

Stephen Power

Via email: Stephen.Power@shred-x.com.au

Friday, 21 December 2018

Dear Stephen,

**Re: 10832 – Groundwater Monitoring Event – 115 Gladstone St, Fyshwick, ACT 2609 (Block 13, Section 37, Fyshwick).**

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## INTRODUCTION

Robson Environmental Pty Ltd (Robson) was engaged by Stephen Power to sample a groundwater monitoring network designed to assess for the potential leakage of hydrocarbons from two (2) underground storage tanks (USTs) used to store diesel for onsite use. The USTs are located in the sealed car park area of 115 Gladstone St, Fyshwick, ACT, 2609 (Block 13 Section 37, Fyshwick), herein referred to as 'the site'. The location of the site is shown on **Figure 1**.

It is understood that the groundwater assessment was requested as due diligence prior to the sale of the site. Two (2) groundwater wells (MW01 and MW02) were previously installed as part of the site leak detection system in accordance with the ACT Environment Protection Authority (EPA (2014)) '*Environmental Guidelines for Service Station Sites and Hydrocarbon Storage*'. The locations of the wells are shown on **Figure 2**.

## OBJECTIVE

The objective of the assessment documented within this letter report was to assess the groundwater for potential hydrocarbon contamination within the site.

## SCOPE OF WORK

The scope of work undertaken for the soil assessment included the following:

- Mobilisation of a suitably qualified environmental consultant (SQEC) to the site and appropriate equipment to purge and gauge groundwater from the monitoring wells;
- Undertake a groundwater monitoring event (GME) to assess if groundwater below the site has been impacted from potential leakage from the USTs;
- Collection of groundwater samples from two (2) existing groundwater monitoring wells installed on site;
- Submission of groundwater samples to a National Association of Testing Authorities (NATA) accredited laboratory for analysis of contaminants of concern associated with diesel storage including total recoverable hydrocarbons (TRH), benzene, toluene, ethyl benzene and xylene (BTEX);
- Review and interpretation of field and laboratory results;
- Preparation of this assessment report in general accordance with the NSW Office of Environment and Heritage (OEH, 2011) '*Guidelines for Consultants Reporting on Contaminated Sites*'.

## PREVIOUS ENVIRONMENTAL ASSESSMENTS

No previous environmental assessments were provided to Robson for review for this assessment.

## SAMPLING METHODOLOGY

The groundwater sampling and assessment works were undertaken in accordance with the following ACT EPA endorsed guidelines:

- Australian Standard AS4482.1-2005 '*Guide to the sampling and investigation of potentially contaminated soil – Part 1: Non-volatile and semi-volatile compounds*' herein referred to as AS4482.1-2005;
- Australian/New Zealand Standard (AS/NZS) 5667.11: 1998 '*Water quality – sampling – guidance on sampling of ground waters*';
- AS/NZS 5667.1: 1998 '*Water quality – sampling – guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples*';
- EPA Victoria (2000) '*Groundwater Sampling Guidelines*' (Publication 669);
- EPA Victoria (2006) '*Hydrogeological Assessment (Groundwater Quality) Guidelines*' (Publication 668);
- NEPC (1999) '*National Environment Protection (Assessment of Site Contamination) Measure*' (ASC NEPM (2013)).
- NSW DEC (2007) '*Guidelines for the Assessment and Management of Groundwater Contamination*';
- NSW OEH (2011) '*Guidelines for Consultants Reporting on Contaminated Sites*';

Prior to gauging and sampling, and immediately upon removal of the well cap, the well casing void was screened for ionisable volatile compounds using a PID. A decontaminated interface probe (IP) (a Solinst interface meter) was used to measure the depth to water and to assess for the presence of phase separated hydrocarbons (PSH). Calibration records for the equipment are presented in **Appendix A**.

The monitoring well was purged using a new disposable bailer and sampled using a hydrasleeve which was placed into the well the previous day at the base of the screen at a depth of approximately 17.7 metres below ground level (mbgl) and left to equilibrate for at least 12 hours. Primary samples were immediately placed into appropriately pre-preserved, clean, laboratory supplied sample containers. The samples were then stored in an ice-cooled insulated container.

Groundwater quality parameters (pH, electrical conductivity (EC), temperature and oxidation-reduction potential (REDOX)) were recorded at the time of sample collection from the monitoring well.

Groundwater samples were submitted to National Association of Testing Authorities (NATA) accredited laboratories for analysis under chain of custody (COC) conditions.

For quality assurance/quality control (QA / QC) purposes one (1) duplicate sample was collected and analysed. The duplicate sample was analysed by the primary laboratory and used to assess the reproducibility of the sampling and analytical methods used. The QC samples were labelled with no reference to the parent sample on the sample container or COC to ensure analytical results were not biased by the laboratory. One (1) trip blank

sample was also collected to assess that the storage and transport procedures were adequate.

As only one (1) sample was taken, a rinsate sample was deemed not required for this assessment.

## ANALYTICAL SCHEDULE

As the presence of potential contamination in the groundwater is unknown all samples were analysed for the following contaminants of potential concern (COPC):

- Total recoverable hydrocarbons (TRH);
- Benzene, toluene, ethyl benzene and xylene (BTEX);

Samples collected from the monitoring wells were analysed for total concentrations of the above analytes. The primary and trip blank samples were submitted to SGS Laboratories (SGS), Alexandria, NSW, while the duplicate samples were submitted to Envirolab Services Pty Ltd (Envirolab), Chatswood, NSW. Both of the laboratories are NATA accredited for the analysis performed.

## ADOPTED ASSESSMENT CRITERIA

The USTs are used for the storage of diesel therefore, in accordance with NSW EPA (1994) '*Guidelines for Assessing Service Station Sites*' and ACT EPA (2014) '*Environmental Guidelines for Service Station Sites and Hydrocarbon Storage*', it was assessed that the groundwater analytical suite is to comprise total concentrations of TRH fractions C<sub>6</sub>-C<sub>9</sub> and C<sub>10</sub>-C<sub>40</sub>, BTEX and pH.

Within the ACT, specific guidelines to assess groundwater quality are not defined, but rather water quality objectives to assess the potential contamination risks to receiving water bodies are considered. The ACT has defined ambient environmental standards which are presented in the *Environment Protection Regulation 2005* made under the *Environment Protection Act 1997*. The relevant criteria that would apply to receiving water bodies in the vicinity of the site are the Ambient Environmental Standard Aquatic Habitat – Urban Drains and Streams (AQUA/4). In addition, Table 1 of the ACT EPA (2014) '*Environmental Guidelines for Service Station Sites and Hydrocarbon Storage*' has also defined several criteria for groundwater parameters when monitoring around hydrocarbon storage.

It is also noted that the Australian and New Zealand Environment and Conservation Council (ANZECC, 2000) '*Australian and New Zealand Guidelines for Fresh and Marine Water Quality*' is a national set of guidelines adopted for the protection of aquatic ecosystems. It is noted that for the contaminants assessed, the guideline criteria are equivalent to those presented in Table 1C Groundwater Investigation Levels (GILs) of the ASC NEPM 2013. Ideally, the trigger values for the protection of 95 % of freshwater aquatic species presented in the ANZECC (2000) guideline would be adopted in conjunction with the AQUA/4 and the groundwater criteria presented in ACT EPA (2014) '*Environmental Guidelines for Service Station Sites and Hydrocarbon Storage*' to assess the risk groundwater may pose to aquatic species in receiving waters, as these are conservative values.

Consideration is also given to the potential for vapour from impacted groundwater to affect workers and visitors to the site if a leak or spill did occur. Groundwater health screening levels (HSLs) for vapour intrusion are presented in Table 1A(4) of the ASC NEPM 2013. A summary of the adopted principal groundwater investigation levels (GILs) are presented in **Table A** overleaf.

