As per email from Robert Holmes (3rd Dec 2015)
(i) The roadway 3.05m wide will be consolidated with the title to the proposed lot 2,
(ii) Existing rights of way benefiting the adjacent properties are to be carried forward,
(iii) An additional right of way over the area 0.55 wide as shown by ABCD in favour of 35 Mulgrave Street, 37 Mulgrave Street and 1 Gee Street is to be created in addition to the above.
(iv) As part of this permit a driveway to council standards will be constructed along Lot 2 from Gee street for a length of 46.38m.

BALANCE PLAN TO BE CREATED FOR BALANCE OF Title Reference 121007/1
This is to be retained in the ownership of The LAUNCESTON CITY COUNCIL.

A new sewer connection for lot 2 is to be consructed as shown over the existing 375dia sewer main.
The existing sewer connection is to be kept for Lot 1.
The exact connection point will be located and confirmed that it does not pass through Lot 2.

28 GARDEN GR
Property ID 7532763
Title Reference 44898/6

8 PEDDER ST
Title Reference
13997/1

3 GEE ST
Title Reference
23684/7

6 PEDDER ST
Title Reference
40782/1

2
772m²

SHED

SHED

PART OF Title Reference 121007/1
Subdivision Road (3.05 wide)
LAUNCESTON CITY COUNCIL

4 PEDDER ST
CT 110825/1

4 PEDDER ST
Title Reference
215304/1

35 MULGRAVE ST
Title Reference 60041/17

37 MULGRAVE ST
Title Reference 60041/13

1 GEE ST
Title Reference 69718/4

Existing 375dia
Gravity reticulation
sewer Main

3 GEE ST
Title Reference 23684/7

EXISTING WORKSHOP
(domestic purposes)
(Used for storing vehicles and occasional (personal) mechanical repairs.)

5 GEE ST
Property ID 6618135
Title Reference 71095/2

1
641m²

EXISTING
W.B HOUSE

Grated
Pit

Grated
Pit

New sewer
connection
for lot 2.

Existing
Gate

Existing
Driveway

New sewer
connection
for lot 2.

ROADWAY 3.05 Wide

GEE STREET

LIP OF KERB

LIP OF KERB

EP denotes Electricity Pole

CONTOUR INTERVAL 0.5
DATUM AHD (DSM G71)

PROPOSAL PLAN
2 LOT SUBDIVISION
BOUNDARY ADJUSTMENT

REVISION C

3 GEE ST
SOUTH LAUNCESTON TAS 7249

Property ID 7532755
Title Reference 23684/7
Owners Names:
AMANDA LESLEY PIERCEY
ANGUS JAMES PIERCEY

DATE	SCALE
28 Jan 2016	1: 250
DRAWN AJP	FILE 5804 06
SURVEYED AJP	

A.J PHILLIPS SURVEYING
6 BINDAREE ROAD
LEGANA
7277

email: ajpsurv@bigpond.net.au
Ph 6330 3505
Mobile 0412 315 880

PLANNING EXHIBITED DOCUMENTS
For the Planning Authority DA 0455/2015
Date 29/07/2016

THIS PLAN WAS PREPARED AS A PROPOSED SUBDIVISION TO ACCOMPANY A DEVELOPMENT APPLICATION TO COUNCIL AND SHOULD NOT BE USED FOR ANY OTHER PURPOSE.
THE DIMENSIONS, AREAS AND TOTAL NUMBER OF LOTS SHOWN HERON ARE SUBJECT TO FIELD SURVEY AND ALSO TO THE REQUIREMENTS OF COUNCIL AND ANY OTHER AUTHORITY WHICH MAY HAVE REQUIREMENTS UNDER ANY RELEVANT LEGISLATION.
IN PARTICULAR NO RELIANCE SHOULD BE PLACED ON THE INFORMATION ON THIS PLAN FOR ANY FINANCIAL DEALINGS INVOLVING THIS LAND.
THIS NOTE IS AN INTEGRAL PART OF THIS PLAN.

TASMAN
geotechnics

ENVIRONMENTAL SITE ASSESSMENT
3 GEE STREET, SOUTH LAUNCESTON

Prepared for: **Angus Piercey**

Date: 23 May 2016

Document Reference: TG16024/1 - 02report

Tasman Geotechnics Pty Ltd ABN 96 130 022 589
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E wayne@tasmangeotechnics.com.au

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Appendices

Version	Date	Prepared by	Authorised by	Distribution
Draft	23 May 2016	Dr Wayne Griffioen	Dr Wayne Griffioen	Electronic

1 INTRODUCTION

Tasman Geotechnics was engaged by Mr Angus Piercey to conduct an Environmental Site Assessment (ESA) at 3 Gee Street, South Launceston, Tasmania (title reference 23684/7).

The assessment is required as the site is to be developed for residential use and the Launceston City Council has identified the site to be potentially contaminated (the workshop has a sub-floor pit). The proposed development involves demolition of the existing shed and construction of a residential dwelling.

We have carried out a site characterisation in accordance with Schedule B2 of the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended in 2013 (NEPM, 2013). On the basis of our site characterisation, we conclude that there is no health risk for residential use associated with the previous activities involving the workshop pit.

The assessment has been reviewed and endorsed by Mr R Cooper of Environmental Services and Design (ES&D), who is a Site Contamination Practitioners Australia (SCPA) certified practitioner (certification No. 15020). An endorsement letter is presented in Appendix A.

2 SCOPE OF WORK

The Environmental Site Assessment presented in this report was carried out as follows:

- Obtain background and historical information
- Developing a preliminary Conceptual Site Model (CSM) for determining scope of fieldwork, including soil sampling plan
- Carrying out the fieldwork (drilling and collecting soil samples) and laboratory testing
- Updating the CSM with fieldwork observations, and carrying out Health Risk Assessment on the basis of the laboratory results.

3 BACKGROUND INFORMATION

3.1 Setting

The site is located is a residential area. The site is about 75m long and about 15m wide (surface area about 1075m^2). The site is surrounded on all sides by existing residential houses. Coronation Park is located about 80m south west and downhill of the site. The regional setting is shown in Figure 1.

The site appears to be located at the base of a shallow valley, draining toward the south west. The base of the valley is approximately halfway into the property. In the northern part of the site, the ground slope is about 4° toward the south, and in the southern part, the ground slope is about 1° toward the north.

3.2 Geology and Hydrogeology

The surface geology of the site is mapped as undifferentiated Tertiary aged sediments (Mineral Resources Tasmania, Digital Geological Atlas, 1:25,000 series, Launceston sheet). The sediments are described as "*poorly consolidated clay, silt and clayey labile sand with rare gravel and lignite*".

