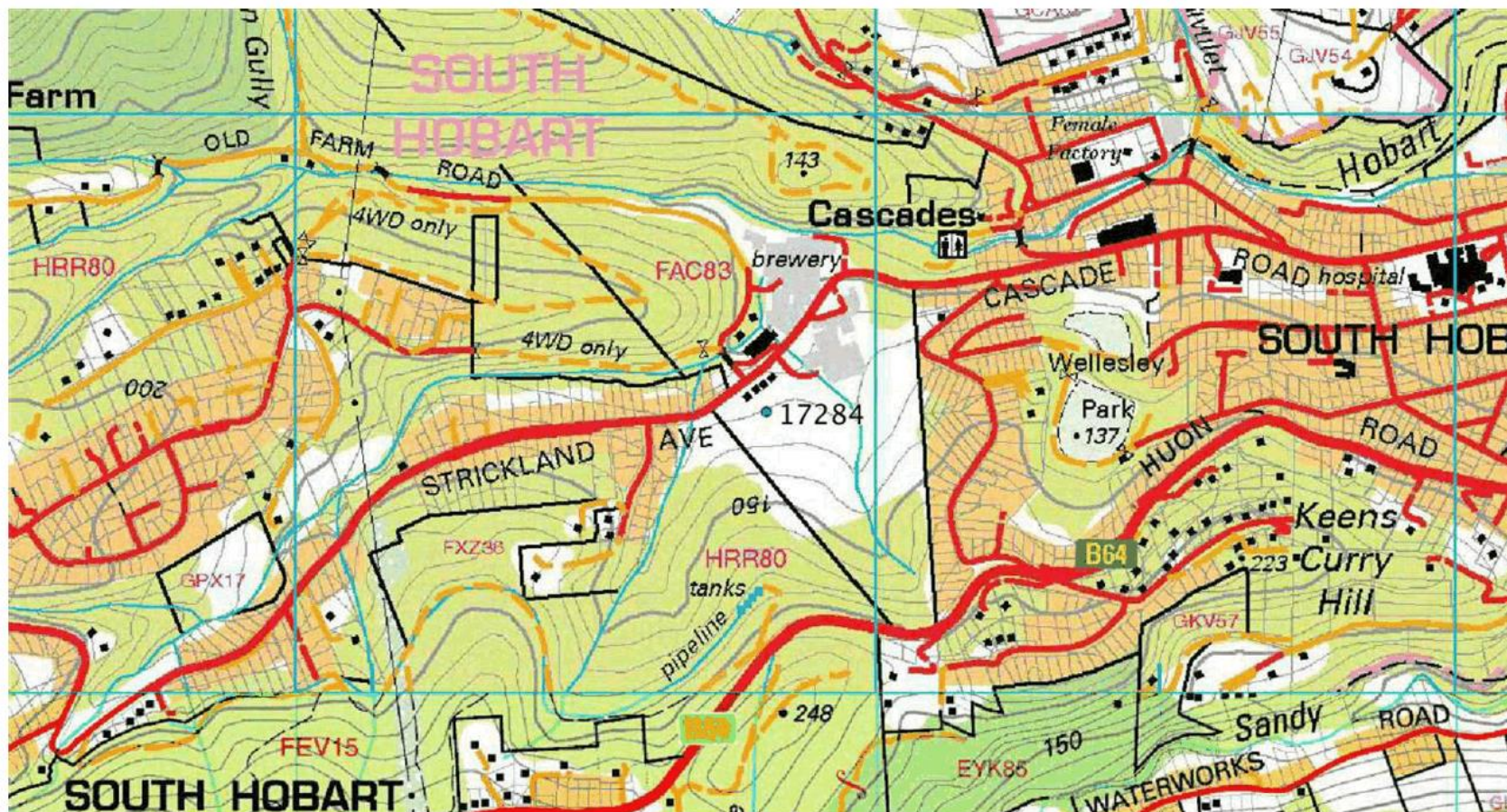
Date of Issue: 01/02/19

Appendix F

GIAP Search Results

EMC1936

Groundwater Feature Detailed Report



Disclaimer and Copyright. Map data is compiled from a variety of sources and hence its accuracy is variable. If you wish to make decisions based on this data you should consult with professional advisers. Apart from any use permitted under the Copyright Act 1968, no part of this report may be copied without the permission of the General Manager, Water and Marine Resources Division, Department of Primary Industries, Parks, Water and Environment, PO Box 41, Hobart, TAS 7001.

EMC1936	Groundwater Feature Detailed Report
---------	--

Identification **Feature id:** 17284 **Feature type:** Bore

Location **Locality:** South Hobart
Easting: 523814 **Datum:** GDA94
Northing: 5250483 **Accuracy:** 200
Ground level (m ASL):

Construction **Date drilled:** 14/03/1996
Drilling company: KMR Drilling Pty Ltd
Depth (metres): 60.00
Initial yield (L/sec): 0.63
Initial EC (µS/cm):

Bore diameters

From (m)	To (m)	Diameter (mm)	Drilling technique
0.0	60.0	190.00	Downhole Hammer (Rotary Hammer)

Casings

From (m)	To (m)	Inside diameter (mm)	Outside diameter (mm)	Material
0.0	60.0		125.00	unplasticised polyvinylchloride uPVC

Screens

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

Seals

From (m)	To (m)	Material type
NA		

**Geological /
Hydrogeological
Information****Lithological Log**

From (m)	To (m)	Lithological description
0.0	3.0	clay
3.0	60.0	mudstone, sandstone

Depth to water struck

Date	From (m)	To (m)	Cumulative yield
13/03/1996	48.0		0.63

Main aquifer geology: Triassic

Final TDS (mg/L):

**Standing Water
Levels****Standing water levels**

Date	SWL (metres)
NA	

EMC1936

*Groundwater Feature
Detailed Report***Current status*****Last recorded statuses***

Type	Value	Date recorded
function	capped	14/03/1996