**Table A: Adopted Groundwater Investigation Levels**

Contaminant	ANZECC (2000) <sup>1</sup> (µg/L)	ACT AQUA/4 <sup>2</sup> (µg/L)	ACT EPA (2014) <sup>3</sup> (µg/L)	ASC NEPM (2013) <sup>4</sup> Groundwater HSLs <8m (mg/L)	Adopted GIL (µg/L)
TPH C <sub>6</sub> -C <sub>9</sub>	NE	NE	NE	NL	NE
TPH C <sub>10</sub> -C <sub>40</sub>	NE	NE	600	NL	600
F1 (C <sub>6</sub> -C <sub>10</sub> less Naphthalene)	NE	NE	NE	7.0	7,000
F2 (C <sub>6</sub> -C <sub>10</sub> less BTEX)	NE	NE	NE	NL	NE
Benzene	950	300	300	6.0)	300
Toluene	ID	300	300	NL	300
Ethylbenzene	ID	140	140	NL	140
m-xylene	ID	NE	NE	NE	NE
o-xylene	350	NE	NE	NE	350
p-xylene	200	NE	NE	NE	200
Xylene	NE	NE	380	NE	380
Naphthalene	16	NE	NE	NE	16

**Notes:**

1. ANZECC (2000) 'Australian and New Zealand Guidelines for Fresh and Marine Water Quality'. Trigger values for freshwater aquatic ecosystems, 95 % level of protection (% species).
2. ACT Environment Protection Regulation 2005 – AQUA/4 Urban Drains and Streams.
3. ACT EPA (2014) 'Environmental Guidelines for Service Station Sites and Hydrocarbon Storage'.
4. ASC NEPM (2013) Table 1A(4) Groundwater HSLs for Vapour Intrusion.

NL – Non Limiting, NE – Not established, ID – Insufficient data to derive a reliable trigger value.

**FIELD WORK AND OBSERVATIONS**

The monitoring well locations are shown on **Figure 2**. General field observations are summarised below:

- Two (2) groundwater monitoring wells (MW01 and MW02) were gauged and purged by a SQEC using disposable bailers on 3 December 2018;
- MW01 was observed to have a standing water level of 15.76 m below the top of casing (mBTOC). Total depth of MW01 was 17.752 mBTOC;

- MW02 was dry, therefore groundwater sampling was unable to be undertaken of MW02. Total depth of MW02 was 14.378 mBTOC;
- Groundwater sampling was undertaken on 6 December 2018 by a SQEC;
- One (1) groundwater sample was collected from MW01 and identified as MW01-W01;
- No indications of odours, PSH or sheen were observed within the monitoring wells;
- As the cover of each monitoring well was opened, each well was screened with the PID. In summary, the samples recorded readings of between 0.0 parts per million (ppm) and 0.1 ppm indicating a negligible potential for the presence of volatile ionisable hydrocarbon species.

The QA/QC samples collected during the assessment included the following:

- Sample QC01 which was a duplicate of primary sample MW01-W01;
- One (1) trip blank identified as TB01 to accompany all collected samples during collection and transportation.

Physical groundwater parameters measured during the gauging and sampling of MW01 are presented below in **Table B**.

**Table B:** Summary of Groundwater Field Parameters

Well	Temperature (°C)	pH	DO (%)	EC (mS/cm)	ORP (mV)	Colour
<b>3/12/2018</b>						
MW01	16.6	7.21	60.9	1.033	217.8	Opaque
<b>6/12/2018</b>						
MW01	24.0	7.58	67.7	0.722	207.7	Clear

**Notes:** DO = Dissolved Oxygen, EC = Electrical Conductivity , ORP = Oxidation Reduction Potential.

## ANALYTICAL RESULTS

A summary of the laboratory results for the analysed groundwater samples are presented in **Table 1**, whilst the certified laboratory reports, sample receipt advice and COC documentation are included in **Attachment C**.

All the recorded analytical results were below the laboratory limit of reporting (LOR) and therefore below the chosen assessment criteria.

## QUALITY ASSURANCE AND QUALITY CONTROL RESULTS

### Field Quality Control

Field QA/QC procedures comprised the collection of one (1) duplicate sample and one (1) trip blank. To validate the data, Relative Percentage Difference (RPD) analysis was undertaken (refer to the formula below).

$$RPD = \frac{\text{Result No. 1} - \text{Result No.2}}{\text{Mean Result}} \times 100$$

Calculated RPD results are considered acceptable when the value is less than 50 %. Should the RPD value exceed 50 %, then further investigation to the cause of the difference between the primary and QC results would be undertaken. It is noted that where a sample concentration is less than five (5) times greater than the LOR then any RPD is considered acceptable.

The analytical results and calculation of the RPDs for the duplicate pair is presented in **Table 2**. The RPD values for the groundwater samples were within the acceptable range.

Trip Blank Sample

The trip blank sample recorded results below the laboratory LOR for all analytes. The trip blank results indicate that there was negligible potential for cross contamination (particularly volatile constituents) between the samples during collection or while in transit from the site to the laboratory. Laboratory results for the trip blank sample is summarised in **Table 1**.

**Laboratory Quality Control**

The results of the laboratory internal quality control program are included along with the laboratory reports in **Attachment C**. The acceptable limits for the laboratory QA/QC are presented below in **Table C**.

**Table C:** Summary of Acceptable Laboratory QA/QC Limits

Sample Type	Acceptable Limits
Surrogate Spikes	60% - 140%
Duplicate Sample	0% - 50% (if result is five (5) times greater than the laboratory LOR)
Matrix Spikes	70% - 130% (metals) and 60% - 140% (organics)
Method Blanks	Greater than the LOR

In summary, the laboratory QA/QC results indicate the following:

- The surrogate and matrix spike recovery results were within the laboratories acceptable ranges;
- The laboratory duplicate sample analyses were within the acceptable limits;
- The laboratory control samples, which were run with each batch of samples analysed, were within acceptable QC limits set by the laboratory;
- The concentrations of the laboratory blanks, which were run with the primary samples, were below the laboratory LOR.

Based on the results of the implemented field quality control (calculation of the RPDs for the sample duplicate pair) and trip blank sample, and the results of the internal quality control implemented by the laboratory, Robson considers the analytical results provided in the laboratory reports to be acceptable for the purposes of this assessment.



## CONCLUSIONS AND RECOMMENDATIONS

In summary there were no visual or odorous indications of significant hydrocarbon contamination during the fieldwork and the results of the groundwater sampling indicated the following:

- No hydrocarbon odours, PSH or sheen were recorded in the wells;
- The collected and analysed groundwater samples recorded no detectable concentrations of hydrocarbons.

This report should be read in conjunction with the Statement of Limitations and the Report Terms and Conditions attached to this report. Please do not hesitate to contact Robson on (02) 6239 5656 should you have any queries regarding this letter.

For and on behalf of Robson Environmental Pty Ltd,



Tara Stephens  
Environmental Scientist  
Environmental Assessment and Remediation

### Attachments

Statement of Limitations  
Report Terms and Conditions

### Figures

Figure 1: Site Location Plan  
Figure 2: Sample Location Plan

### Tables

Table 1: Water Analytical Results  
Table 2: Water QA/QC Results

### Attachments

Attachment A: PID Calibration Documentation  
Attachment B: Site Photographs  
Attachment C: Sample Receipt Advice, COC Documentation and Certified Laboratory Reports

## **STATEMENT OF LIMITATIONS**

The findings contained within this report are the result of the interpretation of discrete/specific sampling methodologies used in accordance with normal industry practices and standards. To the best of Robson's knowledge, our assessment of the data represents a reasonable interpretation of the general condition of the site. Under no circumstances, however, can it be considered that these findings represent the actual state of the entire site.