The nearest streams mapped on the 1:25,000 scale topographic map are located about 2.5km away: South Esk River to the north west of the site and Kings Meadows Rivulet, which is located south east of the site. Given the local topographic direction is toward the west, the surface water most relevant to the site is the South Esk River.

Based on the local topography, the local groundwater flow direction is likely to be south-westerly, toward Coronation Park.

A search of the DPIPWE Groundwater Information Access Portal shows there are no registered groundwater bores within 1km of the site.

3.3 Site History

A search was made of records kept at the Community History Centre (at the Queen Victoria Museum in Inveresk) for references to 3 Gee Street. The records included: Tasmanian Government Gazette of 1933, 1935, 1938, 1942 and 1957, the 1948 Post Office Directory and various UBD editions (1965, 1971, 1983 and 1994).

Based on these records, the history of the site is summarized as follows:

The house and shed at 3 Gee Street were constructed between 1935 and 1938. The resident was A.V. Hay, who operated a motor mechanic workshop. A newspaper advertisement shows A.V. Hay was selling cars from 3 Gee Street in the early 1950's.

Sometime between 1957 and 1971, Frank Morganti took over the workshop, and continued operations until sometime between 1984 and 1994. Since then, the workshop has been used for storing vehicles and occasional (personal) mechanical repairs.

An enquiry with the Department of Justice showed that there are no Dangerous Goods records relating to underground tanks or storage of flammable materials for the site.

3.4 Site Condition

From our field work, we note that the garage is about 15m long and 14m wide. The building has timber floorboards. There is a concrete pit in the garage, about halfway along the western wall. The pit is 3m long, 1m wide and 1.7m deep.

There were no significant stains inside the concrete pit or on the timber floorboards.

4 AREAS AND CHEMICALS OF CONCERN

The site history shows the site has been used for mechanical repairs. Contamination could result from fuel and oil spills, oil leaks from the pit and storage of waste oils. The chemicals of concern are hydrocarbons (Total Recoverable Hydrocarbons, TRH, and Polycyclic Aromatic Hydrocarbons, PAH), as well as BTEX (Benzene, Toluene, Ethylbenzene and Xylenes) and phenols.

The treatment and location of historical waste oil storage is not known. Therefore, the soil sampling was aimed at i) sampling soil downhill of the pit and ii) inside the workshop near the pit.

5 SCOPE OF WORK

5.1 Fieldwork

The fieldwork was carried out on 23 March 2016 in the full time presence of a Geo-Environmental Engineer from Tasman Geotechnics. The fieldwork consisted of drilling 2 boreholes using a 4WD mounted auger rig as follows:

- BH1 to 3m depth south of the pit inside the workshop, and
- BH2 to 3m depth west (and downhill) of the pit.

The location of BH1 was as close as practicable to the pit, as vehicles parked in the workshop prevented getting closer.

The sampling methodology was consistent with AS 4482.1 – 2005 and AS4482.2 – 1999. A duplicate sample (Duplo1) was taken in BH2 at 2m depth.

Upon reaching the target sampling depth, the auger was withdrawn from the hole to ground level. A soil sample was taken from the auger tip and transferred into a clean glass jar provided by the laboratory. The sample jars were completely filled (zero head space) and placed in an ice cooled esky.

Upon reaching target depth, the boreholes were backfilled with drilling spoil as no contamination was present. The augers were cleaned by removing excess soil from the flights between boreholes.

No groundwater inflow was noted during the fieldwork although the sandy silt at 2.1m to 2.5m in BH1 became wet. No monitoring wells were installed at the site.

The locations of the boreholes is shown in Figure 2 and engineering borehole logs are presented in Appendix B.

5.2 Laboratory Testing

All samples were forwarded by overnight express courier under Tasman Geotechnics' chain of custody documentation to Eurofin|MGT's NATA accredited laboratory in Oakleigh (VIC).

Two soil samples (plus 1 duplicate sample for quality control purposes) were analysed by Eurofins|MGT for total recoverable hydrocarbons (TRH), volatile aromatic hydrocarbons (benzene, toluene, ethylbenzene, xylenes and naphthalene), Polycyclic Aromatic Hydrocarbons (PAH) and phenols.

Samples for analysis were selected from the borehole located down-gradient of the pit.

The laboratory test certificates for the soil samples are presented in Appendix C and discussed in Section 7.2.

6 ASSESSMENT CRITERIA

TRH, PAH, phenol and BTEXN concentrations in soil were compared to the investigation and screening levels published in Schedule B1 of the National Environment Protection (Assessment of Soil Contamination) Measure 1999 as amended in April 2013 (NEPM, 2013).

Health Screening Levels (HSLs) are presented in Schedule B1 for selected petroleum compounds and fractions, and are applicable to assessing human health risk via the inhalation and direct contact pathways. The HSLs depend on specific soil physic-chemical properties, land use scenarios and the characteristics of building structures.

Health Investigation Levels (HILs) are presented in Schedule B1 for PAH and phenols and are applicable to all relevant pathways of exposure.

In this instance it is proposed to change the site use to residential. Therefore, the applicable exposure setting is: residential use (HSL-A and HIL-A).

7 RESULTS AND DISCUSSION

7.1 Subsurface Conditions

The typical subsurface condition consists of fill (comprised of clay or sandy silt) to about 2.5m below ground level, overlying high plasticity orange clay.

A layer of brown sandy silt was encountered in BH1 from 2.1m to 2.5m depth. It is likely that the silt is the original topsoil underlying the fill, as it was relatively wet.

No groundwater inflow was observed during the fieldwork. It is likely that the wet conditions in BH2 are related to infiltration from recent rain, and does not represent the permanent groundwater table.

7.2 Soil Contamination

No hydrocarbon odours were noted during the fieldwork and the PID readings were generally around 1ppm. The highest PID reading was 2.5ppm, reported in BH2, at 2.0m depth. The samples from BH2, located down-gradient of the pit, were submitted for laboratory testing.

The laboratory test results are presented in Table T1, and show concentrations of TRH, PAH, BTEXN and phenols are below detection levels in both soil samples submitted for analysis.

The concentrations were below HSL-A and HIL-A.

