



August 2017

123 KING ROAD, OAKFORD

# Targeted Groundwater Assessment – Factual Report

**Submitted to:**

Department of Water and Environmental Regulation  
The Atrium, Level 4  
168 St Georges Terrace  
PERTH WA 6000

REPORT



**Report Number.** 1779954-001-R-Rev1

**Distribution:**

1 electronic copy – Department of Water and  
Environmental Regulation  
1 electronic copy – Golder Associates Pty Ltd





## Table of Contents

<b>1.0 INTRODUCTION</b>	<b>1</b>
<b>2.0 SCOPE OF SERVICES</b>	<b>1</b>
<b>3.0 METHODOLOGY</b>	<b>1</b>
3.1 Well locations	1
3.2 Well installation	1
3.3 Well surveying	3
3.4 Well development	3
3.5 Groundwater gauging	3
3.6 Groundwater monitoring	3
<b>4.0 BASIS OF ASSESSMENT</b>	<b>7</b>
<b>5.0 WASTE CHARACTERISATION</b>	<b>7</b>
<b>6.0 RESULTS</b>	<b>7</b>
6.1 Groundwater flow	7
6.2 Field parameters	8
6.3 Analytical results	8
<b>7.0 QUALITY ASSURANCE/QUALITY CONTROL</b>	<b>9</b>
<b>8.0 SUMMARY</b>	<b>11</b>
<b>9.0 IMPORTANT INFORMATION</b>	<b>12</b>
<b>10.0 REFERENCES</b>	<b>12</b>
<b>TABLES</b>	
Table A: Field ranking system	1
Table B: Groundwater well installation summary	2
Table C: PID screening summary	2
Table D: Well gauging summary	3
Table E: DWER-listed products of potential PFAS contamination during environmental sampling	5
Table F: Summary of groundwater analytical results	8
Table G: QA/QC summary	10



**FIGURES (AT END OF TEXT)**

Figure 1: Site Location

Figure 2: Well Locations

Figure 3: Groundwater Elevations

Figure 4: Guideline Exceedances

**TABLES (AT END OF TEXT)**

Table 1: Groundwater Levels

Table 2: Groundwater Analytical Results

Table 2A: PFAS Analytical Results

Table 3: QA/QC: RPD Analysis

Table 4: QA/QC: Blank Results

**APPENDICES**

**APPENDIX A**

Borehole Logs

**APPENDIX B**

Calibration Certificates

**APPENDIX C**

Waste Disposal Certificate

**APPENDIX D**

Chain of Custody Documentation

**APPENDIX E**

Groundwater Sampling Sheets

**APPENDIX F**

Laboratory Analytical Reports

**APPENDIX G**

Important Information



## 1.0 INTRODUCTION

Golder Associates Pty Ltd (Golder) was engaged by the Department of Water and Environmental Regulation (DWER) to conduct a targeted groundwater assessment at 123 King Road, Oakford, WA (the site; refer to Figure 1).

## 2.0 SCOPE OF SERVICES

The scope of services was to:

- Install five shallow groundwater wells to a depth of approximately 5 m below ground level (bgl), dependent upon encountered conditions.
- Undertake groundwater gauging of the newly installed wells and an additional three wells located off site.
- Undertake groundwater sampling of the newly installed wells.
- Prepare a factual report presenting the results of groundwater analysis (this report)

## 3.0 METHODOLOGY

### 3.1 Well locations

Groundwater well locations were nominated by the DWER. Prior to installation of groundwater monitoring wells, the locations were agreed between the DWER and the landowners. The wells were located such that groundwater quality upgradient and downgradient of the site could be assessed.

### 3.2 Well installation

All drill locations were cleared by a licensed utility locator prior to ground disturbance. Following confirmation that no services were located within the drill location, each location was physically checked using non-destructive testing.

Drilling was undertaken by Direct Push Probing Pty Ltd using push tube and solid stem auger. The first 1.5 m were cleared using a hand auger.

All boreholes were logged in the field by a Golder environmental scientist. Detailed descriptions of the soil profile encountered at each borehole location was documented in accordance with the Unified Soil Classification System (USCS). Site soils comprised predominantly grey black sand to black brown silty sand at depth.

Soil was assessed in the field for visual and olfactory signs of contamination, with the assessment listed on the bore log for each well. Table A outlines the Field Ranking System used.

**Table A: Field ranking system**

Visual Contamination		Odorous Soil	
Rank	Description	Rank	Description
0	No visible evidence of contamination	A	No odour
1	Slight evidence of visual contamination (trace)	B	Slightly offensive
2	Visible contamination (more than trace)	C	Moderately offensive
3	Obviously contaminated (significant colour)	D	Strongly offensive

Groundwater was encountered at approximately 2.7 m bgl for all wells during drilling. Five groundwater monitoring wells were installed as part of this assessment (named VB1, VB2, VB3, VB4, and VB5) to depths ranging between of 4.5 m bgl and 5 m bgl.





Table B below summarises well details.

**Table B: Groundwater well installation summary**

Well ID	Drilling Date	Borehole Depth (m bgl)	Screen Interval (m bgl)	Groundwater Level Observed During Drilling (m bgl)	Soil Description
VB1	28/06/2017	5	1.7-4.7	2.7	Sand to silty sand
VB2	28/06/2017	5	1.7-4.7	2.7	Sand to silty sand
VB3	28/06/2017	5	1.7-4.7	2.7	Sand to silty sand
VB4	28/06/2017	4.5	1.5-4.5	2.7	Sand to silty sand
VB5	28/06/2017	5	2-5	2.7	Sand to silty sand

A photoionisation detector (PID) was used during drilling to detect ionisable organic compounds in soil at approximately every 0.5 m intervals. No visual signs of contamination were noted during well installation works, while a generic rotten egg odour was noted during drilling of wells VB1, VB4 and VB5.

The soil PID results are summarised in Table C.

**Table C: PID screening summary**

Well ID	Minimum PID Measurement		Maximum PID Measurement	
	Value (ppm)	Depth (m bgl)	Value (ppm)	Depth (m bgl)
VB1	0.0	0-0.1	44.7	4.4-4.5
VB2	0.1	1.4-2.5	21.8	4.4-4.5
VB3	0.0	0-1.5	11.2	4.9-5
VB4	0.0	0-1	62.8	3.9-4
VB5	0.1	0-0.1	46.6	2.9-3

Monitoring wells were completed as outlined below:

- 50 mm Class 18 uPVC threaded prepacked casing (AS/NZS 1477:1999) with PVC end cap
- 0.5 mm machine slotted 50 mm Class 18 uPVC threaded screen (AS/NZS 1477:1999)
- 1.6-3.6 mm washed and graded filter pack to 1.0 m above slotted screen
- Approximately 1 m screen above the watertable
- Approximately 2 m screen below the watertable
- Minimum 0.5 m bentonite seal above the filter pack to minimise infiltration of surface water and potential for cross-contamination between lithologies
- Annulus grouted to the surface using a bentonite-cement grout mixture or backfilled, and
- The five wells installed were finished with secure steel stick-up (0.6 m) well cover with lock.

Refer to Appendix A for borehole logs and well completion details.



### 3.3 Well surveying

All five newly installed groundwater wells were surveyed by a certified land surveyor to a relative datum, allowing inferred groundwater flow direction to be calculated. Survey data is summarised in Table 1.

### 3.4 Well development

Each groundwater well was developed post installation and allowed to equilibrate for a period of at least seven days. Well development comprised purging of at least 40 L of groundwater using a low flow submersible pump and visual monitoring of purge water until water appeared clear.

Development water was stored in drums at the site until analytical results were obtained to allow appropriate disposal of the groundwater. A soil sample of the drill cuttings was also collected at this time to allow for appropriate disposal. Toxfree removed the waste from site on 26 July 2017 under the supervision of Golder. The Certificate of Disposal is presented in Appendix C.

### 3.5 Groundwater gauging

All newly installed wells plus the three off-site wells were gauged during groundwater monitoring on 10 July 2017. Groundwater gauging data is summarised below in Table D.

**Table D: Well gauging summary**

Well ID	Groundwater Level (m below top of casing)
VB1	2.884
VB2	2.622
VB3	2.816
VB4	2.257
VB5	2.207
BH101*	2.037
BH02A*	1.953
MB03A*	2.002

Notes: \* existing off-site well

### 3.6 Groundwater monitoring

Golder conducted one round of low-flow groundwater sampling on 10 July 2017 using a peristaltic pump at five groundwater monitoring locations. Groundwater samples were collected and preserved in accordance with the relevant section of the Australian Standard AS/NZS 5667.11:1998: Water Quality – Sampling, Part 11 – Guidance on Sampling of Groundwaters; and Section 8.2.4 of Schedule B2 of the National Environment Protection (Assessment of Site Contamination) Measure 2013 (“NEPM method”).

Our protocols for sampling followed chain of custody (COC) requirements with COCs that were discreet and did not inform the laboratory of the client, the site location or well identifiers. Each sample had a unique, nondescript identification number. COC documentation is included in Appendix D.

A water level was recorded prior to sampling using an interface probe and the drawdown was monitored during pumping to ensure that the groundwater level was maintained with less than 10 cm drawdown. During the purging, near continuous measurement of field groundwater parameters were undertaken using a pre-calibrated water quality meter and flow through cell. Each groundwater sample was collected once the field parameters stabilised (to within 5% to 10%). Calibration certificates are included in Appendix B. Groundwater sampling sheets are included in Appendix E.