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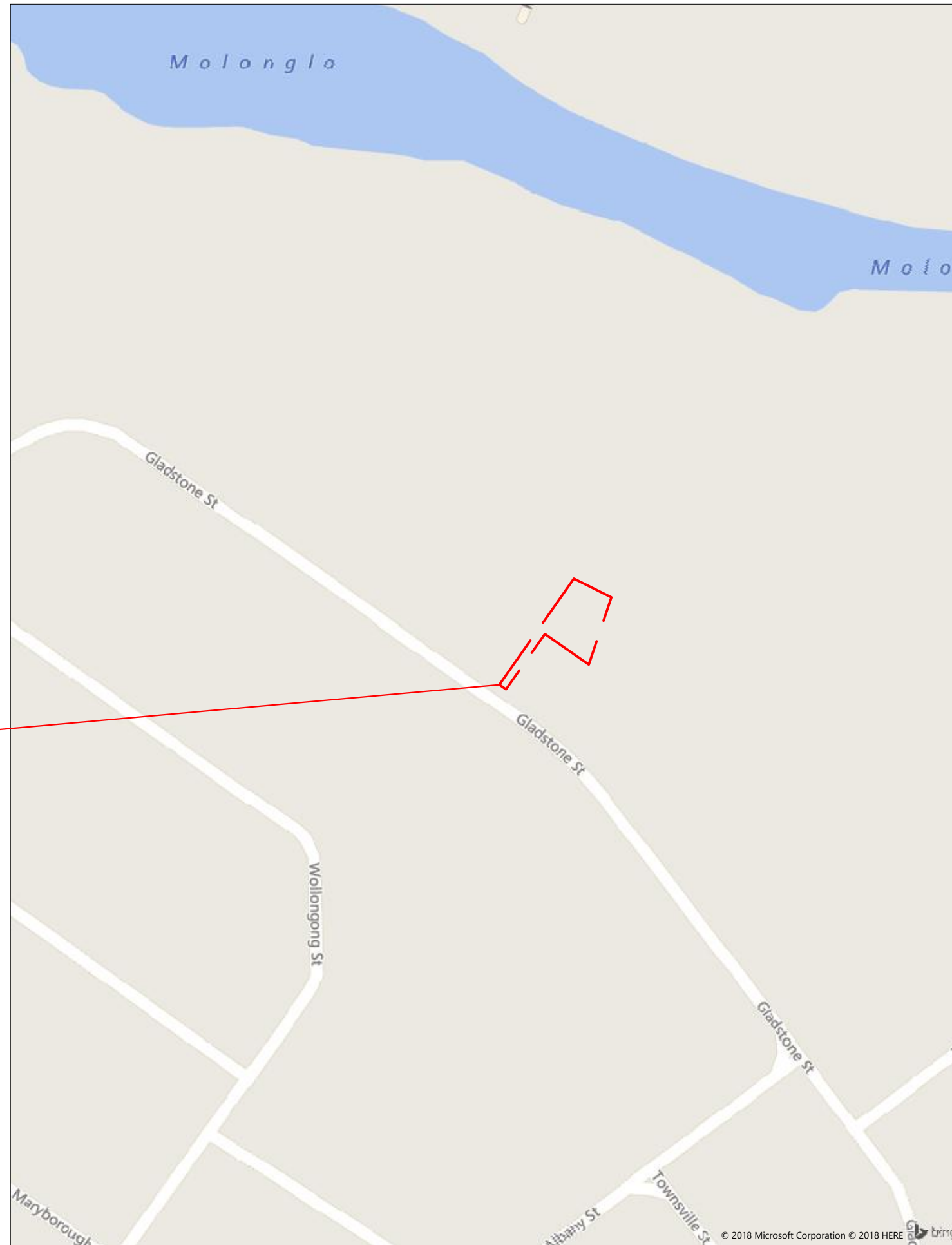
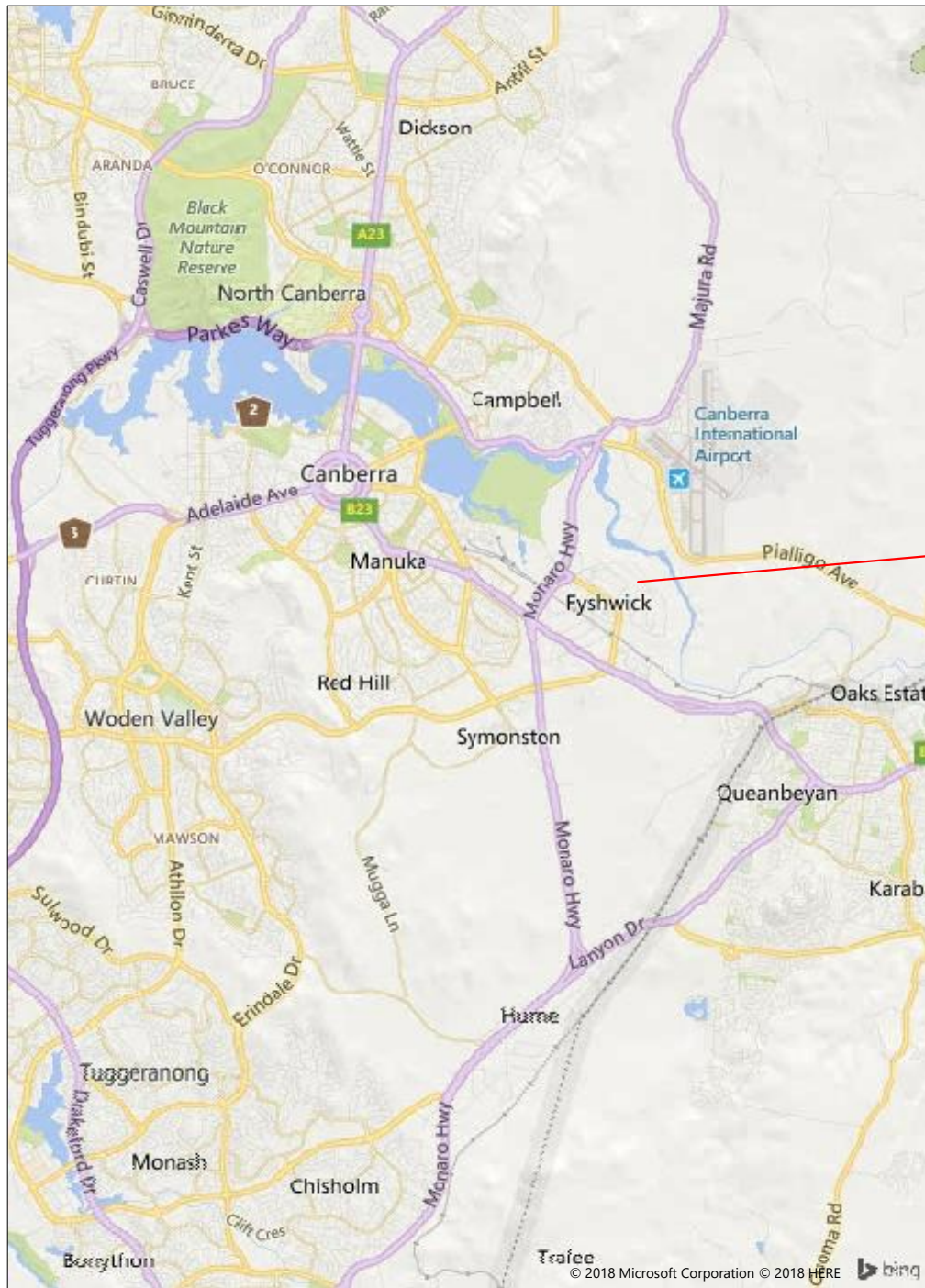
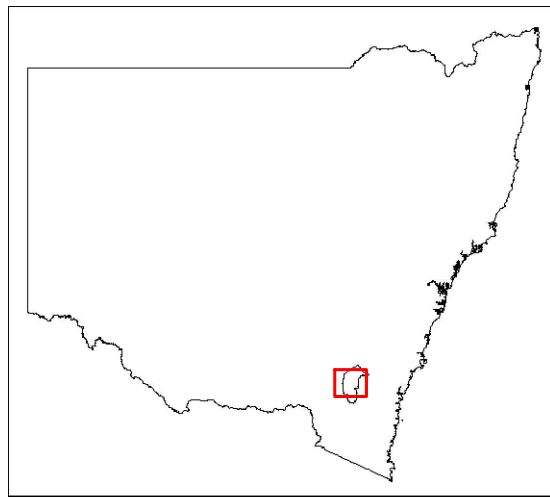
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<b>HSEQ Management System</b>			
EAR_PF001_Report Terms and Conditions	Date Revised: 23/05/2017	Rev: 2	Page 1 of 1

## FIGURES



**LEGEND**

SITE BOUNDARY

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**NOTES**

Scale, locations, and boundaries are approximate only.