7.3 Conceptual Site Model

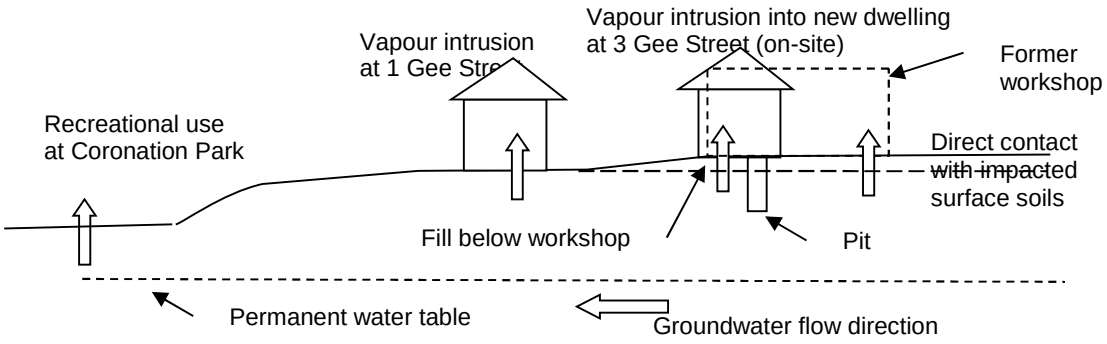
Development of a Conceptual Site Model (CSM) is an essential part of site assessments, as it provides the framework for identifying how the receptors may be exposed to (potential) contamination, either in the present or in future. A CSM is a representation of site-related information regarding contamination sources, receptors and exposure pathways.

Sources: potential on-site sources of contamination include fuel and oil spills, oil leaks from the pit and storage of waste oils. No soil contamination was identified during the fieldwork.

Receptors: the receptors most at risk are future residents, including children, in houses to be constructed at the site of the workshop.

Pathways: These include direct contact with contaminated soil by workers when excavating for the new dwelling, vapour inhalation for residents of the new dwelling, direct contact for children playing in gardens, or uptake by home-grown vegetables.

A schematic diagram of the CSM is shown below.



7.4 Assessment

Based on the analytical results and absence of field indications of contamination, it is our conclusion that the site is suitable for residential use, provided a Management Plan is implemented in the post demolition stage of the development.

The management plan should include:

i) Inspection of areas under the timber floors of the workshop, to confirm no visual impacts of hydrocarbon contamination (oil stains etc) in the footprint of the workshop

ii) Take soil validation samples at actual pit location, and analyse for hydrocarbons, to confirm no contamination, and

iii) Excavate a trench (to about 0.4m depth) outside the building footprint to check for uncontrolled disposal of waste (eg engine parts, oil filters).

8 QUALITY ASSURANCE AND QUALITY CONTROL

8.1 Field Duplicate

A duplicate sample, Duplo1 was taken from borehole BH2 at 1.8m to 2.0m depth. Table 1 provides a comparison between the field sample and the duplicate, as expressed by the Relative Percent Difference (RPD). RPD is defined as:

RPD = (value1 – value2)/average(value1, value2) x 100%

According to AS 4482.1 (2005), the typical acceptable range of RPD is 30% to 50%. Where the concentration is below laboratory detection limits, the RPD is reported as 0% in Table 1.

Table 1. Summary of RPD for field duplicate

Analyte	Detection Limit	BH2, 1.8 to 2.0m	Duplo1	RPD
Unit	**mg/kg**	**mg/kg**	**mg/kg**	**%**
Benzene	0.1	<0.1	<0.1	0
Toluene	0.1	<0.1	<0.1	0
Ethylbenzene	0.1	<0.1	<0.1	0
Xylenes (total)	0.3	<0.3	<0.3	0
Naphthalene	0.5	<0.5	<0.5	0
F1 TRH C6-C10	20	<20	<20	0
F2 TRH >C10-C16	50	<50	<50	0

The RPD for this sample was 0% and is acceptable.

8.2 Laboratory QA Results

Samples were sent for analysis to Eurofin|MGT, a NATA accredited laboratory. Eurofin|MGT performs an internal QA/QC program for all analyses comprising laboratory blanks, matrix duplicates and spikes on sample matrices and laboratory blanks (refer to the laboratory analysis certificates in Appendix C). Table 2 summarises the results of the laboratory quality control testing.

Table 2. Summary of Laboratory Quality Control Testing

Laboratory Batch Number	Sampling Date	No. of samples in batch	Max RPD for matrix duplicates	Lab Control Recovery	Spike Recovery	Laboratory Blanks
			30%	70% to 130%[1]	70% to 130%[1]	<LOR[2]
494520-S	23 March 2016	3	<1	51 to 99	36 to 128	<LOR[2]

Notes: 1. For phenols the laboratory acceptable recovery is 30 to 130%

2. LOR = Limit of Reporting

Spike recovery ranged from 36 to 107% for phenols, which is within the range considered acceptable by the laboratory. Therefore, the laboratory quality testing was within the acceptable range.

8.3 QA/QC Conclusions

On the basis of the laboratory QA/QC results, it is considered that the field and laboratory programs have provided acceptable QA/QC results and that the results of the sampling and analysis program are sufficiently reliable to support the conclusions of this assessment.

9 CONCLUSIONS

The site history shows that potential sources of contamination include fuel and oil spills, oil leaks from the pit and storage of waste oils.

Two boreholes were drilled adjacent to the pit, and soil samples taken at various intervals. Field screening with hand-held PID showed no hydrocarbon impacts in soil samples. Soil samples from the borehole down-gradient of the pit were submitted to Eurofins|MGT for analysis of TRH, PAH, phenols and BTEXN.

None of the soil samples analysed in the laboratory showed impact with TRH, PAH, phenols and BTEXN.

Groundwater inflow was not encountered during the investigation.

It is our assessment, based on the analytical results and absence of field indications of contamination and the Health Screening Levels, that the site is suitable for residential use provided a Management Plan is implemented in the post demolition stage of the development.

The management plan should include:

i) Inspection of areas under the timber floors of the workshop, to confirm no visual impacts of hydrocarbon contamination (oil stains etc) in the footprint of the workshop

ii) Take soil validation samples at actual pit location, and analyse for hydrocarbons, to confirm no contamination, and

iii) Excavate a trench (to about 0.4m depth) outside the building footprint to check for uncontrolled disposal of waste (eg engine parts, oil filters).

10 REFERENCES

- AS 4482.1, Guide to sampling and investigation of potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds, 2005.
- AS 2282.2, Guide to sampling and investigation of potentially contaminated soil, Part 2: Volatile substances, 1999
- National Environment Protection (Assessment of Site Contamination) Measure, Guideline on Investigation Levels for Soil and Groundwater, Schedule B1, NEPM, 2013
- National Environment Protection (Assessment of Site Contamination) Measure, Guideline on Site Characterisation, Schedule B2, NEPM, 2013

Important information about your Environmental Site Assessment

These notes are provided to help you understand the limitations of your report.