Each groundwater sample was collected using dedicated nitrile gloves, dedicated high density polyethylene tubing and placed into bottles supplied by the laboratory with the relevant preservatives (where appropriate). Samples for metals analysis were field filtered with a single-use disposable 0.45 µm filter prior to mixing with preservative. Samples were labelled and stored on ice for transport by Golder field staff to the NATA-accredited laboratory for analysis.

PFAS sampling was undertaken at the site with the purpose to confirm the absence/presence of PFAS compounds in groundwater.

The DWER Guidelines<sup>1</sup> indicates commonly suspected PFAS sources and alternative practices to eliminate the potential for PFAS cross contamination during well installation and sampling. Table E overleaf indicates compliance to the current guideline practices.

---

<sup>1</sup> Interim Guidelines on the Assessment and Management of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS), Contaminated Sites Guidelines, Government of Western Australia, Department of Water and Environmental Regulation, January 2017.



## GROUNDWATER ASSESSMENT – 123 KING ROAD OAKFORD

**Table E: DWER-listed products of potential PFAS contamination during environmental sampling**

Product	Mitigation Practice	Alternative Product/Practice	Compliance
New clothing	Not to be used/ consumed by sampling personnel	Wash all field clothing a minimum of six times after purchase to remove surface coatings before using at the site.	Yes. Field staff ensured field clothing had been sufficiently washed prior to use on site.
Clothing with stain-resistant, rain-resistant, or waterproof coatings/treated fabric (for example GORE-TEX®)		Avoid sampling during rain if possible; polyethylene rain gear (for example disposable LDPE), vinyl or polyvinyl chloride (PVC) clothing are acceptable.	Yes. Golder sampled on a day where no rain was forecast or observed.
Tyvek® clothing		None	Yes
Fast food wrappers and containers		Use rigid plastic containers or bags or stainless steel containers for all food brought to site.	Yes. Field personnel took a dedicated lunch break to minimise potential cross contamination from food packaging.
Pre-wrapped foods and snacks (for example chocolate bars, energy bars, granola bars and potato chips)		Use plastic (rigid containers or bags) or stainless steel containers to bring food to site.	Yes. Field personnel took a dedicated lunch break to minimise potential cross contamination from food packaging.  Hands were thoroughly washed and rinsed prior to and following handling of food containers.
Teflon® containing or coated field equipment (tubing, bailers, tape and plumbing paste)	Do not use at site	High Density Polyethylene (HDPE) or silicone tubing, and HDPE or polypropylene field equipment recommended.  Concawe (2016) reports that although high purity Teflon tubing does not cause 'blank contamination' in contrast to common Teflon tubing, some researchers have found that Teflon could adsorb PFAS.	Yes
Teflon® lined lids on containers (for example sample containers, rinsate water storage containers)	Do not use at site	Polypropylene lids for sample containers and polypropylene or HDPE containers for rinsate.	Yes. Teflon was not present in the sampling containers used for groundwater analysis.
Glass sample containers with lined lids	Do not use	Use polypropylene or HDPE for sample containers (PFAS adsorb strongly to glass).	Yes



## GROUNDWATER ASSESSMENT – 123 KING ROAD OAKFORD

Product	Mitigation Practice	Alternative Product/Practice	Compliance
Aluminium foil	Do not use	Thin HDPE sheeting (commonly used as drop cloths for painting or home improvement) can be used.	Yes
Self-sticking notes and similar office products (for example 3M Post-It notes)	Do not use at site	Avoid the use of these products at the site.	Yes
Waterproof paper, notebooks, and labels	Do not use at site	Standard paper and paper labels.	Yes
Drilling fluid containing PFAS	Do not use at site	PFAS-free drilling fluids or use alternative techniques (for example sonic drilling) which do not require drilling fluids.	Yes. For QA/QC purposes, a rinsate sample taken during drilling included PFAS analysis to confirm the effectiveness of decontamination procedures.
Detergents and decontamination solutions (for example Decon 90® Decontamination Solution)	Do not use	Follow water-only decontamination approach.	Yes. Removed Decon 90 from decontamination procedures and adopted a triple water rinse for all non-dedicated equipment.
Reusable chemical or gel ice packs (for example BlueIce®)	Do not use	Ice contained in plastic (polyethylene) bags (double bagged).	Yes



### 4.0 BASIS OF ASSESSMENT

The following guidelines were adopted for the purposes of assessing groundwater conditions at the site:

- Guidelines for Fresh Waters, as published in Assessment and management of contaminated sites (Department of Environment Regulation, 2014)
- Australian Drinking Water Guidelines (Health and Aesthetic Values), as published in Assessment and management of contaminates sites (Department of Environment Regulation, 2014)
- Guidelines for the non-potable use of groundwater, as published in 'Assessment and management of contaminates sites (Department of Environment Regulation, 2014)
- Guidelines for irrigation and livestock water, as published in the 'Australian and New Zealand Guidelines for Fresh and Marine Water Quality' (ANZECC & ARMCANZ, 2000), and
- Health based guidance values Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS), (Department of Health, April 2017)<sup>2</sup>
- Interim screening levels for ecological – freshwater, as published in 'Interim Guideline on the Assessment and Management of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) (Department of Environment Regulation, 2017).
  - As PFAS can bio-accumulate and biomagnify, a higher level of species protection is required to be adopted. For a receiving environment such as the vineyard, the environment may be described as highly disturbed. Due to the presence of a conservation category wetland to the east of the site, a 99% species protection levels have been adopted for initial comparison.

### 5.0 WASTE CHARACTERISATION

One soil sample was collected from the spoil drum for waste characterisation following the well installations. The sample was sent to a NATA-accredited laboratory for waste classification analysis. The soil sample was collected using dedicated nitrile gloves and then placed into laboratory-supplied glass jar with minimal headspace. The soil sample was labelled and placed in an esky on ice for transport to a NATA-accredited laboratory. Data from the waste classification was provided to the waste contractor for appropriate disposal.

### 6.0 RESULTS

#### 6.1 Groundwater flow

The depth to groundwater for all five newly installed wells and three existing wells ranged between 1.953 m bgl (BH02A) and 2.884 m bgl (VB1). The groundwater elevation at MB03A did not appear to correlate with expected groundwater elevations (refer to Table 1 and Figure 3), therefore this elevation was not used for the purposes of groundwater contouring. Groundwater elevations ranged from 19.786 m AHD (VB5) to 20.547 m AHD (BH101).

Based on groundwater depths measured on 10 July 2017, inferred groundwater flow was to the south-east and was consistent with regional groundwater flow, as per the Department of Water (DoW) Hydrogeological Atlas. The recorded groundwater level at VB2 indicated a slightly higher groundwater level than surrounding wells by 1 cm; however, the difference is considered negligible and not thought to alter the overall inferred groundwater flow direction as calculated. Groundwater levels are presented in Table 1 and shown on Figure 3.

<sup>2</sup> [https://www.health.gov.au/internet/main/publishing.nsf/Content/2200FE086D480353CA2580C900817CDC/\\$File/fs-Health-Based-Guidance-Values.pdf](https://www.health.gov.au/internet/main/publishing.nsf/Content/2200FE086D480353CA2580C900817CDC/$File/fs-Health-Based-Guidance-Values.pdf) accessed 30 August 2017.





### 6.2 Field parameters

No groundwater odours or sheen were noted during groundwater sampling. Water colour as observed ranged from pale brown-orange to pale brown. Turbidity was observed as low for all wells. Electrical conductivity ranged from 404.3 µS/cm (VB1) to 1300 µS/cm (VB4). pH was considered acidic at the site ranging from 4.13 (VB1) to 5.87 (VB4). In-field pH monitoring reported pH levels for all wells (VB1 to VB5) outside the Fresh Water Guideline, Long-Term Irrigation Water and AWDG Drinking Water for Aesthetic Value Guidelines of 6.5-8.5 and 6-8.5.

Field parameters at the time of sampling are summarised in Table 2 and in-field groundwater sampling sheets are in Appendix E.

### 6.3 Analytical results

Laboratory analytical reports are included as Appendix F. Groundwater analytical results are summarised in Table 2 and summarised in Table F. PFAS groundwater analytical results are summarised in Table 2A and in Table F. Groundwater guideline exceedances at each well have been presented visually in Figure 4.