CLIENT:	STEPHEN POWER
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SITE:	115 GLADSTONE STREET, FYSHWICK, ACT 2609 (BLOCK 13 SECTION 37, FYSHWICK)
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PROJECT:	GROUNDWATER MONITORING EVENT
TITLE:	SITE LOCATION PLAN




SCALE (m):	
REF:	MICROSOFT 2018 HERE 2018

DRAWN:	TS	FIGURE:	1	DATE:	20.12.2018
CHECKED:	BK	PROJECT:	10832	REV:	A





**LEGEND**

-  BLOCK BOUNDARY
-  SITE BOUNDARY
-  MONITORING WELL



**NOTES**  
 Scale, locations, and boundaries are approximate only.



KEY PLAN - INSET

**Robson ENVIRONMENTAL**  
 Environmental Excellence through Experience, Endeavor and Evaluation

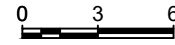
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 www.robsonenviro.com.au  
 ABN: 55 008 660 900

CLIENT:  
**STEPHEN POWER**


SITE:  
 115 GLADSTONE STREET, FYSHWICK, ACT 2609  
 (BLOCK 13 SECTION 37, FYSHWICK)

PROJECT:  
 GROUNDWATER MONITORING EVENT

TITLE:  
 GENERAL SITE PLAN

SCALE (m): 

REF:  
 NEARMAP 2018

DRAWN: TS	FIGURE: 2	DATE: 20.12.2018
CHECKED: BK 	PROJECT: 10832	REV: A



## **TABLES**



**Table 1: Soil Analytical Results**

Stephen Power

10832: Groundwater Monitoring Event  
December 2018

				Sample ID Field ID Sampled Date/Time	SE87119.001 MW01 - W01 6/12/2018	207534-1 QC-01 6/12/2018	SE87119.002 TB01 6/12/2018
Chemical Group	Chemical Name	Units	LOR				
Benzene, Toluene, Ethyl Benzene and Xylene (BTEX)	Benzene	µg/L	0.5	<0.5	<1	<0.5	
	Ethylbenzene	µg/L	0.5	<0.5	<1	<0.5	
	Toluene	µg/L	0.5	<0.5	<1	<0.5	
	Xylene (m & p)	µg/L	1	<1	<2	<1	
	Xylene (o)	µg/L	0.5	<0.5	<1	<0.5	
	Xylene Total	µg/L	1.5	<1.5	-	<1.5	
	Total BTEX	mg/L	0.003	<0.003	-	<0.003	
Total Recoverable Hydrocarbons (TRH)	C10-C16	mg/L	0.06	<0.06	<0.05	-	
	C6 - C9	µg/L	40	<40	<10	<40	
	C6-C10	mg/L	0.05	<0.05	<0.01	<0.05	
	C10 - C14	µg/L	50	<50	<50	-	
	C15 - C28	µg/L	200	<200	<100	-	
	C29-C36	µg/L	200	<200	<100	-	
	TRH C37-C40	mg/L	0.2	<0.2	-	-	
	+C10 - C36 (Sum of total)	µg/L	450	<450	-	-	
	C10 - C40 (Sum of total)	µg/L	650	<650	-	-	
	C6-C10 less BTEX (F1)	mg/L	0.05	<0.05	<0.01	<0.05	
	F2-NAPHTHALENE	mg/L	0.06	<0.06	<0.05	-	
	C16-C34	mg/L	0.5	<0.5	<0.1	-	
	C34-C40	mg/L	0.5	<0.5	<0.1	-	
Polycyclic Aromatic Hydrocarbons (PAH)/Phenols	Naphthalene	µg/L	0.5	<0.5	<1	<0.5	

**Notes:**

HIL = Health Investigation Level, HSL = Health Screening Level, EIL = Ecological Investigation Level, ESL = Ecological Screening Level  
 SP = Stockpile Sample, LOR = Limit of Reporting, NE = Guideline not established, mg/kg = milligrams per kilogram, NC = Not Calculable  
 % = Percent, < = Less than, # = All constituents are below LOR, g = grams, QA/QC = Quality Assurance/Quality Control, meQ = milli equivalence, - = Not analysed  
 TB = Trip Blank, TS = Trip Spike

10832: Groundwater Monitoring Event  
December 2018

				Sample ID	SE87119.001	207534-1	
				Field ID	MW01 - W01	QC-01	RPD
				Sampled Date/Time	6/12/2018	6/12/2018	
Chemical Group	Chemical Name	Units	LOR				
Benzene, Toluene, Ethyl Benzene and Xylene (BTEX)	Benzene	µg/L	0.5 : 1 (Interlab)	<0.5	<1	0	
	Ethylbenzene	µg/L	0.5 : 1 (Interlab)	<0.5	<1	0	
	Toluene	µg/L	0.5 : 1 (Interlab)	<0.5	<1	0	
	Xylene (m & p)	µg/L	1 : 2 (Interlab)	<1	<2	0	
	Xylene (o)	µg/L	0.5 : 1 (Interlab)	<0.5	<1	0	
Total Recoverable Hydrocarbons (TRH)	C10-C16	mg/l	0.06 : 0.05 (Interlab)	<0.06	<0.05	0	
	C6 - C9	µg/L	40 : 10 (Interlab)	<40	<10	0	
	C6-C10	mg/l	0.05 : 0.01 (Interlab)	<0.05	<0.01	0	
	C10 - C14	µg/L	50	<50	<50	0	
	C15 - C28	µg/L	200 : 100 (Interlab)	<200	<100	0	
	C29-C36	µg/L	200 : 100 (Interlab)	<200	<100	0	
	C6-C10 less BTEX (F1)	mg/l	0.05 : 0.01 (Interlab)	<0.05	<0.01	0	
	F2-NAPHTHALENE	mg/l	0.06 : 0.05 (Interlab)	<0.06	<0.05	0	
	C16-C34	mg/l	0.5 : 0.1 (Interlab)	<0.5	<0.1	0	
Polycyclic Aromatic Hydrocarbons (PAH)/Phenols	C34-C40	mg/l	0.5 : 0.1 (Interlab)	<0.5	<0.1	0	
	Naphthalene	µg/L	0.5 : 1 (Interlab)	<0.5	<1	0	

\*\*High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 80 (1-10 x EQL); 50 (10-30 x EQL); 30 ( > 30 x EQL) )

\*\*\*Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

**Notes:**

QA/QC = Quality Assurance/Quality Control, SP = Stockpile Sample, LOR = Limit of Reporting, mg/kg = milligrams per kilogram, < = Less than, - = Not analysed

**Assessment Criteria:**

\*RPDs have only been considered where a concentration is greater than 5 times the EQL.