Project Scope

Your report has been developed on the basis of a specific purpose as understood by Tasman Geotechnics, and applies only to the site or area investigated. The scope of work may vary depending on the purpose of the assessment. For example the purpose of the report may be for due diligence in property transactions, to assess the environmental effects of an existing operations, or provision of baseline conditions. Tasman Geotechnics should be consulted if there are subsequent changes to the proposed project, to assess how the changes impact on the assessment.

Subsurface Conditions

Subsurface conditions are created by natural processes and the activity of man.

A site assessment identifies subsurface conditions at discreet locations. Actual conditions at other locations may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by earth, rock and time.

Nothing can be done to change the conditions that exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, the services of Tasman Geotechnics should be retained throughout the project, to identify conditions that vary from those inferred, conduct additional investigation or tests if required and recommend solutions to problems encountered on site.

Advice and Recommendations

Your report contains advice or recommendations which are based on observations, measurements, calculations and professional interpretation, all of which have a level of uncertainty attached.

The recommendations are based on the assumption that subsurface conditions encountered at the discreet locations are indicative of an area. This can not be substantiated until implementation of the project has commenced. Tasman Geotechnics is familiar with the background information and should be consulted to assess whether or not the report's recommendations are valid, or whether changes should be considered.

The report as a whole presents the findings of the site assessment, and the report should not be copied in part or altered in any way.

Source: TheLIST
Contour interval = 10m

PLANNING EXHIBITED DOCUMENTS

drawn	**AC**		client:	**Angus Piercey**
approved	**WG**		project:	**Environmental Site Assessment** **3 Gee Street, Launceston**
date	**10/5/2016**			
scale	**NTS**		title:	**Regional Setting**
original size	**A4**	TASMAN geotechnics	project no: **TG16024/1 – 02report**	figure no: **FIGURE 1**

Source: TheLIST for cadastral boundaries and topographic map

drawn	**AC**	TASMAN geotechnics	client:	**Angus Piercey**
approved	**WG**		project:	**Environmental Site Assessment 3 Gee Street, Launceston**
date	**24/03/2016**			
scale	**NTS**		title:	**Site Layout and Borehole Locations**
original size	**A4**		project no: **TG16024/1 – 02report**	figure no: **FIGURE 2**

Table T1

Borehole	BH2	BH2	HSL-A		TEF	HIL-A
Depth	2m	3m	clay 2m to <4m	Csat		
% Moisture	17	21				
BTEX						
Benzene	< 0.1	< 0.1	2	430		
Toluene	< 0.1	< 0.1	NL	630		
Ethylbenzene	< 0.1	< 0.1	NL	68		
m&p-Xylenes	< 0.2	< 0.2				
o-Xylene	< 0.1	< 0.1				
Xylenes - Total	< 0.3	< 0.3	NL	330		
Phenols (Halogenated)						
2.4.5-Trichlorophenol	< 1	< 1				
2.4.6-Trichlorophenol	< 1	< 1				
2.4-Dichlorophenol	< 0.5	< 0.5				
2.6-Dichlorophenol	< 0.5	< 0.5				
2-Chlorophenol	< 0.5	< 0.5				
4-Chloro-3-methylphenol	< 1	< 1				
Pentachlorophenol	< 1	< 1				100
Tetrachlorophenols - Total	< 1	< 1				
Total Halogenated Phenol	< 1	< 1				3000*
Phenols (non-Halogenated)						
2.4-Dimethylphenol	< 0.5	< 0.5				
2.4-Dinitrophenol	< 5	< 5				
2-Cyclohexyl-4.6-dinitrophenol	< 20	< 20				
2-Methyl-4.6-dinitrophenol	< 5	< 5				
2-Methylphenol (o-Cresol)	< 0.2	< 0.2				
2-Nitrophenol	< 1	< 1				
3&4-Methylphenol (m&p-Cresol)	< 0.4	< 0.4				
4-Nitrophenol	< 5	< 5				
Dinoseb	< 20	< 20				
Phenol	< 0.5	< 0.5				
Total Non-Halogenated Phenol	< 20	< 20				3000*
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	< 0.5	< 0.5				
Acenaphthylene	< 0.5	< 0.5				
Anthracene	< 0.5	< 0.5				
Benz(a)anthracene	< 0.5	< 0.5			0.1	
Benzo(a)pyrene	< 0.5	< 0.5			1	
Benzo(b&j)fluoranthene	< 0.5	< 0.5			0.1	
Benzo(g.h.i)perylene	< 0.5	< 0.5			0.01	
Benzo(k)fluoranthene	< 0.5	< 0.5			0.1	
Chrysene	< 0.5	< 0.5			0.01	
Dibenz(a.h)anthracene	< 0.5	< 0.5			1	
Fluoranthene	< 0.5	< 0.5				
Fluorene	< 0.5	< 0.5				
Indeno(1.2.3-cd)pyrene	< 0.5	< 0.5			0.1	
Naphthalene	< 0.5	< 0.5	NL	10		
Phenanthrene	< 0.5	< 0.5				
Pyrene	< 0.5	< 0.5				
Benzo(a)pyrene TEQ (lower bound)	< 0.5	< 0.5				
Benzo(a)pyrene TEQ (medium bound)	0.6	0.6				3
Benzo(a)pyrene TEQ (upper bound)	1.2	1.2				
Total PAH	< 0.5	< 0.5				300
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH C6-C10	< 20	< 20				
TRH C6-C10 less BTEX (F1)	< 20	< 20	150	850		
Naphthalene	< 0.5	< 0.5	NL	10		
TRH >C10-C16	< 50	< 50				
TRH >C10-C16 less Naphthalene (F2)	< 50	< 50	NL	560		
TRH >C16-C34	< 100	< 100				
TRH >C34-C40	< 100	< 100				

Notes:

1. Concentrations in mg/kg
2. Grey cells indicate exceedance of HSL-A or HIL-A
3.* HIL-A for phenol in Schedule B1 does not distinguish between halogenated and non-halogenated phenols

Appendix A

SCPA Practitioner Endorsement

Environmental Service & Design

ABN: 97 107 517 144

20/5/2016

Dr Wayne Griffioen
Senior Geotechnical Engineer
Tasman Geotechnics
Level 1, 10 Goodman Court
PO Box 4026, INVERMAY TAS 7248

Endorsement – Environmental Site Assessment - 3 Gee Street South Launceston.

I have been engaged to validate the *Environmental Site Assessment for 3 Gee Street South Launceston*. The review looked at the report and validates that the data conforms to acceptable standards and that the statements made are valid. The report scope is a preliminary site assessment that includes a management plan that will validate the site for residential purposes.

Tasman Geotechnics conducted the site assessment and site history for the site. All contaminants of concern were assessed. A Conceptual Site Model (CSM) was conducted to determine risk.