Table F: Summary of groundwater analytical results

Item	Summary of Results
<b>Sample Quality Parameters</b>	<p>Total oxidised nitrogen reported concentrations above the Fresh Water Guideline (Lowland River) of 0.15 mg/L for wells VB2, VB3, VB4. Wells VB1 and VB5 reported concentrations below LOR.</p> <p>Total nitrogen reported concentrations above the Fresh Water Guideline (Lowland River) of 1.2 mg/L for all wells. Wells VB1, VB2, VB3, and VB4 reported concentrations exceeding the Long-Term Irrigation Water Guidelines, while equalling the guideline for VB5.</p> <p>Total phosphorus reported concentrations ranging between 2 and 12 mg/L and exceed the Fresh Water Guideline (Lowland River) of 0.065 mg/L and the Long-Term Irrigation Water Guideline of 0.05 mg/L for all wells.</p> <p>Nitrate (as N) reported concentrations above the ADWG Drinking Water Health Value (11 mg/L) at VB3 and VB4 with concentrations ranging from 24 to 33 mg/L.</p> <p>Ammonia (as N) reported concentrations above the ADWG Drinking Water Aesthetic Value (0.4 mg/L) at VB1, VB2, VB4 and VB5 with concentrations ranging from 1.1 to 2.5 mg/L.</p>
<b>Metals</b>	<p>Dissolved aluminium reported concentrations ranging between 0.38 mg/L (VB3) to 1.7 mg/L (VB5) exceeding the Non-Potable Groundwater Use Guideline, AWDG Drinking Water Aesthetic Value Guideline, and Freshwater Guideline for all wells.</p> <p>Dissolved cadmium reported concentrations below the LOR.</p> <p>Reported dissolved chromium concentrations ranged between 0.002 mg/L (VB2, VB3) and 0.007 mg/L (VB5) and exceed the Freshwater Guideline for speciated Cr VI in all wells. It is noted that in the absence of an unspicated Cr guideline value, the speciated Cr VI value of 0.001 mg/L was applied as an initial screen.</p> <p>Dissolved copper concentrations exceed the Fresh Water Guidelines for wells VB2, VB3 and VB4. The adjusted guideline value based on water hardness was also applied; however, the three wells still exceed the adjusted value.</p> <p>Dissolved iron concentrations ranged between 1 mg/L (VB3) and 3.5 mg/L (VB2) and exceed the Non-Potable Groundwater Use, ADWG Drinking Water Aesthetic Value, Fresh Water and Long Term Irrigation Water Guidelines for all wells.</p>



Item	Summary of Results
	<p>Dissolved mercury reported concentrations below the LOR for all wells; however, the LOR exceeds the Fresh Water Guideline of 0.00006 mg/L and therefore for reporting purposes is shown as an exceedance across all wells.</p> <p>Dissolved zinc concentrations exceed the Fresh Water Guidelines for all wells. The adjusted guideline value based on water hardness was also applied which resulted in zinc exceedances at VB1, VB4 and VB5.</p>
<p><b>Total Recoverable Hydrocarbons, MAH, PAH</b></p>	<p>Total recoverable hydrocarbons (TRH) and BTEX reported concentrations below LOR for all wells.</p> <p>Polyaromatic hydrocarbons (PAH) also reported concentrations below the LOR for all wells; however, the LOR for benzo(a)pyrene exceeds the Non-Potable Groundwater Use Guideline of 0.0001 mg/L and AWDG Drinking Water Health Value Guideline of 0.00001 mg/L and therefore is shown as an exceedance across all wells.</p>
<p><b>Herbicides</b></p>	<p>Dinoseb reported concentrations below LOR.</p>
<p><b>Phenolics</b></p>	<p>Phenolics 2,4,6-Trichlorophenol, 2,4-Dichlorophenol and 2-Chlorophenol reported concentrations below LOR for all wells; however, the LOR exceeds applicable Guidelines and therefore are shown as an exceedance.</p>
<p><b>PFAS</b></p>	<p>Reported concentrations for Sum of PFHxS and PFOS ranged between 0.02 µg/L (VB5) and 0.17 µg/L (VB4), with detections in all wells. Concentrations of PFHxS and PFOS (sum) at all wells exceeded the PFAS Ecological Freshwater Guideline for 99% species protection of 0.00023 µg/L. Concentrations of PFHxS and PFOS (sum) exceeded the DOH Drinking Water guideline of 0.07 µg/L at VB1, VB3 and VB4.</p> <p>PFOA reported concentrations ranging between &lt;0.01 µg/L (VB1 and VB5) and 0.08 µg/L (VB4) and reported concentrations below applicable guideline values.</p> <p>Detectable concentrations were noted for the following compounds where no guideline values were available:</p> <ul style="list-style-type: none"> <li>■ Perfluorooctane sulfonic acid (PFOS) – &lt;0.01 µg/L (VB2) – 0.11 µg/L (VB1).</li> <li>■ Perfluorohexane sulfonic acid (PFHxS) –&lt;0.01 µg/L (VB10) – 0.15 µg/L (VB4).</li> <li>■ Perfluorobutanoic acid (PFBA) – &lt;0.05 µg/L (VB1, VB5) – 0.53 µg/L (VB4).</li> <li>■ Perfluorohexanoic acid (PFHxA) - &lt;0.01 µg/L (VB1) – 2.6 µg/L (VB4).</li> <li>■ Perfluoroheptanoic acid (PFHpA) – &lt;0.01 µg/L (VB1) – 0.65 µg/L (VB4).</li> <li>■ Perfluoropentanoic acid (PFPeA) – &lt;0.01 µg/L (VB1) – 2.6 µg/L (VB4).</li> <li>■ Perfluoropentane sulfonic acid (PFPeS) – &lt;0.01 µg/L (VB1, VB5) – 0.07 µg/L (VB4).</li> <li>■ Perfluorobutane sulfonic acid (PFBS) – &lt;0.01 µg/L (VB1) – 0.12 µg/L (VB4).</li> </ul>

## 7.0 QUALITY ASSURANCE/QUALITY CONTROL

Analytical results for quality assurance duplicate samples have been compared to the results of the primary samples. This comparison has been assessed in terms of a relative percent difference (RPD) calculated as:

$$\%RPD = \frac{A - B}{A + B} \times 200$$

where: A is the concentration of an analyte from the initial sample, and

B is the concentration of the same analyte in the duplicate sample.



RPD values can range from 0 to 200, with a value of 0 representing perfect agreement between results, whilst values approaching 200 represent a complete divergence of results. For the purposes of this assessment, Golder considers that an RPD that is less than or equal to 30% represents good correlation between laboratory results.

Where one sample reported a concentration above the detection limit and the duplicate was below laboratory detection limits or vice versa, half the limit of detection has been used to calculate the RPD. Where both analytes reported concentrations below the laboratory detection limit, a nominal RPD value of less than 30% has been assigned.

The following field QA/QC samples were collected:

- Two trip blanks – one sample per esky containing samples for volatile compounds
- One rinsate sample– collected from water washed over the auger during drilling
- One field duplicate, and
- One field triplicate/intra-laboratory sample.

QA/QC criteria are summarised in Table G together with an assessment of whether the criteria have been met. Field duplicate, rinsate and trip blank results are included in Tables 3 and 4.

**Table G: QA/QC summary**

Item	Objective	Summary of Results	Compliance
Calibration check of water quality meter	Ensure water quality meter is calibrated within acceptable limits.	Completed in full	Yes
Chain of Custody Records	Completed in full	Completed in full	Yes
Recovery and analysis of rinsate blanks	No contamination of blanks	No contamination of rinsate blanks	Yes
Recovery and analysis of trip blanks	No contamination of blanks	No contamination of trip blanks	Yes
Recovery and analysis of field replicate samples	Collect replicate samples at a minimum rate of 10% and assess that RPDs are within $\pm 30\%$ for results $> 5 \times \text{LOR}$	$> 10\%$ duplicates were recovered, not all RPDs were $< 30\%$ for results $> 5 \times \text{LOR}$	Note 1
NATA-certification and approved analytical methods	Comply with reference	All complied	Yes
Sample preservation and holding times	Completed in full	One sample exceedance for pH	Note 2
Analysis of laboratory method blanks	No contamination of blanks	No contamination of blanks	Yes
Analysis of laboratory duplicates	RPDs $< 30\%$ for results $> 5 \times \text{LOR}$	All complied	Yes
Analysis of surrogate and spike recoveries	Percentage recovery 5%	Some analyses did not comply	Note 3
Frequency of Laboratory Duplicate Samples	Frequency $\geq 10\%$	Some analyses did not meet frequency of laboratory duplication	Note 4



Notes: <sup>1</sup> RPDs greater than 30% for results greater than five times LOR were identified between two sets of primary and duplicate samples for chemical oxygen demand and between the primary and triplicate (intra-laboratory) for ammonia, chemical oxygen demand, total organic carbon, zinc, potassium and Perfluorooctane sulfonic acid (PFOS). There are no guidelines for chemical oxygen demand or total organic carbon, therefore, these outliers do not affect the outcomes of the investigation. Although zinc concentrations were higher in the secondary sample in one case, both samples exceeded the same guidelines, therefore this outlier also did not affect the outcomes of the investigation. No PFOS was detected in the secondary sample, therefore the primary sample was considered for the purposes of this investigation. In total, the RPD exceedances did not impact on the findings of this investigation.

<sup>2</sup> The pH extraction holding time for Q00186-01 (intra-lab triplicate) was exceeded. The samples were not received at the lab until the following day, therefore exceeding the extraction time of six hours from time of sample collection. Normally, laboratory pH is not considered as field pH readings are used for assessment, therefore this holding time does not affect the outcomes of this investigation.

<sup>3</sup> Surrogate exceedances were reported for PAH/Phenols and TRH silica gel clean-up for Q00186-01 (intra-lab triplicate). These recovery percentages were slightly below the criteria for the surrogate exceedances. As silica gel clean-up results were not considered due to the lack of TRH detections, this outlier does not affect the outcomes of the investigation.