RESULT	RPD exceeds 50% but is less than 5 x the LOR and is therefore considered suitable
RESULT	Result exceeds the RPD acceptance criteria



## **Attachment A**

### **PID Calibration Documentation**

Electronic version current

Uncontrolled copy valid only at time of printing

Project Number and Name: 10832 GME  
 Client: \_\_\_\_\_ Location: 115 Gladstone St Fyshwick ACT  
 Project Manager: MG Field Personnel: MG Date: 3/12/18

### Photoionisation Detector (PID)

MiniRAE 2000 (100-900758)  MiniRAE 3000 (592-901208)  Other/hire   
 Equipment Serial/ID Number: \_\_\_\_\_

#### Calibration and Service Details

Frequency required by manufacturer: 6 months Calibration (Fresh Air): 0.0 ppm  
 Calibrated by (personnel and company name): Active Environmental Solutions (AES) Calibration (Span Gas - Isobutylene): 100.0 ppm  
 Date last calibration (by qualified technician): 06/09/2018 (MiniRAE 2000) 02/07/2018 (MiniRAE 3000)

#### Field Challenge Details

Date	Time	Zero-Fresh Air	Span-Isobutylene
<u>3/12/18</u>	<u>10.45</u>	<u>0.0</u>	<u>100.0</u>

### Water Quality Meter (WQM)

YSI 556 MPS (06E2510 AF)  Other/hire   
 Equipment Serial/ID Number: \_\_\_\_\_

#### Calibration and Service Details

Frequency required by manufacturer: 12 months  
 Calibrated by (personnel and company name): Xylem Analytics Calibration standard / Comments: \_\_\_\_\_  
 Date last calibration (by qualified technician): 04/12/2017 (YSI 556 MPS)

#### Field Challenge Details

Date	Time	pH	EC (ms/cm)(µScm)	DO (%) (ppm)	Redox - ORP (mV)
<u>3/12/18</u>	<u>10.00</u>	<u>✓</u>	<u>✓</u>	<u>✓</u>	<u>✓</u>

### Interface Probe (IP)

Solinst Interface Meter (122 010029-1)  Other/hire   
 Equipment Serial/ID Number: \_\_\_\_\_

#### Maintenance Details

Frequency required by manufacturer: 12 months  
 Calibrated by (personnel and company name): ThermoFisher Scientific Comments: In house service and repair performed - Nov 2017  
 Date last calibration (by qualified technician): 28/04/2016 (Solinst IP 122)

#### Field Maintenance Details

Date	Time	Cleaning Method
<u>3/12/18</u>	<u>10.20</u>	<u>Decon 90</u>

### Gas Monitor (CO<sub>2</sub>, H<sub>2</sub>S, LEL, O<sub>2</sub>)

Equipment Serial/ID Number: \_\_\_\_\_ Equipment Description: \_\_\_\_\_

#### Calibration and Service Details

Frequency required by manufacturer: \_\_\_\_\_  
 Date last calibration (by qualified technician): \_\_\_\_\_ Calibration standard / Comments: \_\_\_\_\_  
 Calibrated by (personnel and company name): \_\_\_\_\_

#### Field Challenge Details

Date	Time	CO	H <sub>2</sub> S	LEL	O <sub>2</sub>

Electronic version current

Uncontrolled copy valid only at time of printing

Project Number and Name: 10832 - 115 Gladstone St Ryshwick - Groundwater Assessment  
 Client: Stephen Power Location: As Above  
 Project Manager: BK Field Personnel: BK, TS. Date: 5/12/18

**Photoionisation Detector (PID)**

MiniRAE 2000 (100-900758)  MiniRAE 3000 (592-901208)  Other/hire   
 Equipment Serial/ID Number: \_\_\_\_\_

**Calibration and Service Details**

Frequency required by manufacturer: 6 months Calibration (Fresh Air): 0.0 ppm  
 Calibrated by (personnel and company name): Active Environmental Solutions (AES) Calibration (Span Gas - Isobutylene): 100.0 ppm  
 Date last calibration (by qualified technician): 06/09/2018 (MiniRAE 2000) 02/07/2018 (MiniRAE 3000)

**Field Challenge Details**

Date	Time	Zero-Fresh Air	Span-Isobutylene
<u>5/12/18</u>	<u>1130</u>	<u>0.00</u>	<u>100.00</u>
<u>6/12/18</u>	<u>1115</u>	<u>0.00</u>	<u>100.00</u>

**Water Quality Meter (WQM)**

YSI 556 MPS (06E2510 AF)  Other/hire  Equipment Serial/ID Number: \_\_\_\_\_

**Calibration and Service Details**

Frequency required by manufacturer: 12 months  
 Calibrated by (personnel and company name): Xylem Analytics Calibration standard / Comments: \_\_\_\_\_  
 Date last calibration (by qualified technician): 04/12/2017 (YSI 556 MPS)

**Field Challenge Details**

Date	Time	pH	EC (ms/cm)(µScm)	DO (%) (ppm)	Redox - ORP (mV)
<u>6/12/18</u>	<u>1015</u>	<u>4, 7, and 10</u>	<u>0.885</u>	<u>99.3</u>	<u>237.5 20°C</u>

**Interface Probe (IP)**

Solinst Interface Meter (122 010029-1)  Other/hire  Equipment Serial/ID Number: \_\_\_\_\_

**Maintenance Details**

Frequency required by manufacturer: 12 months  
 Calibrated by (personnel and company name): ThermoFisher Scientific Comments: In house service and repair performed - Nov 2017  
 Date last calibration (by qualified technician): 28/04/2016 (Solinst IP 122)

**Field Maintenance Details**

Date	Time	Cleaning Method
<u>5/12/18</u>	<u>1130</u>	<u>Used wet wipes to clean probe between wells.</u>

**Gas Monitor (CO<sub>2</sub>, H<sub>2</sub>S, LEL, O<sub>2</sub>)**

Equipment Serial/ID Number: \_\_\_\_\_ Equipment Description: \_\_\_\_\_

**Calibration and Service Details**

Frequency required by manufacturer: \_\_\_\_\_  
 Date last calibration (by qualified technician): \_\_\_\_\_ Calibration standard / Comments: \_\_\_\_\_  
 Calibrated by (personnel and company name): \_\_\_\_\_

**Field Challenge Details**

Date	Time	CO	H <sub>2</sub> S	LEL	O <sub>2</sub>





# AES

## ACTIVE ENVIRONMENTAL SOLUTIONS

### Calibration and Service Report – PID

<b>Company:</b> Robson Environmental Pty Ltd	<b>Manufacturer:</b> RAE	<b>Serial #:</b> <b>592-901208</b>
<b>Contact:</b> Alex Hannan-Joyner	<b>Instrument:</b> MINIRAE 3000 SN: 592-901208	<b>Asset #:</b>
<b>Address:</b> PO Box 112 FYSHWICK ACT 2609	<b>Model:</b> MiniRAE 3000	<b>Part #:</b> 059-B116-100
	<b>Configuration:</b> VOC	<b>Sold:</b> 23.04.2009
	<b>Wireless:</b> -	<b>Last Cal:</b> 13.12.2017
<b>Phone:</b> 02 6239 5656	<b>Network ID:</b> -	<b>Job #:</b> <b>51766</b>
<b>Fax:</b>	<b>Unit ID:</b> -	<b>Cal Spec:</b>
<b>Email:</b> <a href="mailto:alex@robsonenviro.com.au">alex@robsonenviro.com.au</a>	<b>Details:</b>	<b>Order #:</b> 4303

Item	Test	Pass/Fail	Comments	Serial Number
Battery	NiCd, NiMH, Dry cell, Lilon	P		
Charger	Power Supply	P		
	Cradle, Travel Charger	P		
Pump	Flow	P	>500 mL/min	
Filter	Filter, fitting, etc	P		
Alarms	Audible, visual, vibration	P		
Display	Operation	P		
Switches	Operation	P		
PCB	Operation	P		
Connectors	Condition	P		
Firmware	Version	P	Upgraded, 2.16	
Datalogger	Operation	P		
Monitor Housing	Condition	P		
Case	Condition / Type	P	Dirty, cleaned	
Sensors				
	PID Lamp	P	Dirty, cleaned	
	PID Sensor	P		
	THP Sensor	P		

#### Engineer's Report

Data download and PC configuration checked - Firmware upgraded to latest (Version: 2.16).  
 Lamp and Rubber Boot cleaned. Pump Flow rate >400mL/min.  
 PID sensor checked if moisture sensitive - passed O.K.  
 New Filter fitted. Unit calibrated and serviceable.