All the required processes were covered in the report and conclusions were drawn. The presence of the buildings prevented a full site validation for residential use as the site is moving to a more sensitive use.

Environmental Site Assessment - 3 Gee Street South Launceston is sufficient to meet the council requirements for contamination assessment under the planning scheme. The report concluded, and I confirm that the management plan is required to provide the required validation prior to moving to a more sensitive use. The conclusions drawn allow me to confirm the risk based conclusion that there is low risk on site. The validation report will confirm the preliminary site assessment.

Rod Cooper.

Certified Site Contamination Practitioner

CERTIFIED PRACTITIONER
2015/16
SCPA
Site Contamination Practitioners Australia
RODNEY COOPER
CERTIFICATION No. 15020
SITE ASSESSMENT AND MANAGEMENT

PO Box 651 (14 Cattley Street) BURNIE TAS 7320
Telephone: (03) 6431 2999 Facsimile: (03) 6431 2933 Email: admin@esandd.com.au www.esandd.com.au

Appendix B

Borehole Logs

SOIL DESCRIPTION EXPLANATION SHEET

TASMAN geotechnics

Soils are described in accordance with the Unified Soil Classification System (USCS), as shown in the following table.

FIELD IDENTIFICATION

					DRY STRENGTH	DILATANCY	TOUGHNESS
COARSE GRAINED SOILS	more than 50% of material less than 63mm is larger than 0.075mm	GRAVELS	GW	Well graded gravels and gravel-sand mixtures, little or no fines			
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines			
		GRAVELLY SOILS	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines			
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines			
		SANDS	SW	Well graded sands and gravelly sands, little or no fines			
			SP	Poorly graded sands and gravelly sands, little or no fines			
		SANDY SOILS	SM	Silty sand, sand-silt mixtures, non-plastic fines			
			SC	Clayey sands, sand-clay mixtures, plastic fines			
FINE GRAINED SOILS	more than 50% of material less than 63mm is less than 0.075mm	SILT & CLAY, liquid limit less than 50%	ML	Inorganic silts, very fine sands or clayey fine sands	None to low	Quick to slow	None
			CL	Inorganic clays or low to medium plasticity, gravelly clays, sandy clays and silty clays	Medium to high	None to very slow	Medium
			OL	Organic silts and organic silty clays of low plasticity	Low to medium	Slow	Low
		SILT & CLAY, liquid limit greater than	MH	Inorganic silts, micaceous or diatomaceous fine sands or silts	Low to medium	Slow to none	Low to medium
			CH	Inorganic clays of high plasticity, fat clays	High	None	High
			OH	Organic clays of medium to high plasticity	Medium to high	None to very slow	Low to medium
PEAT			Pt	Peat muck and other highly organic soils			

Particle size descriptive terms

Name	Subdivision	Size
Boulders		>200mm
Cobbles		63mm to 200mm
Gravel	coarse	20mm to 63mm
	medium	6mm to 20mm
	fine	2.36mm to 6mm
Sand	coarse	600µm to 2.36mm
	medium	200µm to 600µm
	fine	75µm to 200µm

Consistency of cohesive soils

Term		Undrained strength	Field guide
Very soft	VS	<12kPa	A finger can be pushed well into soil with little effort
Soft	S	12 - 25kPa	Easily penetrated several cm by fist
Firm	F	25 - 50kPa	Soil can be indented about 5mm by thumb
Stiff	St	50-100kPa	Surface can be indented but not penetrated by thumb
Very stiff	VSt	100-200kPa	Surface can be marked but not indented by thumb
Hard	H	>200kPa	Indented with difficulty by thumb nail
Friable	Fb	-	Crumbles or powders when scraped by thumb nail

Moisture Condition

Dry (D)	Looks and feels dry. Cohesive soils are hard, friable or powdery. Granular soils run freely through fingers.
Moist (M)	Soil feels cool, darkened in colour. Cohesive soils are usually weakened by moisture presence, granular soils tend to cohere.
Wet (W)	As for moist soils, but free water forms on hands when sample is handled

Cohesive soils can also be described relative to their plastic limit, ie: <Wp, =Wp, >Wp

The plastic limit is defined as the minimum water content at which the soil can be rolled into a thread 3mm thick.

Density of granular soils

Term	Density index
Very loose	<35%
Loose	15 to 35%
medium dense	35 to 65%
Dense	65 to 85%
Very dense	>85%

Minor Components

Term	Proportions	Observed properties
Trace of	Coarse grained: <5% Fine grained: <15%	Presence just detectable by feel or eye. Soil properties little or no different to general properties of primary component.
With some	Coarse grained: 5-12% Fine grained: 15-30%	Presence easily detected by feel or eye. Soil properties little different to general properties of primary component.

ENGINEERING BOREHOLE LOG

Borehole no. BH1

Sheet no. 1 of 1
Job no. TG16024/1

Client : Angus Piercey
Project : ESA
Location : 3 Gee Street, Launceston

TASMAN geotechnics

Date : 23/3/2016
Logged By : FH

Drill model : Rockmaster 4WD mounted **Slope :** deg **RL Surface :**
Hole diameter : 120mm **Bearing :** deg **Datum :**

Method	Penetration 1	2	3	4	Notes Samples Tests	Water		Graphic Log	Classification	Material Description	Moisture Condition	Consistency density, index	Structure, additional observations
auger							0.50			FILL, clay, brown with some gravel	D	H-Fb	
										becomes sandy	M	V.St.	
							1.00						
							1.50						
					D		2.00				M-W	F	PID = 0.9ppm
							2.50		ML	SANDY SILT, brown	W		
									CH	CLAY, high plasticity, orange		V.St.	
					D		3.00						PID = 0.7ppm
							3.50			Terminated @ 3.0m, still going			
							4.00						

ENGINEERING BOREHOLE LOG

Borehole no. BH2

Sheet no. 1 of 1
Job no. TG16024/1

Client : Angus Piercey
Project : ESA
Location : 3 Gee Street, Launceston

TASMAN geotechnics

Date : 23/3/2016
Logged By : FH

Drill model : Rockmaster 4WD mounted **Slope :** deg **RL Surface :**
Hole diameter : 120mm **Bearing :** deg **Datum :**

Method	Penetration 1	2	3	4	Notes Samples Tests	Water		Graphic Log	Classification	Material Description	Moisture Condition	Consistency density, index	Structure, additional observations
auger							0.50			FILL, sandy silt, black	M	S	
							1.00			brown		S	
							1.50						
					D		2.00				W		PID = 2.5ppm
							2.50		CH	CLAY, high plasticity, orange		V.St.	
					D		3.00						PID = 0.2ppm
							3.50			Terminated @ 3.0m, still going			
							4.00						