Matrix spike exceedance was noted for sulfate for the intra-laboratory/triplicate sample due to background levels being greater than four times the spike level. This result does not impact the findings of this investigation as sulfate concentrations in the triplicate sample was comparable to the primary sample.

<sup>4</sup> Sample control frequency for Q00186-01 (intra-laboratory/triplicate) for phenols and TRH (silica gel) did not meet required laboratory frequency. As this was a triplicate sample and no detections were noted of these analytes in either the primary or secondary samples, this does not impact the findings of this investigation.

## 8.0 SUMMARY

Five new groundwater wells were installed, gauged and sampled at the site (VB1, VB2, VB3, VB4 and VB5). The depth of well installation ranged from between 4.5 m and 5 m bgl. Three existing groundwater wells (BH101, BH02A, MB03A) located to the north of the site were also gauged. Depth to groundwater ranged between 1.953 (BH02A) and 2.884 (VB1) m bgl for the five newly installed groundwater wells and three existing wells. Groundwater elevations ranged from 19.786 m AHD (VB5) to 20.547 m AHD (BH101). The direction of the hydraulic head at the site was inferred to be towards the south-east and was consistent with expected regional groundwater flow.

Site soil comprised Sand and Silty Sand to a depth of 5 m bgl. No soil samples were scheduled for laboratory analysis as part of this groundwater assessment.

The pH in groundwater at the site was slightly acidic and below the acceptable ranges adopted for DER Fresh Water, Irrigation Water and Drinking Water (aesthetic) Guideline values.

Various nutrient concentrations were detected in groundwater at the site, with nitrate, nitrite, nitrogen, ammonia and phosphate exceeding applicable ADWG, DER Fresh Water and Irrigation Water Guideline values.

Various dissolved metal concentrations at the site exceeded several of the applicable Guideline values; specifically, aluminium, copper, iron and zinc.

No TRH, BTEX, PAH, phenols or herbicides were detected above laboratory reporting limits in groundwater at the site.

The standard PFAS analysis was undertaken for 28 compounds. Total oxidisable precursor (TOP) and total organo-fluorine (TOF) analysis was not undertaken. PFAS analysis reported detectable concentrations for the following compounds: PFOA, PFOS, PFHxS, Sum of PFHxS and PFOS, PFBA, PFHxA, PFHpA, PFPeA, PFPeS, and PFBS. Concentrations of PFHxS and PFOS (sum) exceeded the PFAS Ecological Freshwater Guideline for 99% species protection of 0.00023 µg/L at all wells. Concentrations of PFHxS and PFOS (sum) exceeded the PFAS DOH Drinking Water Guideline of 0.07 µg/L at VB1, VB3 and VB4.



## 9.0 IMPORTANT INFORMATION

Your attention is drawn to the document titled – “Important Information Relating to this Report”, which is included in Appendix G of this report. The statements presented in that document are intended to inform a reader of the report about its proper use. There are important limitations as to who can use the report and how it can be used. It is important that a reader of the report understands and has realistic expectations about those matters. The Important Information document does not alter the obligations Golder Associates has under the contract between it and its client.

## 10.0 REFERENCES

ANZECC & ARMCANZ (2000). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand.

DER (2014). *Contaminated Sites Guidelines: Assessment and Management of Contaminated Sites*, December, 2014. Department of Environment Regulation, Perth W.A.

DER (2017). *Interim Guideline on the Assessment and Management of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)*, Contaminated Sites Guideline, Department of Environment Regulation, January 2017.

Department of Water. *Hydrogeological Atlas*. Government of Western Australia. Available at: <http://atlases.water.wa.gov.au/idelve/hydroatlas/>.



## **Report Signature Page**

**GOLDER ASSOCIATES PTY LTD**

A handwritten signature in black ink that reads "Sarah Garvey".

Sarah Garvey  
Senior Environmental Consultant

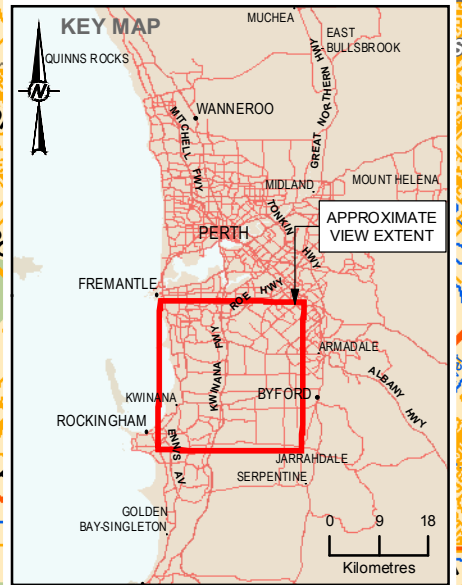
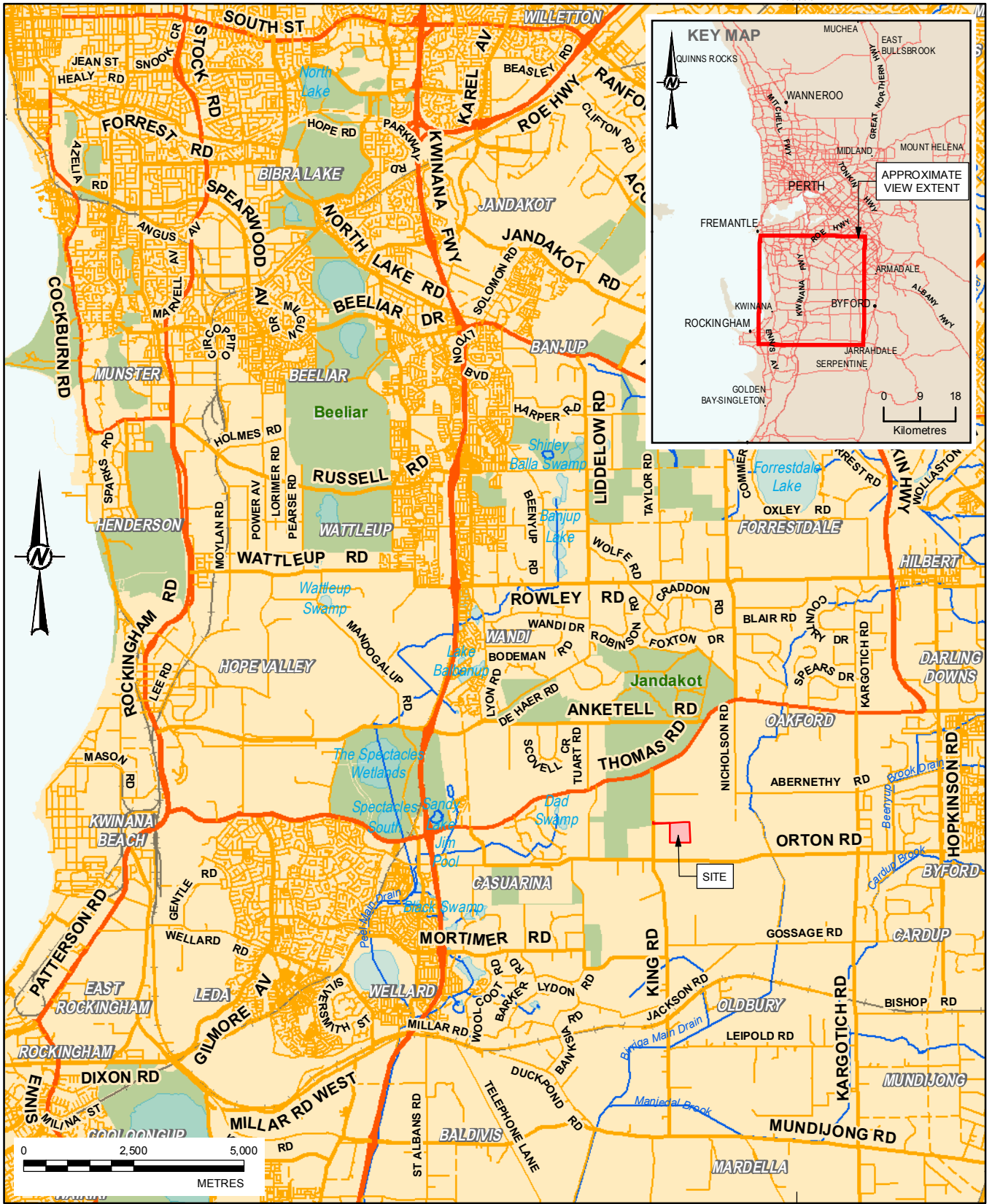
CLB:SHG/IYK/hn

A.B.N. 64 006 107 857

Golder, Golder Associates and the GA globe design are trademarks of Golder Associates Corporation.