<b>Melbourne</b>	<b>Head Office</b>	2 Merchant Avenue	THOMASTOWN VIC 3074	T: +(613) 9464 2300	F: +(613) 9464 3421
<b>Sydney</b>	S14 Lvl 2	6-8 Holden Street	ASHFIELD NSW 2131	T: +(612) 9716 5966	F: +(612) 9716 5988
<b>Perth</b>	Unit 6	41 Holder Way	MALAGA WA 6090	T: +(618) 9249 5663	F: +(618) 9249 5362
<b>Brisbane</b>	Unit 17	23 Ashtan Place	BANYO QLD 4014	T: +(617) 3267 1433	F: +(617) 3267 3559

[sales@aesolutions.com.au](mailto:sales@aesolutions.com.au)

ISO Certified  
9001:2008

[www.aesolutions.com.au](http://www.aesolutions.com.au)



# AES

ACTIVE ENVIRONMENTAL SOLUTIONS

## Calibration Certificate

Sensor	Type	Serial No.	Span Gas	Concentration	Traceability Lot #	CF	Reading	
							Zero	Span
PID	10.6eV	106J520570	Isobutylene	100 PPM	S110317-1		0	100

Calibrated/Repaired by: EXO BUSINESS ADMIN ACCOUNT

Date: 02.07.2018

Next Due: 02.01.2019

<b>Melbourne</b>	<b>Head Office</b>	2 Merchant Avenue	THOMASTOWN VIC 3074	T: +(613) 9464 2300	F: +(613) 9464 3421
<b>Sydney</b>	S14 Lvl 2	6-8 Holden Street	ASHFIELD NSW 2131	T: +(612) 9716 5966	F: +(612) 9716 5988
<b>Perth</b>	Unit 6	41 Holder Way	MALAGA WA 6090	T: +(618) 9249 5663	F: +(618) 9249 5362
<b>Brisbane</b>	Unit 17	23 Ashtan Place	BANYO QLD 4014	T: +(617) 3267 1433	F: +(617) 3267 3559

[sales@aesolutions.com.au](mailto:sales@aesolutions.com.au)

ISO Certified  
9001:2008

[www.aesolutions.com.au](http://www.aesolutions.com.au)

### Model 556 Calibration Certificate

Customer:	Robson Environmental Pty Ltd
Contact:	Danica Tagaza
Instrument s/n:	06E2510 AF
Service Job #:	4213663

### Calibration Standards

This instrument has been tested and calibrated to factory specifications, as detailed below:

Parameter	Standard	Result	Standard	Result	Standard	Result
Temperature	Control:	22.56 ± 0.05 °C	Instrument:	22.55	± 0.15 °C ?	✓
Specific Conductivity	10 mS /cm	10.00	Cell Constant:	5.03	4.55 to 5.45 ?	✓
Dissolved O <sub>2</sub>	Saturated air	-	99.25 % @ 754.3 mmHg	100	Polarisation?	✓
Dissolved O <sub>2</sub>	Zero check	1.6	< 2% ?	✓	-	-
pH	7	7.00	10	10.00	4	4.00
pH mV	Offset: -50 to +50?	-1.0	-165 to -180 from offset?	-175.1	+165 to +180 from offset?	175.7
ORP (Zobell's)	232.9 mV @ 23.53 °C	232.8	Offset:	6.2	-	-
Barometer	_____ mmHg	-	Offset:	-	-	-

### Calibration Constants - Diagnostics

Sensor	Allowable range	Result
D.O. gain	0.7 to 1.5	1.0

Technician: Koji Sata Kibara Signed: *[Signature]* Date: 4/12/2017



## Calibration Standards

Standard	Type	Manufacturer	Lot #
1,000 $\mu$ S/cm	Standard Conductivity Buffer	ACR	
10,000 $\mu$ S/cm	Standard Conductivity Buffer	ACR	309647
50,000 $\mu$ S/cm	Standard Conductivity Buffer	ACR	
4 pH	pH 4 Buffer	ACR	309016
7 pH	pH 7 Buffer	ACR	308872
10 pH	pH 10 Buffer	ACR	309865
ORP	Zobell Part A	ACR	309168
ORP	Zobell Part B	ACR	309170
DO Zero	Nitrogen Gas	BOC	9200313911
Turbidity Zero	Deionised Water	ACR	
12.7 NTU	6072G Turbidity Standard	YSI	
126 NTU	6073G Turbidity Standard	YSI	
Chlorophyll Zero	Deionised Water	ACR	
Chlorophyll Span	Diluted Rhodamine WT	ACR	
BGA-PC Zero	Deionised Water	ACR	
BGA-PC Span	Diluted Rhodamine WT	ACR	
BGA-PE Zero	Deionised Water	ACR	
BGA-PE Span	Diluted Rhodamine WT	ACR	
1 mg/L Nitrate	Nitrate Standard	ACR	
10 mg/L Nitrate	Nitrate Standard	ACR	
100 mg/L Nitrate	Nitrate Standard	ACR	
1 mg/L Ammonium	Ammonium Standard	ACR	
10 mg/L Ammonium	Ammonium Standard	ACR	
100 mg/L Ammonium	Ammonium Standard	ACR	



## SERVICE REPORT

<b>COMPANY</b>	Robson Environmental Pty Ltd		
<b>CONTACT</b>	Danica Tagaza		
<b>EQUIPMENT</b>	Solinst Interface Meter	<b>SERIAL NO.</b>	1220100291
<b>QUOTE NO.</b>	155483	<b>RECEIVED</b>	28/04/2016

<b>REQUEST/PROBLEM DESCRIPTION</b>
Service

<b>COMMENTS/ADDITIONAL REPAIRS/SERVICES PERFORMED</b>
<ul style="list-style-type: none"> <li>The instrument is cleaned and checked</li> <li>Tested on Petrol and Water</li> <li>Found performing OK</li> <li>New black bag supplied</li> <li>New batteries supplied</li> <li>Checked and tested before sending to customer</li> </ul>

<b>SERVICED BY</b>	Milenko	<b>COMPLETED</b>	10/05/2016
<b>SIGNATURE</b>			

“We do more than give you great equipment... We give you great solutions!”

<b>Phone: (Free Call) 1300 735 295</b>		<b>Environmental Assessment Technologies</b>		<b>Fax: (Free Call) 1800 675 123</b>	
Melbourne Branch 5 Caribbean Drive, Scoresby 3179 Email: RentalsEnviroVIC@thermofisher.com	Sydney Branch Level 1, 4 Talavera Road, North Ryde 2113 Email: RentalsEnviroNSW@thermofisher.com	Adelaide Branch 27 Beulah Road, Norwood, South Australia 5067 Email: RentalsEnviroSA@thermofisher.com	Brisbane Branch Unit 2/5 Ross St Newstead 4006 Email: RentalsEnviroQLD@thermofisher.com	Perth Branch 121 Beringarra Ave Malaga WA 6090 Email: RentalsEnviroWA@thermofisher.com	

## **Attachment B**

### Site Photographs



**Photograph 1:** View of the site to the northeast (06/12/2018).



**Photograph 2:** Groundwater monitoring well MW01 (06/12/2018).





**Photograph 3:** Groundwater monitoring well MW02 (06/12/2018).



**Photograph 4:** Groundwater sample collected from monitoring well MW01 (06/12/2018).

## **Attachment C**

Sample Receipt Advice, Chain of Custody Documentation and Certified  
Laboratory Reports



## SAMPLE RECEIPT ADVICE

SE187119

### CLIENT DETAILS

Contact Tara Stephens  
Client Robson Environmental Pty Ltd  
Address 140 Gladstone Street, FYSHWICK  
PO Box 112, FYSHWICK  
ACT 2609

Telephone (02) 6239 5656  
Facsimile (02) 6239 5669  
Email tara@robsonenviro.com.au

Project **10832 GME**  
Order Number (Not specified)  
Samples 2

### LABORATORY DETAILS

Manager Huong Crawford  
Laboratory SGS Alexandria Environmental  
Address Unit 16, 33 Maddox St  
Alexandria NSW 2015

Telephone +61 2 8594 0400  
Facsimile +61 2 8594 0499  
Email au.environmental.sydney@sgs.com

Samples Received Fri 7/12/2018  
Report Due Fri 14/12/2018  
SGS Reference **SE187119**

### SUBMISSION DETAILS

This is to confirm that 2 samples were received on Friday 7/12/2018. Results are expected to be ready by COB Friday 14/12/2018. Please quote SGS reference SE187119 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	SGS	Sample cooling method	Ice Bricks
Samples received in correct containers	Yes	Sample counts by matrix	2 Water
Date documentation received	7/12/2018	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	7.1°C	Sufficient sample for analysis	Yes
Turnaround time requested	Standard		

Unless otherwise instructed, water and bulk samples will be held for one month from date of report, and soil samples will be held for two months.