Appendix C

Certificates of Laboratory Analysis

Chain Of Custody

COC Number: TG16024/1 - COC1

PAGE _1__ OF __1__

To: Eurofins
Address: 3 Kingston Town Close
OAKLEIGH VIC 3166
03 8564 5026
Attention: Sample receival

From: Tasman Geotechnics
PO Box 4026
INVERMAY TAS 7248
wayne@tasmangeotechnics.com.au
M: 0427 810 534
T: 6332 3750
F: 6332 3752

Courier: TNT
Consignment: 9802 0454 3987

Despatched by: WG
Date: 24/03/2016
Time: 4pm

Received by: _____
Date: _____
Time: _____

Client: Angus Piercey
Project No: TG16024/1
Project: 3 Gee Street, South Launceston

Sample Number	Depth from	Depth to	date	matrix	Suite B4a	Suite B1	PAH									
BH1	2		23/03/2016	soil												
BH1	3		23/03/2016	soil												
BH2	2		23/03/2016	soil	\											
BH2	3		23/03/2016	soil	\											
Duplo1			23/03/2016	soil		\										

Legend: \ requested test

Turn-around-time: standard

494520

Robert Johnston 29/03/16 Eurofins MGT

AU02_USR_LAB00020

From: Wayne Griffioen <wayne@tasmangeotechnics.com.au>
Sent: Tuesday, 29 March 2016 3:11 PM
To: AU02_USR_LAB00020
Subject: RE: TG16024/1 issues

Hi Anthony,
The one with the orange tinge is from BH2-3.0m. The other one is BH1-3.0m

Regards,
Dr Wayne Griffioen
Senior Geotechnical Engineer
Tasman Geotechnics
Level 1, 10 Goodman Court
PO Box 4026, INVERMAY TAS 7248
m: 0427 810 534
t: 03 6332 3750
f: 03 6332 3752

From: AU02_USR_LAB00020 [mailto:EnviroSampleVic@eurofins.com]
Sent: Tuesday, 29 March 2016 12:19 PM
To: wayne@tasmangeotechnics.com.au
Cc: Onur Mehmet <OnurMehmet@eurofins.com>
Subject: TG16024/1 issues

Hi Wayne,

We have 2 samples labelled as BH2-3.0, but we are missing BH1-3.0.

One has an orange tinge through it.

Please advise which is which.

Anthony

Enviro Sample VIC

Eurofins MGT
2-5 Kingston Town Close
OAKLEIGH VIC 3166
AUSTRALIA

Phone : +61 3 85645922
Fax : +61 3 8564 5090

Email : EnviroSampleVic@eurofins.com
Website : www.eurofins.com.au

eurofins | mgt

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com.au web : www.eurofins.com.au

Melbourne
3-5 Kingston Town Close
Oakleigh Vic 3166
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Sample Receipt Advice

Company name:	**Tasman Geotechnics**
Contact name:	Emily Bartlett
Project name:	3 GEE STREET SOUTH LAUNCESTON
Project ID:	TG16024/1
COC number:	TG16024/1 - COC1
Turn around time:	5 Day
Date/Time received:	Mar 29, 2016 11:17 AM
Eurofins | mgt reference:	**494520**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Appropriate sample containers have been used.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Onur Mehmet on Phone : (+61) (3) 8564 5026 or by e.mail: OnurMehmet@eurofins.com

Results will be delivered electronically via e.mail to Emily Bartlett - emily@tasmangeotechnics.com.au.

eurofins | mgt

Certificate of Analysis

Tasman Geotechnics
PO Box 4026
INVERMAY
TAS 7248

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Emily Bartlett**

Report **494520-S**
Project name 3 GEE STREET SOUTH LAUNCESTON
Project ID TG16024/1
Received Date Mar 29, 2016

Client Sample ID			**BH2 2M**	**BH2 3M**	**DUPLO1**
Sample Matrix			**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**M16-Ma26538**	**M16-Ma26539**	**M16-Ma26540**
Date Sampled			**Mar 23, 2016**	**Mar 23, 2016**	**Mar 23, 2016**
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					
TRH C6-C9	20	mg/kg	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	< 50	< 50
BTEX					
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	58	68	63
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50
Polycyclic Aromatic Hydrocarbons					
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	-
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	-
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	-
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	-
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	-
Anthracene	0.5	mg/kg	< 0.5	< 0.5	-
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	-
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	-
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	-
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	-
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	-
Chrysene	0.5	mg/kg	< 0.5	< 0.5	-
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	-
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	-
Fluorene	0.5	mg/kg	< 0.5	< 0.5	-
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	-

Client Sample ID			BH2 2M	BH2 3M	DUPLO1
Sample Matrix			Soil	Soil	Soil
Eurofins | mgt Sample No.			M16-Ma26538	M16-Ma26539	M16-Ma26540
Date Sampled			Mar 23, 2016	Mar 23, 2016	Mar 23, 2016
Test/Reference	LOR	Unit			
Polycyclic Aromatic Hydrocarbons					
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	-
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	-
Pyrene	0.5	mg/kg	< 0.5	< 0.5	-
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	-
2-Fluorobiphenyl (surr.)	1	%	97	103	-
p-Terphenyl-d14 (surr.)	1	%	107	107	-
Phenols (Halogenated)					
2-Chlorophenol	0.5	mg/kg	< 0.5	< 0.5	-
2.4-Dichlorophenol	0.5	mg/kg	< 0.5	< 0.5	-
2.4.5-Trichlorophenol	1.0	mg/kg	< 1	< 1	-
2.4.6-Trichlorophenol	1.0	mg/kg	< 1	< 1	-
2.6-Dichlorophenol	0.5	mg/kg	< 0.5	< 0.5	-
4-Chloro-3-methylphenol	1.0	mg/kg	< 1	< 1	-
Pentachlorophenol	1.0	mg/kg	< 1	< 1	-
Tetrachlorophenols - Total	1.0	mg/kg	< 1	< 1	-
Total Halogenated Phenol*	1	mg/kg	< 1	< 1	-
Phenols (non-Halogenated)					
2-Cyclohexyl-4.6-dinitrophenol	20	mg/kg	< 20	< 20	-
2-Methyl-4.6-dinitrophenol	5	mg/kg	< 5	< 5	-
2-Methylphenol (o-Cresol)	0.2	mg/kg	< 0.2	< 0.2	-
2-Nitrophenol	1.0	mg/kg	< 1	< 1	-
2.4-Dimethylphenol	0.5	mg/kg	< 0.5	< 0.5	-
2.4-Dinitrophenol	5	mg/kg	< 5	< 5	-
3&4-Methylphenol (m&p-Cresol)	0.4	mg/kg	< 0.4	< 0.4	-
4-Nitrophenol	5	mg/kg	< 5	< 5	-
Dinoseb	20	mg/kg	< 20	< 20	-
Phenol	0.5	mg/kg	< 0.5	< 0.5	-
Total Non-Halogenated Phenol*	20	mg/kg	< 20	< 20	-
Phenol-d6 (surr.)	1	%	64	112	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100
% Moisture	1	%	17	21	14