\\golder.gds\gap\perth\jobs\env\2017 - contam sites\1779954 - der groundwater oakford\correspondence out\1779954-001-r-rev1.docx





**LEGEND**

 SITE BOUNDARY

**NOTES**

1. COORDINATE SYSTEM: GDA 1994 MGA ZONE 50

**REFERENCE**

BASED ON INFORMATION PROVIDED BY AND WITH THE PERMISSION OF THE WESTERN AUSTRALIAN LAND INFORMATION AUTHORITY TRADING AS LANDGATE (2017)

CLIENT  
 DEPARTMENT OF WATER AND ENVIRONMENTAL  
 REGULATION

PROJECT  
 TARGETED GROUNDWATER ASSESSMENT - 123 KING ROAD,  
 OAKFORD

CONSULTANT



YYYY-MM-DD 2017-08-31

DESIGNED

PREPARED SR

REVIEWED SHV

APPROVED SHV

TITLE

**SITE LOCATION**

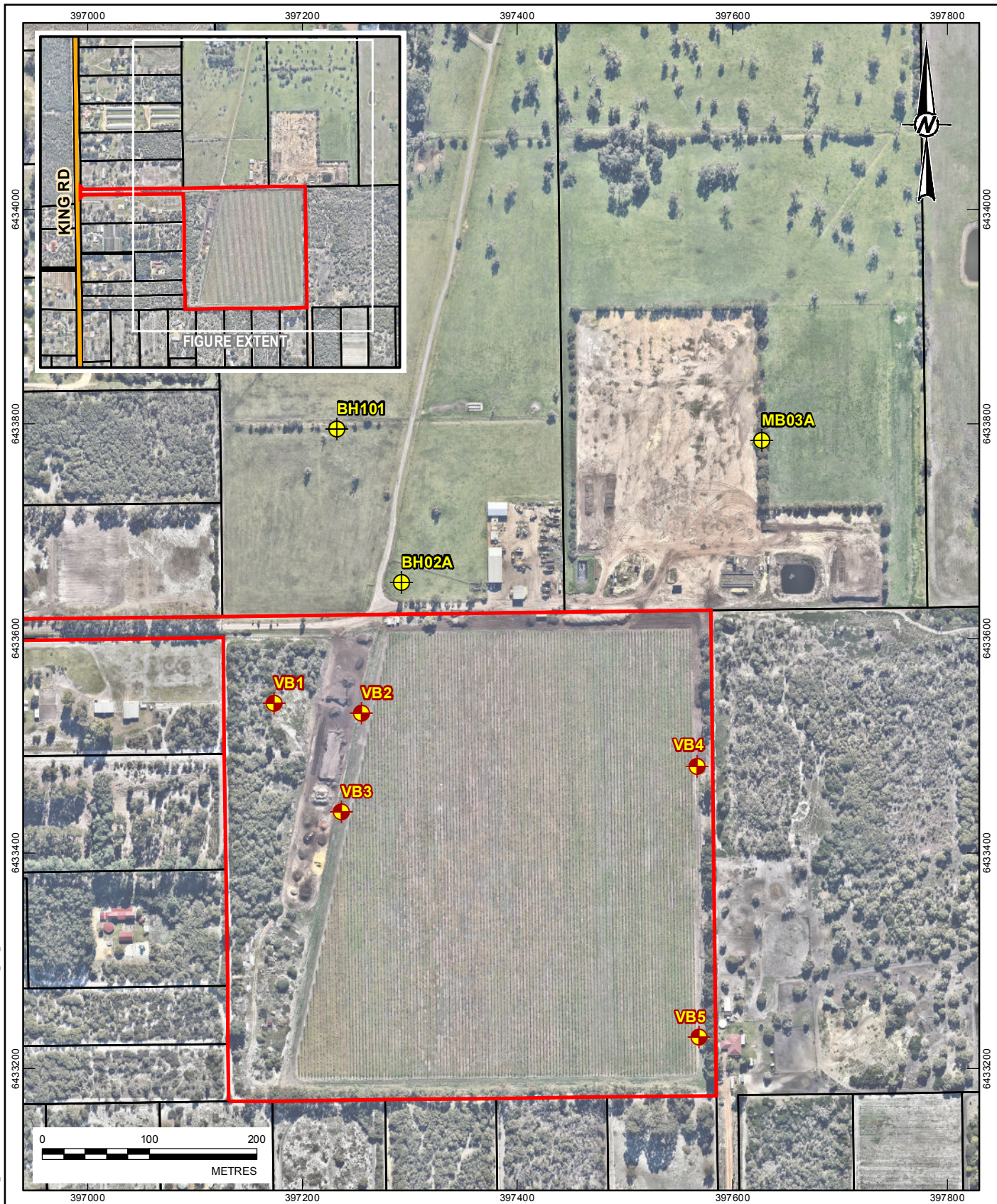
PROJECT NO.  
1779954

CONTROL  
001 R

REV.  
1

FIGURE  
**1**





**LEGEND**

- NEW GROUNDWATER MONITORING WELL
- EXISTING GROUNDWATER MONITORING WELL
- SITE BOUNDARY
- CADASTRE

**NOTES**

1. COORDINATE SYSTEM: GDA 1994 MGA ZONE 50

NOT FOR CONSTRUCTION  
**DRAFT**

**REFERENCE**

CADASTRE AND ROADS © WESTERN AUSTRALIAN LAND INFORMATION AUTHORITY TRADING AS LANDGATE (2017)  
AERIAL IMAGE SOURCED FROM NEARMAP. DATED JUN. 2017.

CLIENT  
DEPARTMENT OF WATER AND ENVIRONMENTAL REGULATION

PROJECT  
TARGETED GROUNDWATER ASSESSMENT - 123 KING ROAD, OAKFORD

CONSULTANT  
 Golder Associates

YYYY-MM-DD	2017-08-31
DESIGNED	
PREPARED	SR
REVIEWED	SHV
APPROVED	SHV

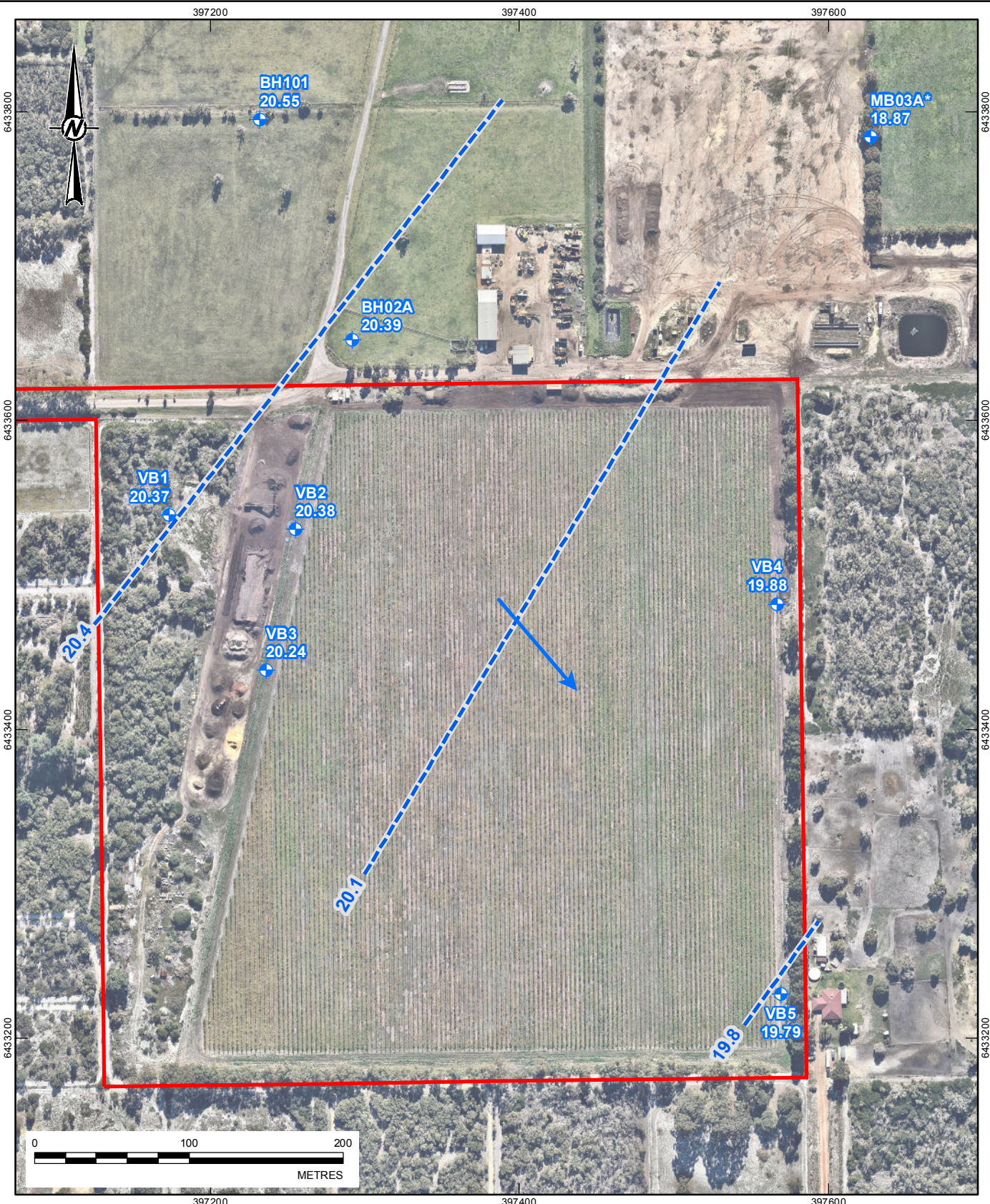
TITLE  
**GROUNDWATER WELL LOCATIONS**

PROJECT NO.	CONTROL	REV.	FIGURE
1779954	001 R	1	<b>2</b>

Path: B:\DepartmentL\_of\_EnvironmentL\_Regulation\Oakford\99\_ PROJ\CTB\1779954-Groundwater\02\_P\PRODUCTION\MXD\001\_RI\Rev\1779954-001\_R-F002-Rev1\_Well\_locations.mxd

2mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: IS O A 4





**LEGEND**

- 20.123 GROUNDWATER LEVEL (m AHD)
- + GROUNDWATER MONITORING WELL
- INFERRED GROUNDWATER CONTOUR
- \* GROUNDWATER LEVEL NOT USED IN INTERPRETATION OF FLOW
- INFERRED GROUNDWATER FLOW DIRECTION
- SITE BOUNDARY

**NOTES**

1. COORDINATE SYSTEM: GDA 1994 MGA ZONE 50

**REFERENCE**

CADASTRE AND ROADS © WESTERN AUSTRALIAN LAND INFORMATION AUTHORITY TRADING AS LANDGATE (2017)  
AERIAL IMAGE SOURCED FROM NEARMAP. DATED JUN. 2017.