### COMMENTS

For TB01, only TRH(C6-C9)/BTEX analysed. Insufficient sample to do TRH(C10-C40) - Vials only supplied.

This document is issued by the Company under its General Conditions of Service accessible at [www.sgs.com/en/Terms-and-Conditions.aspx](http://www.sgs.com/en/Terms-and-Conditions.aspx). Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.



CLIENT DETAILS


Client **Robson Environmental Pty Ltd**

Project **10832 GME**

SUMMARY OF ANALYSIS

No.	Sample ID	TRH (Total Recoverable Hydrocarbons) in Water	VOCs in Water	Volatile Petroleum Hydrocarbons in Water
001	MW01 - W01	10	12	8
002	TB01	-	12	8

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document. The numbers shown in the table indicate the number of results requested in each package. Please indicate as soon as possible should your request differ from these details. Testing as per this table shall commence immediately unless the client intervenes with a correction.

 <p><b>Occupational Hygiene Health Safety &amp; Environmental Consulting</b></p> <p><b>CHAIN OF CUSTODY FORM</b></p>		<b>From:</b> Robson Environmental Pty Ltd PO Box 112 Fyshwick ACT 2609 140 Gladstone Street Fyshwick ACT 2609 ABN: 55 008 660 900		<b>Client Information:</b> Stephen Power			<b>ESDAT Files Required</b> YES				<b>To:</b> SGS 33 Maddox Street Alexandria NSW 2015  Contact: Irfan Sayeed Phone: (02) 8594 0404 Mobile: 0400 588 130 Fax: (02) 8594 0499 Email: ABN: 44 000 964 278												
		<b>Contact:</b> Tara Stephens  <b>Phone:</b> (02) 6239 5656 <b>Mobile:</b> 0447 033 222 <b>Fax:</b> (02) 6239 5669 <b>Email:</b> <a href="mailto:results@robsonenviro.com.au">results@robsonenviro.com.au</a>		<b>Site Address:</b> 115 Gladstone St, Fyshwick, ACT			<b>Required Turnaround Time:</b> 24hr <input type="checkbox"/> 48hr <input type="checkbox"/> 5-7 days <input checked="" type="checkbox"/> 36hr <input type="checkbox"/> 72hr <input type="checkbox"/>																
		<b>Job No. :</b> 10832		<b>Sampled by:</b> TS / BK			<b>Analysis Required</b>																
<b>Job Name:</b> GME		<b>Lab ID</b>		<b>Sample ID</b>		<b>Sample Depth</b>		<b>Date Sampled</b>		<b>Sample Location</b>		<b>No. of Sample Jars</b>		<b>Sample Type</b>		<b>Sample Preservation (Ice, Acid, Ambient)</b>		<b>TRH</b>		<b>BTEX</b>		<b>Comments</b>	
1		MW01 - W01				6/12/2018		MW01		1 jar, 2 vials		Water		Ice		x		x					
2		TB01				6/12/2018				1 vial		Water		Ice		x		x					
Relinquished by: TS		Date: 6/12/2018		Time: 2pm		Received by: <i>Natalie</i>		Time: <i>7/12 @ 11am</i>															
Relinquished by:		Date:		Time:		Received by:		Time:															
Relinquished by:		Date:		Time:		Received by:		Time:															
<b>CL6:</b> TRH, BTEX & Pb				<b>CL15:</b> TRH, BTEX, PAH, Phenols, OC, OP, PCB & 8 Heavy Metals																			
<b>CL2:</b> 8 Heavy metals (As, Cd, Cr, Cu, Ni, Pb, Zn, Hg)				<b>Mirco 2:</b> E.Coli, Faecal Coliforms, Total Coliforms																			

SGS EHS Alexandria Laboratory



**SE187119 COC**  
 Received: 07 - Dec - 2018

CLIENT DETAILS

Contact Tara Stephens  
 Client Robson Environmental Pty Ltd  
 Address 140 Gladstone Street, FYSHWICK  
 PO Box 112, FYSHWICK  
 ACT 2609

Telephone (02) 6239 5656  
 Facsimile (02) 6239 5669  
 Email tara@robsonenviro.com.au

Project **10832 GME**  
 Order Number (Not specified)  
 Samples 2

LABORATORY DETAILS

Manager Huong Crawford  
 Laboratory SGS Alexandria Environmental  
 Address Unit 16, 33 Maddox St  
 Alexandria NSW 2015

Telephone +61 2 8594 0400  
 Facsimile +61 2 8594 0499  
 Email au.environmental.sydney@sgs.com

SGS Reference **SE187119 R0**  
 Date Received 7/12/2018  
 Date Reported 14/12/2018

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

SIGNATORIES



**Akheeque Beniamen**  
 Chemist



**Ly Kim Ha**  
 Organic Section Head



**Teresa Nguyen**  
 Organic Chemist

VOCs in Water [AN433] Tested: 11/12/2018

PARAMETER	UOM	LOR	MW01 - W01	TB01
			WATER - 6/12/2018 SE187119.001	WATER - 6/12/2018 SE187119.002
Benzene	µg/L	0.5	<0.5	<0.5
Toluene	µg/L	0.5	<0.5	<0.5
Ethylbenzene	µg/L	0.5	<0.5	<0.5
m/p-xylene	µg/L	1	<1	<1
o-xylene	µg/L	0.5	<0.5	<0.5
Total Xylenes	µg/L	1.5	<1.5	<1.5
Total BTEX	µg/L	3	<3	<3
Naphthalene	µg/L	0.5	<0.5	<0.5

Volatile Petroleum Hydrocarbons in Water [AN433] Tested: 11/12/2018

PARAMETER	UOM	LOR	MW01 - W01	TB01
			WATER - 6/12/2018 SE187119.001	WATER - 6/12/2018 SE187119.002
TRH C6-C9	µg/L	40	<40	<40
Benzene (F0)	µg/L	0.5	<0.5	<0.5
TRH C6-C10	µg/L	50	<50	<50
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50

TRH (Total Recoverable Hydrocarbons) in Water [AN403] Tested: 11/12/2018

PARAMETER	UOM	LOR	MW01 - W01
			WATER - 6/12/2018 SE187119.001
TRH C10-C14	µg/L	50	<50
TRH C15-C28	µg/L	200	<200
TRH C29-C36	µg/L	200	<200
TRH C37-C40	µg/L	200	<200
TRH >C10-C16	µg/L	60	<60
TRH >C16-C34 (F3)	µg/L	500	<500
TRH >C34-C40 (F4)	µg/L	500	<500
TRH C10-C36	µg/L	450	<450
TRH C10-C40	µg/L	650	<650
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60

METHOD

METHODOLOGY SUMMARY

**AN403**

Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). Where F2 is corrected for Naphthalene, the VOC data for Naphthalene is used.

**AN403**

Additionally, the volatile C6-C9/C6-C10 fractions may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Recoverable Hydrocarbons - Silica (TRH-Silica) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents.

**AN403**

The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.

**AN433**

VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC's are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.



FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
**	Indicative data, theoretical holding time exceeded.	NVL	Not validated.	LOR	Limit of Reporting.
		IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

Samples analysed as received.  
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the "Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.

Note that in terms of units of radioactivity:

- a. 1 Bq is equivalent to 27 pCi
- b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : <http://www.sgs.com.au/~media/Local/Australia/Documents/Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf>

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## STATEMENT OF QA/QC PERFORMANCE

SE187119 R0

### CLIENT DETAILS

Contact Tara Stephens  
Client Robson Environmental Pty Ltd  
Address 140 Gladstone Street, FYSHWICK  
PO Box 112, FYSHWICK  
ACT 2609

Telephone (02) 6239 5656  
Facsimile (02) 6239 5669  
Email tara@robsonenviro.com.au

Project **10832 GME**  
Order Number (Not specified)  
Samples 2

### LABORATORY DETAILS

Manager Huong Crawford  
Laboratory SGS Alexandria Environmental  
Address Unit 16, 33 Maddox St  
Alexandria NSW 2015

Telephone +61 2 8594 0400  
Facsimile +61 2 8594 0499  
Email au.environmental.sydney@sgs.com

SGS Reference **SE187119 R0**  
Date Received 07 Dec 2018  
Date Reported 14 Dec 2018

### COMMENTS

All the laboratory data for each environmental matrix was compared to SGS' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document and was supplied by the Client. This QA/QC Statement must be read in conjunction with the referenced Analytical Report. The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met (within the SGS Alexandria Environmental laboratory).