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins | mgt Suite B4A			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Mar 31, 2016	14 Day
- Method: TRH C6-C36 - LTM-ORG-2010			
BTEX	Melbourne	Mar 31, 2016	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Mar 31, 2016	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Polycyclic Aromatic Hydrocarbons	Melbourne	Mar 30, 2016	14 Day
- Method: USEPA 8270 Polycyclic Aromatic Hydrocarbons			
Phenols (Halogenated)	Melbourne	Mar 30, 2016	14 Day
- Method: USEPA 8270 Phenols			
Phenols (non-Halogenated)	Melbourne	Mar 30, 2016	14 Day
- Method: USEPA 8270 Phenols			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Mar 31, 2016	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
% Moisture	Melbourne	Mar 29, 2016	14 Day
- Method: LTM-GEN-7080 Moisture			

eurofins | mgt

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com.au web : www.eurofins.com.au

Melbourne
3-5 Kingston Town Close
Oakleigh VIC 3166
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Company Name:	Tasman Geotechnics	**Order No.:**		**Received:**	Mar 29, 2016 11:17 AM
Address:	PO Box 4026	**Report #:**	494520	**Due:**	Apr 5, 2016
	INVERMAY	**Phone:**	6332 3750	**Priority:**	5 Day
	TAS 7248	**Fax:**	6332 3752	**Contact Name:**	Emily Bartlett
Project Name:	3 GEE STREET SOUTH LAUNCESTON				
Project ID:	TG16024/1				

Eurofins | mgt Client Manager: Onur Mehmet

Sample Detail					HOLD	Moisture Set	Eurofins | mgt Suite B1	Eurofins | mgt Suite B4A
Laboratory where analysis is conducted								
Melbourne Laboratory - NATA Site # 1254 & 14271					X	X	X	X
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794								
External Laboratory								
Sample ID	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**				
BH2 2M	Mar 23, 2016		Soil	M16-Ma26538		X		X
BH2 3M	Mar 23, 2016		Soil	M16-Ma26539		X		X
DUPLO1	Mar 23, 2016		Soil	M16-Ma26540		X	X	
BH1 2M	Mar 23, 2016		Soil	M16-Ma26541	X			
BH1 3M	Mar 23, 2016		Soil	M16-Ma26542	X			

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Nephelometric Turbidity Units

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
ASLP	Australian Standard Leaching Procedure (Eurofins | mgt uses NATA accredited in-house method LTM-GEN-7010)
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