CLIENT  
DEPARTMENT OF WATER AND ENVIRONMENTAL REGULATION

PROJECT  
TARGETED GROUNDWATER ASSESSMENT - 123 KING ROAD, OAKFORD

CONSULTANT	YYYY-MM-DD	2017-08-31
	DESIGNED	
	PREPARED	SR
	REVIEWED	SHV
	APPROVED	SHV

TITLE <b>GROUNDWATER ELEVATIONS ( JULY 2017)</b>		
PROJECT NO. 1779954	CONTROL 001 R	REV. 1
		FIGURE <b>3</b>

Path: B:\DepartmentL\_of\_EnvironmentL\_Regulation\Oakford\99\_P\PROJECTS\1779954-Groundwater\02\_P\PRODUCTION\MXD\001\_R\Rev\1779954-001\_R-F003-Rev1\_GWL.mxd

20mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: IS O A4



397200 397400 397600

6433800

6433800

6433600

6433600

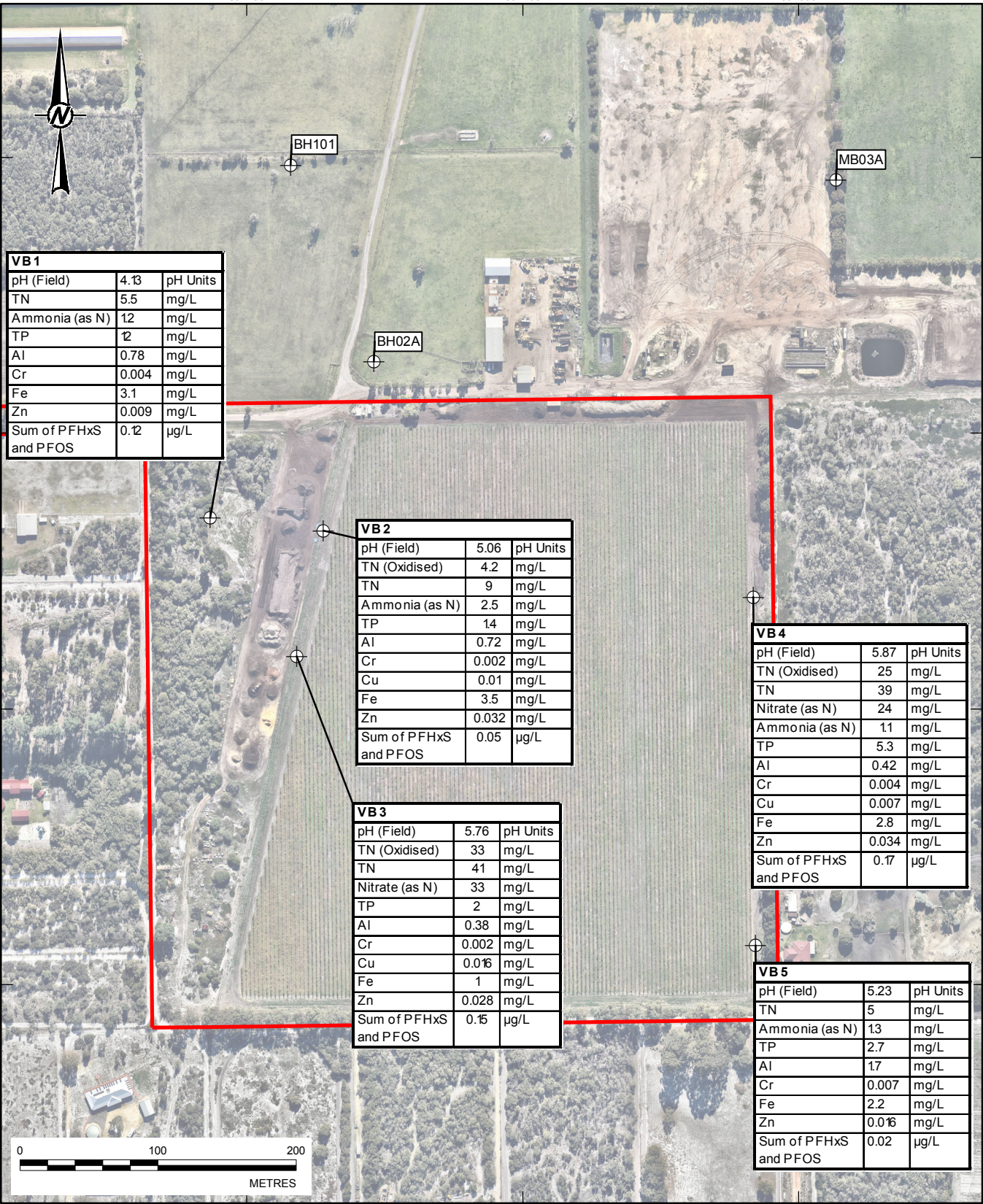
6433400

6433400

6433200

6433200

397200 397400 397600



VB 1		
pH (Field)	4.13	pH Units
TN	5.5	mg/L
Ammonia (as N)	12	mg/L
TP	12	mg/L
Al	0.78	mg/L
Cr	0.004	mg/L
Fe	3.1	mg/L
Zn	0.009	mg/L
Sum of PFHxS and PFOS	0.12	µg/L

VB 2		
pH (Field)	5.06	pH Units
TN (Oxidised)	4.2	mg/L
TN	9	mg/L
Ammonia (as N)	2.5	mg/L
TP	14	mg/L
Al	0.72	mg/L
Cr	0.002	mg/L
Cu	0.01	mg/L
Fe	3.5	mg/L
Zn	0.032	mg/L
Sum of PFHxS and PFOS	0.05	µg/L

VB 3		
pH (Field)	5.76	pH Units
TN (Oxidised)	33	mg/L
TN	41	mg/L
Nitrate (as N)	33	mg/L
TP	2	mg/L
Al	0.38	mg/L
Cr	0.002	mg/L
Cu	0.016	mg/L
Fe	1	mg/L
Zn	0.028	mg/L
Sum of PFHxS and PFOS	0.15	µg/L

VB 4		
pH (Field)	5.87	pH Units
TN (Oxidised)	25	mg/L
TN	39	mg/L
Nitrate (as N)	24	mg/L
Ammonia (as N)	11	mg/L
TP	5.3	mg/L
Al	0.42	mg/L
Cr	0.004	mg/L
Cu	0.007	mg/L
Fe	2.8	mg/L
Zn	0.034	mg/L
Sum of PFHxS and PFOS	0.17	µg/L

VB 5		
pH (Field)	5.23	pH Units
TN	5	mg/L
Ammonia (as N)	13	mg/L
TP	2.7	mg/L
Al	17	mg/L
Cr	0.007	mg/L
Fe	2.2	mg/L
Zn	0.016	mg/L
Sum of PFHxS and PFOS	0.02	µg/L

**LEGEND**

- GROUNDWATER MONITORING WELL
- SITE BOUNDARY

**NOTES**

1. COORDINATE SYSTEM: GDA 1994 MGA ZONE 50

**REFERENCE**

CADASTRE AND ROADS © WESTERN AUSTRALIAN LAND INFORMATION AUTHORITY TRADING AS LANDGATE (2017)  
AERIAL IMAGE SOURCED FROM NEARMAP. DATED JUN. 2017.