### SAMPLE SUMMARY

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

### TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
MW01 - W01	SE187119.001	LB163234	06 Dec 2018	07 Dec 2018	13 Dec 2018	11 Dec 2018	20 Jan 2019	14 Dec 2018

### VOCs in Water

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
MW01 - W01	SE187119.001	LB163277	06 Dec 2018	07 Dec 2018	13 Dec 2018	11 Dec 2018	20 Jan 2019	14 Dec 2018
TB01	SE187119.002	LB163277	06 Dec 2018	07 Dec 2018	13 Dec 2018	11 Dec 2018	20 Jan 2019	14 Dec 2018

### Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
MW01 - W01	SE187119.001	LB163277	06 Dec 2018	07 Dec 2018	13 Dec 2018	11 Dec 2018	20 Jan 2019	14 Dec 2018
TB01	SE187119.002	LB163277	06 Dec 2018	07 Dec 2018	13 Dec 2018	11 Dec 2018	20 Jan 2019	14 Dec 2018

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA/QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

VOCs in Water

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	MW01 - W01	SE187119.001	%	40 - 130%	88
	TB01	SE187119.002	%	40 - 130%	85
d4-1,2-dichloroethane (Surrogate)	MW01 - W01	SE187119.001	%	40 - 130%	108
	TB01	SE187119.002	%	40 - 130%	113
d8-toluene (Surrogate)	MW01 - W01	SE187119.001	%	40 - 130%	98
	TB01	SE187119.002	%	40 - 130%	94
Dibromofluoromethane (Surrogate)	MW01 - W01	SE187119.001	%	40 - 130%	105
	TB01	SE187119.002	%	40 - 130%	116

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	MW01 - W01	SE187119.001	%	40 - 130%	88
	TB01	SE187119.002	%	40 - 130%	85
d4-1,2-dichloroethane (Surrogate)	MW01 - W01	SE187119.001	%	60 - 130%	108
	TB01	SE187119.002	%	60 - 130%	113
d8-toluene (Surrogate)	MW01 - W01	SE187119.001	%	40 - 130%	98
	TB01	SE187119.002	%	40 - 130%	94
Dibromofluoromethane (Surrogate)	MW01 - W01	SE187119.001	%	40 - 130%	105
	TB01	SE187119.002	%	40 - 130%	116



Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

**TRH (Total Recoverable Hydrocarbons) in Water**

Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR	Result
LB163234.001	TRH C10-C14	µg/L	50	<50
	TRH C15-C28	µg/L	200	<200
	TRH C29-C36	µg/L	200	<200
	TRH C37-C40	µg/L	200	<200

**VOCs in Water**

Method: ME-(AU)-[ENV]AN433

Sample Number	Parameter	Units	LOR	Result	
LB163277.001	Monocyclic Aromatic Hydrocarbons	Benzene	µg/L	0.5	<0.5
		Toluene	µg/L	0.5	<0.5
		Ethylbenzene	µg/L	0.5	<0.5
		m/p-xylene	µg/L	1	<1
	Polycyclic VOCs	o-xylene	µg/L	0.5	<0.5
		Naphthalene	µg/L	0.5	<0.5
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	88
		d4-1,2-dichloroethane (Surrogate)	%	-	97
		d8-toluene (Surrogate)	%	-	102
		Bromofluorobenzene (Surrogate)	%	-	99

**Volatile Petroleum Hydrocarbons in Water**

Method: ME-(AU)-[ENV]AN433

Sample Number	Parameter	Units	LOR	Result	
LB163277.001	TRH C6-C9	µg/L	40	<40	
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	88
		d4-1,2-dichloroethane (Surrogate)	%	-	97
		d8-toluene (Surrogate)	%	-	102
		Bromofluorobenzene (Surrogate)	%	-	99

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula:  $RPD = | \text{OriginalResult} - \text{ReplicateResult} | \times 100 / \text{Mean}$

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula:  $MAD = 100 \times \text{SDL} / \text{Mean} + \text{LR}$

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No duplicates were required for this job.

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

**TRH (Total Recoverable Hydrocarbons) in Water**

Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %	
LB163234.002	TRH C10-C14	µg/L	50	1000	1200	60 - 140	84	
	TRH C15-C28	µg/L	200	1100	1200	60 - 140	92	
	TRH C29-C36	µg/L	200	1200	1200	60 - 140	103	
	TRH F Bands	TRH >C10-C16	µg/L	60	1000	1200	60 - 140	84
		TRH >C16-C34 (F3)	µg/L	500	1100	1200	60 - 140	92
		TRH >C34-C40 (F4)	µg/L	500	740	600	60 - 140	123

**VOCs in Water**

Method: ME-(AU)-[ENV]AN433

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %	
LB163277.002	Monocyclic	Benzene	µg/L	0.5	50	45.45	60 - 140	110
	Aromatic	Toluene	µg/L	0.5	50	45.45	60 - 140	109
		Ethylbenzene	µg/L	0.5	50	45.45	60 - 140	109
		m/p-xylene	µg/L	1	99	90.9	60 - 140	109
		o-xylene	µg/L	0.5	49	45.45	60 - 140	109
	Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	4.9	5	60 - 140	98
		d4-1,2-dichloroethane (Surrogate)	µg/L	-	4.4	5	60 - 140	89
		d8-toluene (Surrogate)	µg/L	-	4.6	5	60 - 140	91
		Bromofluorobenzene (Surrogate)	µg/L	-	5.1	5	60 - 140	103

**Volatile Petroleum Hydrocarbons in Water**

Method: ME-(AU)-[ENV]AN433

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %	
LB163277.002		TRH C6-C10	µg/L	50	940	946.63	60 - 140	99
		TRH C6-C9	µg/L	40	770	818.71	60 - 140	94
	Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	5.0	5	60 - 140	101
		d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.0	5	60 - 140	101
		d8-toluene (Surrogate)	µg/L	-	5.0	5	60 - 140	99
		Bromofluorobenzene (Surrogate)	µg/L	-	5.1	5	60 - 140	102
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	µg/L	50	640	639.67	60 - 140	100

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub-sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No matrix spikes were required for this job.



Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula:  $RPD = | \text{OriginalResult} - \text{ReplicateResult} | \times 100 / \text{Mean}$

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula:  $MAD = 100 \times \text{SDL} / \text{Mean} + \text{LR}$

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here : [https://www.sgs.com.au/~media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022\\_QA\\_QC\\_Plan.pdf](https://www.sgs.com.au/~media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022_QA_QC_Plan.pdf)

- \* NATA accreditation does not cover the performance of this service .
  - \*\* Indicative data, theoretical holding time exceeded.
  - Sample not analysed for this analyte.
  - IS Insufficient sample for analysis.
  - LNR Sample listed, but not received.
  - LOR Limit of reporting.
  - QFH QC result is above the upper tolerance.
  - QFL QC result is below the lower tolerance.
- 
- ① At least 2 of 3 surrogates are within acceptance criteria.
  - ② RPD failed acceptance criteria due to sample heterogeneity.
  - ③ Results less than 5 times LOR preclude acceptance criteria for RPD.
  - ④ Recovery failed acceptance criteria due to matrix interference.
  - ⑤ Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
  - ⑥ LOR was raised due to sample matrix interference.
  - ⑦ LOR was raised due to dilution of significantly high concentration of analyte in sample.
  - ⑧ Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
  - ⑨ Recovery failed acceptance criteria due to sample heterogeneity.
  - ⑩ LOR was raised due to high conductivity of the sample (required dilution).
  - † Refer to Analytical Report comments for further information.

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