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%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Phenols (Halogenated)							
2-Chlorophenol	mg/kg	< 0.5			0.5	Pass	
2.4-Dichlorophenol	mg/kg	< 0.5			0.5	Pass	
2.4.5-Trichlorophenol	mg/kg	< 1			1.0	Pass	
2.4.6-Trichlorophenol	mg/kg	< 1			1.0	Pass	
2.6-Dichlorophenol	mg/kg	< 0.5			0.5	Pass	
4-Chloro-3-methylphenol	mg/kg	< 1			1.0	Pass	
Pentachlorophenol	mg/kg	< 1			1.0	Pass	
Tetrachlorophenols - Total	mg/kg	< 1			1.0	Pass	
Method Blank							
Phenols (non-Halogenated)							
2-Cyclohexyl-4.6-dinitrophenol	mg/kg	< 20			20	Pass	
2-Methyl-4.6-dinitrophenol	mg/kg	< 5			5	Pass	
2-Methylphenol (o-Cresol)	mg/kg	< 0.2			0.2	Pass	
2-Nitrophenol	mg/kg	< 1			1.0	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
2.4-Dimethylphenol	mg/kg	< 0.5			0.5	Pass	
2.4-Dinitrophenol	mg/kg	< 5			5	Pass	
3&4-Methylphenol (m&p-Cresol)	mg/kg	< 0.4			0.4	Pass	
4-Nitrophenol	mg/kg	< 5			5	Pass	
Dinoseb	mg/kg	< 20			20	Pass	
Phenol	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	84			70-130	Pass	
TRH C10-C14	%	87			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	90			70-130	Pass	
Toluene	%	92			70-130	Pass	
Ethylbenzene	%	90			70-130	Pass	
m&p-Xylenes	%	90			70-130	Pass	
Xylenes - Total	%	91			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	96			70-130	Pass	
TRH C6-C10	%	76			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	94			70-130	Pass	
Acenaphthylene	%	90			70-130	Pass	
Anthracene	%	93			70-130	Pass	
Benz(a)anthracene	%	89			70-130	Pass	
Benzo(a)pyrene	%	99			70-130	Pass	
Benzo(b&j)fluoranthene	%	79			70-130	Pass	
Benzo(g.h.i)perylene	%	96			70-130	Pass	
Benzo(k)fluoranthene	%	90			70-130	Pass	
Chrysene	%	88			70-130	Pass	
Dibenz(a.h)anthracene	%	91			70-130	Pass	
Fluoranthene	%	84			70-130	Pass	
Fluorene	%	95			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	88			70-130	Pass	
Naphthalene	%	96			70-130	Pass	
Phenanthrene	%	95			70-130	Pass	
Pyrene	%	86			70-130	Pass	
LCS - % Recovery							
Phenols (Halogenated)							
2-Chlorophenol	%	94			30-130	Pass	
2.4-Dichlorophenol	%	74			30-130	Pass	
2.4.5-Trichlorophenol	%	82			30-130	Pass	
2.4.6-Trichlorophenol	%	78			30-130	Pass	
2.6-Dichlorophenol	%	89			30-130	Pass	
4-Chloro-3-methylphenol	%	85			30-130	Pass	
Pentachlorophenol	%	66			30-130	Pass	
Tetrachlorophenols - Total	%	71			30-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
Phenols (non-Halogenated)							
2-Cyclohexyl-4.6-dinitrophenol	%	51			30-130	Pass	
2-Methyl-4.6-dinitrophenol	%	64			30-130	Pass	
2-Methylphenol (o-Cresol)	%	93			30-130	Pass	
2-Nitrophenol	%	84			30-130	Pass	
2.4-Dimethylphenol	%	74			30-130	Pass	
2.4-Dinitrophenol	%	35			30-130	Pass	
3&4-Methylphenol (m&p-Cresol)	%	89			30-130	Pass	
4-Nitrophenol	%	72			30-130	Pass	
Dinoseb	%	70			30-130	Pass	
Phenol	%	99			30-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	93			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	M16-Ma26340	NCP	%	85			70-130	Pass	
TRH C10-C14	M16-Ma26118	NCP	%	101			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	M16-Ma26340	NCP	%	75			70-130	Pass	
Toluene	M16-Ma26340	NCP	%	77			70-130	Pass	
Ethylbenzene	M16-Ma26340	NCP	%	75			70-130	Pass	
m&p-Xylenes	M16-Ma26340	NCP	%	76			70-130	Pass	
o-Xylene	M16-Ma26340	NCP	%	78			70-130	Pass	
Xylenes - Total	M16-Ma26340	NCP	%	76			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M16-Ma26340	NCP	%	84			70-130	Pass	
TRH C6-C10	M16-Ma26340	NCP	%	85			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	B16-Ma26453	NCP	%	109			70-130	Pass	
Acenaphthylene	B16-Ma26453	NCP	%	105			70-130	Pass	
Anthracene	B16-Ma26453	NCP	%	108			70-130	Pass	
Benz(a)anthracene	B16-Ma26453	NCP	%	110			70-130	Pass	
Benzo(a)pyrene	B16-Ma26453	NCP	%	110			70-130	Pass	
Benzo(b&j)fluoranthene	B16-Ma26453	NCP	%	92			70-130	Pass	
Benzo(g.h.i)perylene	B16-Ma26453	NCP	%	106			70-130	Pass	
Benzo(k)fluoranthene	B16-Ma26453	NCP	%	128			70-130	Pass	
Chrysene	B16-Ma26453	NCP	%	108			70-130	Pass	
Dibenz(a.h)anthracene	B16-Ma26453	NCP	%	109			70-130	Pass	
Fluoranthene	B16-Ma26453	NCP	%	107			70-130	Pass	
Fluorene	B16-Ma26453	NCP	%	111			70-130	Pass	
Indeno(1.2.3-cd)pyrene	B16-Ma26453	NCP	%	103			70-130	Pass	
Naphthalene	B16-Ma26453	NCP	%	112			70-130	Pass	
Phenanthrene	B16-Ma26453	NCP	%	111			70-130	Pass	
Pyrene	B16-Ma26453	NCP	%	109			70-130	Pass	
Spike - % Recovery									
Phenols (Halogenated)				Result 1					
2-Chlorophenol	B16-Ma26453	NCP	%	107			30-130	Pass	
2.4-Dichlorophenol	B16-Ma26453	NCP	%	83			30-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
2.4.5-Trichlorophenol	B16-Ma26453	NCP	%	92			30-130	Pass	
2.4.6-Trichlorophenol	B16-Ma26453	NCP	%	90			30-130	Pass	
2.6-Dichlorophenol	B16-Ma26453	NCP	%	97			30-130	Pass	
4-Chloro-3-methylphenol	B16-Ma26453	NCP	%	97			30-130	Pass	
Pentachlorophenol	B16-Ma26453	NCP	%	53			30-130	Pass	
Tetrachlorophenols - Total	B16-Ma26453	NCP	%	81			30-130	Pass	
Spike - % Recovery									
Phenols (non-Halogenated)				Result 1					
2-Cyclohexyl-4.6-dinitrophenol	B16-Ma26453	NCP	%	65			30-130	Pass	
2-Methyl-4.6-dinitrophenol	B16-Ma26453	NCP	%	50			30-130	Pass	
2-Methylphenol (o-Cresol)	B16-Ma26453	NCP	%	102			30-130	Pass	
2-Nitrophenol	B16-Ma26453	NCP	%	102			30-130	Pass	
2.4-Dimethylphenol	B16-Ma26453	NCP	%	78			30-130	Pass	
2.4-Dinitrophenol	B16-Ma26453	NCP	%	36			30-130	Pass	
3&4-Methylphenol (m&p-Cresol)	B16-Ma26453	NCP	%	94			30-130	Pass	
4-Nitrophenol	B16-Ma26453	NCP	%	91			30-130	Pass	
Dinoseb	B16-Ma26453	NCP	%	70			30-130	Pass	
Phenol	B16-Ma26453	NCP	%	106			30-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	M16-Ma26118	NCP	%	106			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M16-Ma26339	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	M16-Ma26198	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	M16-Ma26198	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	M16-Ma26198	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M16-Ma26339	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	M16-Ma26339	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	M16-Ma26339	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	M16-Ma26339	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	M16-Ma26339	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	M16-Ma26339	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M16-Ma26339	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	M16-Ma26339	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	M16-Ma25722	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	M16-Ma25722	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	M16-Ma25722	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	M16-Ma25722	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	M16-Ma25722	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	M16-Ma25722	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	M16-Ma25722	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	M16-Ma25722	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	M16-Ma25722	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	M16-Ma25722	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	M16-Ma25722	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	M16-Ma25722	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	

Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Indeno(1.2.3-cd)pyrene	M16-Ma25722	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	M16-Ma25722	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	M16-Ma25722	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	M16-Ma25722	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Phenols (Halogenated)				Result 1	Result 2	RPD			
2-Chlorophenol	M16-Ma25722	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dichlorophenol	M16-Ma25722	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4.5-Trichlorophenol	M16-Ma25722	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4.6-Trichlorophenol	M16-Ma25722	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
2.6-Dichlorophenol	M16-Ma25722	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
4-Chloro-3-methylphenol	M16-Ma25722	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Pentachlorophenol	M16-Ma25722	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Tetrachlorophenols - Total	M16-Ma25722	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Duplicate									
Phenols (non-Halogenated)				Result 1	Result 2	RPD			
2-Cyclohexyl-4.6-dinitrophenol	M16-Ma25722	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
2-Methyl-4.6-dinitrophenol	M16-Ma25722	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
2-Methylphenol (o-Cresol)	M16-Ma25722	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
2-Nitrophenol	M16-Ma25722	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4-Dimethylphenol	M16-Ma25722	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dinitrophenol	M16-Ma25722	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
3&4-Methylphenol (m&p-Cresol)	M16-Ma25722	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
4-Nitrophenol	M16-Ma25722	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Dinoseb	M16-Ma25722	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
Phenol	M16-Ma25722	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	M16-Ma26198	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	M16-Ma26198	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	M16-Ma26198	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M16-Ma26552	NCP	%	16	17	2.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs

Authorised By

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Harry Bacalis	Senior Analyst-Volatile (VIC)
Huong Le	Senior Analyst-Inorganic (VIC)
Mele Singh	Senior Analyst-Organic (VIC)

Glenn Jackson

National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request