CLIENT  
DEPARTMENT OF WATER AND ENVIRONMENTAL  
REGULATION

PROJECT  
TARGETED GROUNDWATER ASSESSMENT - 123 KING ROAD,  
OAKFORD

CONSULTANT  
 **Golder Associates**

YYYY-MM-DD 2017-08-31  
DESIGNED  
PREPARED SR  
REVIEWED SHV  
APPROVED SHV

TITLE  
**GUIDELINE EXCEEDANCES ( JULY 2017)**

PROJECT NO. 1779954 CONTROL 001 R REV. 1 FIGURE 4

Path: B:\0\_departmental\_Environment\_Regulation\OnRoad\99\_PROJECT\B1779954-Groundwater\02\_PRODUCT\ONM\001-R\Rev\11779954-01-R-F04-Rev1\_Excel\exceedances.mxd

20mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ISO A4



**Table 1: Groundwater Levels July 2017**

Well	Easting (MGZ50)	Northing (MGZ50)	Ground Elevation (m AHD)	TOC Elevation (m AHD)	Date	Water level (m btoc)	Water Elevation (m AHD)	Product Thickness (m)	Water Colour
VB1*	397173.493	6433538.709	22.400	23.253	10/07/2017	2.884	20.369	not observed	Pale brown/orange
VB2*	397255.399	6433529.426	22.191	23.000	10/07/2017	2.622	20.378	not observed	Pale brown/orange
VB3*	397236.123	6433437.989	22.219	23.059	10/07/2017	2.816	20.243	not observed	Pale brown/orange
VB4*	397567.144	6433481.030	21.333	22.134	10/07/2017	2.257	19.877	not observed	Pale brown
VB5*	397569.036	6433228.551	21.265	21.993	10/07/2017	2.207	19.786	not observed	Pale brown
BH101^			22.050	22.584	10/07/2017	2.037	20.547	not observed	
BH02A^			21.800	22.347	10/07/2017	1.953	20.394	not observed	
MB03A^			20.400	20.870	10/07/2017	2.002	18.868	not observed	

Note:

\* Newly installed well

^ Existing well. Gauged during sampling round.

TOC - infers Top of PVC



				Location_Code	VB1	VB2	VB3	VB4	VB5						
				Field_ID	Q00185-6	Q00185-5	Q00185-4	Q00185-1	Q00185-2						
				Sampled Date	10/07/2017	10/07/2017	10/07/2017	10/07/2017	10/07/2017						
				Lab_Report_Number	553774	553774	553774	553774	553774						
Chemical Group	Chemical Name	output unit	LOR	(DWER) DoH Non-Potable Groundwater Use (NPUG)	ANZECC 2000 Livestock Drinking Water Trigger Value (low risk)*	DWER AWDG (2011) Drinking Water Aesthetic Value	DWER AWDG (2011) Drinking Water Health Value	DWER Fresh Water	DWER Long-term Irrigation Water						
Field Parameters	Depth to groundwater (measured)	m TOC	-							2.884	2.622	2.816	2.257	2.207	
	Depth to bottom of well	m TOC	-							5.375	5.41	5.38	5.1	5.65	
	Dissolved Oxygen (Field) (Filtered)	mg/L	-							0.25	0.24	0.04	0.31	0.25	
	Electrolytic Conductivity (Field)	µS/cm	-							404.3	911	824	1300	715	
	pH (Field)	pH_Units	-			6.5-8.5		6.5-8.5	6-8.5	4.13	5.06	5.76	5.87	5.23	
	Redox Potential (Field)	mV	-							-51.3	-31.4	-30.1	-157.9	-158.6	
	Temp (Field)	°C	-							18.3	20.1	19.5	19.2	18.2	
Sample Quality Parameters	Electrical Conductivity @ 25°C	µS/cm	1							400	870	780	1100	680	
	pH (Lab)	pH_unit	0.1			6.5-8.5		6.5-8.5	6-8.5	4.2	5.5	6.2	6.2	5.3	
	Total Dissolved Solids @180°C	mg/L	10							570	690	630	1100	750	
	Sodium	mg/L	0.5							40	60	35	91	70	
	Potassium	mg/L	0.5							18	29	49	86	37	
	Calcium	mg/L	0.5		1000					3.9	35	42	41	8.5	
	Magnesium	mg/L	0.5							9.5	25	16	17	8.1	
	Chloride	mg/L	1		250		250			77	150	44	140	140	
	Sulfate (as SO <sub>4</sub> )	mg/L	5		1000	1000	250	500		31	180	130	190	63	
	Bicarbonate Alkalinity (as CaCO <sub>3</sub> )	mg/L	20							<20	25	68	110	29	
	Carbonate Alkalinity (as CO <sub>3</sub> )	mg/L	10							<10	<10	<10	<10	<10	
	Hydroxide Alkalinity (as CaCO <sub>3</sub> )	mg/L	10							<10	<10	<10	<10	<10	
	Total Alkalinity (as CaCO <sub>3</sub> )	mg/L	20							<20	20	56	92	24	
	Nitrate (as N)	mg/L	0.02		110			11		<0.02	4.1	33	24	<0.02	
	Nitrite (as N)	mg/L	0.02		9			0.9		<0.02	0.16	0.04	0.67	<0.02	
	Nitrogen (Total Oxidised)	mg/L	0.05						0.15"	<0.05	4.2	33	25	<0.05	
	Ammonia (as N)	mg/L	0.01		4		0.4		2.57~	1.2	2.5	0.36	1.1	1.3	
	Total Kjeldahl Nitrogen (as N)	mg/L	0.2							5.5	4.8	8.1	14	5	
	Nitrogen (Total)	mg/L	0.2						1.2"	5.5	9	41	39	5	
	Reactive Phosphorus (as P)	mg/L	0.05							11	1.3	2.4	5.1	3.1	
Total Phosphorus (as P)	mg/L	0.05						0.065"	12	1.4	2	5.3	2.7		
Biological Oxygen Demand	mg/L	5							<5	<5	<5	<5	<5		
Chemical Oxygen Demand	mg/L	25							350	300	260	480	270		
Total Organic Carbon	mg/L	5							240	120	110	200	160		
Hardness (as CaCO <sub>3</sub> )	mg/L	5				200			49	190	170	170	54		
Metals	Aluminium (Filtered)	mg/L	0.05	0.2	5	0.2		0.055	5	0.78	0.72	0.38	0.42	1.7	
	Arsenic (Filtered)	mg/L	0.001	0.1	0.5		0.01	0.013 <sup>d</sup>	0.1	<0.001	<0.001	0.003	0.004	<0.001	
	Cadmium (Filtered)	mg/L	0.0002	0.02	0.01		0.002	0.0002 <sup>e</sup>	0.01	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
	Chromium (Filtered)	mg/L	0.001	0.5**	1		0.05**	0.001**	0.1	0.004	0.002	0.002	0.004	0.007	
	Copper (Filtered)	mg/L	0.001	20	0.4		1	0.0014 <sup>oo</sup>	0.2	<0.001	0.01	0.016	0.016	<0.001	
	Iron (Filtered)	mg/L	0.05	0.3	NT		0.3	0.3	0.2	3.1	3.5	1	2.8	2.2	
	Lead (Filtered)	mg/L	0.001	0.1	0.1		0.1	0.0034 <sup>oo</sup>	2	<0.001	0.002	0.001	0.002	<0.001	
	Mercury (Filtered)	mg/L	0.0001	0.01	0.002		0.001	0.00006	0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
	Nickel (Filtered)	mg/L	0.001	0.2	1		0.02	0.011 <sup>oo</sup>	0.2	0.004	0.006	0.009	0.007	0.005	
	Zinc (Filtered)	mg/L	0.005	3	20		3	0.008 <sup>oo</sup>	2	0.009	0.032	0.028	0.034	0.016	
	Total Recoverable Hydrocarbons	TRH C <sub>7</sub> -C <sub>9</sub> Fraction	mg/L	0.02							<0.02	<0.02	<0.02	<0.02	<0.02
		TRH C <sub>10</sub> -C <sub>14</sub> Fraction	mg/L	0.05							<0.05	<0.05	<0.05	<0.05	<0.05
		TRH C <sub>15</sub> -C <sub>28</sub> Fraction	mg/L	0.1							<0.1	<0.1	<0.1	<0.1	<0.1
TRH C <sub>29</sub> -C <sub>36</sub> Fraction		mg/L	0.1							<0.1	<0.1	<0.1	<0.1	<0.1	
TRH+C <sub>10</sub> -C <sub>36</sub> (Sum of total) (Lab Reported)		mg/L	0.1							<0.1	<0.1	<0.1	<0.1	<0.1	
TRH C <sub>6</sub> -C <sub>10</sub> Fraction F1		mg/L	0.02							<0.02	<0.02	<0.02	<0.02	<0.02	
TRH C <sub>6</sub> -C <sub>10</sub> Fraction Less BTEX F1		mg/L	0.02							<0.02	<0.02	<0.02	<0.02	<0.02	
TRH >C <sub>10</sub> -C <sub>16</sub> Fraction F2		mg/L	0.05							<0.05	<0.05	<0.05	<0.05	<0.05	
TRH >C <sub>10</sub> -C <sub>16</sub> Fraction Less Naphthalene F2		mg/L	0.05							<0.05	<0.05	<0.05	<0.05	<0.05	
TRH >C <sub>16</sub> -C <sub>34</sub> Fraction F3		mg/L	0.1							<0.1	<0.1	<0.1	<0.1	<0.1	
TRH >C <sub>34</sub> -C <sub>40</sub> Fraction F4	mg/L	0.1							<0.1	<0.1	<0.1	<0.1	<0.1		
MAH	Benzene	mg/L	0.001	0.01			0.001	0.95		<0.001	<0.001	<0.001	<0.001	<0.001	
	Toluene	mg/L	0.001	0.025		0.025	0.8			<0.001	<0.001	<0.001	<0.001	<0.001	
	Ethylbenzene	mg/L	0.001	0.003		0.003	0.3			<0.001	<0.001	<0.001	<0.001	<0.001	
	Xylenes (m & p)	mg/L	0.002					0.2		<0.002	<0.002	<0.002	<0.002	<0.002	
	Xylene (o)	mg/L	0.001					0.35		<0.001	<0.001	<0.001	<0.001	<0.001	
	Xylenes (Sum of total) (Lab Reported)	mg/L	0.002	0.02		0.02	0.6			<0.003	<0.003	<0.003	<0.003	<0.003	
PAH	Acenaphthene	mg/L	0.001							<0.001	<0.001	<0.001	<0.001	<0.001	
	Acenaphthylene	mg/L	0.001							<0.001	<0.001	<0.001	<0.001	<0.001	
	Anthracene	mg/L	0.001							<0.001	<0.001	<0.001	<0.001	<0.001	
	Benz(a)anthracene	mg/L	0.001							<0.001	<0.001	<0.001	<0.001	<0.001	
	Benzo(a)pyrene	mg/L	0.001	0.0001			0.00001			<0.001	<0.001	<0.001	<0.001	<0.001	
	Benzo(b)&(j)fluoranthene	mg/L	0.001							<0.001	<0.001	<0.001	<0.001	<0.001	
	Benzo(g,h,i)perylene	mg/L	0.001							<0.001	<0.001	<0.001	<0.001	<0.001	
	Benzo(k)fluoranthene	mg/L	0.001							<0.001	<0.001	<0.001	<0.001	<0.001	
	Chrysene	mg/L	0.001							<0.001	<0.001	<0.001	<0.001	<0.001	
	Dibenz(a,h)anthracene	mg/L	0.001							<0.001	<0.001	<0.001	<0.001	<0.001	
	Fluoranthene	mg/L	0.001							<0.001	<0.001	<0.001	<0.001	<0.001	
	Fluorene	mg/L	0.001							<0.001	<0.001	<0.001	<0.001	<0.001	
	Indeno(1,2,3-c,d)pyrene	mg/L	0.001							<0.001	<0.001	<0.001	<0.001	<0.001	
	Naphthalene	mg/L	0.001					0.016		<0.001	<0.001	<0.001	<0.001	<0.001	
	Phenanthrene	mg/L	0.001							<0.001	<0.001	<0.001	<0.001	<0.001	
	Pyrene	mg/L	0.001							<0.001	<0.001	<0.001	<0.001	<0.001	
PAH (Sum of Common 16 PAHs - Lab Reported)	mg/L	0.001							<0.001	<0.001	<0.001	<0.001	<0.001		
Herbicides	Dinoseb	mg/L	0.1							<0.1	<0.1	<0.1	<0.1	<0.1	



Table 2: Groundwater Analytical Results

				Location_Code	VB1	VB2	VB3	VB4	VB5						
				Field_ID	Q00185-6	Q00185-5	Q00185-4	Q00185-1	Q00185-2						
				Sampled Date	10/07/2017	10/07/2017	10/07/2017	10/07/2017	10/07/2017						
				Lab_Report_Number	553774	553774	553774	553774	553774						
Chemical Group	Chemical Name	output unit	LOR	(DWER) DoH Non-Potable Groundwater Use (NPUG)	ANZECC 2000 Livestock Drinking Water Trigger Value (low risk)*	DWER AWDG (2011) Drinking Water Aesthetic Value	DWER AWDG (2011) Drinking Water Health Value	DWER Fresh Water	DWER Long-term Irrigation Water						
Phenolics	2,4-Dimethylphenol	mg/L	0.003							<0.003	<0.003	<0.003	<0.003	<0.003	
	2,4-Dinitrophenol	mg/L	0.03					0.045		<0.03	<0.03	<0.03	<0.03	<0.03	
	2-Methylphenol	mg/L	0.003							<0.003	<0.003	<0.003	<0.003	<0.003	
	2-Nitrophenol	mg/L	0.01							<0.01	<0.01	<0.01	<0.01	<0.01	
	3- & 4- Methylphenol	mg/L	0.006							<0.006	<0.006	<0.006	<0.006	<0.006	
	4,6-Dinitro-2-methylphenol	mg/L	0.03							<0.03	<0.03	<0.03	<0.03	<0.03	
	4,6-Dinitro-o-cyclohexylphenol	mg/L	0.1							<0.1	<0.1	<0.1	<0.1	<0.1	
	4-Nitrophenol	mg/L	0.03							<0.03	<0.03	<0.03	<0.03	<0.03	
	Phenol	mg/L	0.003						0.32		<0.003	<0.003	<0.003	<0.003	<0.003
	Non-Halogenated Phenols (Sum of total)	mg/L	0.1								<0.1	<0.1	<0.1	<0.1	<0.1
Phenolics-Halogenated	2,4,5-Trichlorophenol	mg/L	0.01							<0.01	<0.01	<0.01	<0.01	<0.01	
	2,4,6-Trichlorophenol	mg/L	0.01	0.2		0.002	0.02	0.003		<0.01	<0.01	<0.01	<0.01	<0.01	
	2,4-Dichlorophenol	mg/L	0.003	2		0.0003	0.2	0.12		<0.003	<0.003	<0.003	<0.003	<0.003	
	2,6-Dichlorophenol	mg/L	0.003							<0.003	<0.003	<0.003	<0.003	<0.003	
	2-Chlorophenol	mg/L	0.003	3		0.0001	0.3	0.34		<0.003	<0.003	<0.003	<0.003	<0.003	
	4-Chloro-3-methylphenol	mg/L	0.01							<0.01	<0.01	<0.01	<0.01	<0.01	
	Pentachlorophenol	mg/L	0.01				0.01	0.0036		<0.01	<0.01	<0.01	<0.01	<0.01	
	Tetrachlorophenols (Sum of total)	mg/L	0.03							<0.03	<0.03	<0.03	<0.03	<0.03	
Halogenated Phenols (Sum of total)	mg/L	0.01							<0.01	<0.01	<0.01	<0.01	<0.01		

Notes:  
 \* Chloride Irrigation Trigger Values, Table 4.2.6, ANZECC & ARMCANZ 2000, based on cropping activities.  
 ^ Table 4.3.2, ANZECC & ARMCANZ Guidelines 2000  
 \*\* No guideline for Chromium, therefore speciated Cr (VI) applied as a conservative guideline.  
 # No guideline for As, therefore speciated As (V) applied as a conservative guideline.  
 NT - not sufficiently toxic.  
 ~ Table 8.3.7, ANZECC and ARMCANZ, Chapter 8, October 2000  
 \* Table 3.3.6 - 3.3.7, Lowland River, ANZECC and ARMCANZ, Volume 1, Chapters 1-7, October 2000  
 ∞ Results against adjusted Trigger Values for water hardness are discussed in the report.



Table 2A: PFAS Analytical Results

1779954-001-R-Rev1

				Location Code	VB1	VB2	VB3	VB4	VB5		
				Field ID	Q00185-6	Q00185-5	Q00185-4	Q00185-1	Q00185-2		
				Sampled Date	10/07/2017	10/07/2017	10/07/2017	10/07/2017	10/07/2017		
				Lab Report Number	553774	553774	553774	553774	553774		
Chemical Group	Chemical Name	output unit	LOR	PFAS - Ecological - Freshwater (99% species protection) WA DWER*	PFAS - Drinking Water WA DOH**	PFAS - Non Potable/Recreational Use DOH**					
Per- and polyfluoroalkyl substances (PFAS)	N-Methyl PFO sulfonamidoethanol (MeFOSE)	µg/L	0.05				<0.05	<0.05	<0.05	<0.05	<0.05
	Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01				<0.01	<0.01	<0.01	<0.01	<0.01
	N-methyl-PFO sulfonamidoacetic acid (MeFOSAA)	µg/L	0.05				<0.05	<0.05	<0.05	<0.05	<0.05
	Perfluorooctanoic Acid (PFOA)	µg/L	0.01	19	0.56	5.6	<0.01	0.02	0.07	0.08	<0.01
	Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01				0.11	<0.01	0.04	0.02	0.01
	Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01				<0.01	0.04	0.11	0.15	0.01
	Sum of PFHxS and PFOS (calculated)	µg/L	0.01	0.00023	0.07	0.7	0.12	0.05	0.15	0.17	0.02
	Sum of PFAS (WA DER 10, calculated)	µg/L	0.01				-	-	-	-	-
	Perfluorobutanoic acid (PFBA)	µg/L	0.05				<0.05	0.49	0.26	0.53	<0.05
	Perfluorohexanoic acid (PFHxA)	µg/L	0.01				<0.01	1	1.7	2.6	0.17
	Perfluoroheptanoic acid (PFHpA)	µg/L	0.01				<0.01	0.2	0.48	0.65	0.03
	Perfluorodecanoic acid (PFDA)	µg/L	0.01				<0.01	<0.01	<0.01	<0.01	<0.01
	Perfluoropentanoic acid (PFPeA)	µg/L	0.01				<0.01	2.1	1.3	2.6	0.16
	Perfluorononanoic acid (PFNA)	µg/L	0.01				<0.01	<0.01	<0.01	<0.01	<0.01
	Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01				<0.01	<0.01	<0.01	<0.01	<0.01
	Perfluorotridecanoic acid (PFTriDA)	µg/L	0.01				<0.01	<0.01	<0.01	<0.01	<0.01
	Perfluorododecanoic acid (PFDoDA)	µg/L	0.01				<0.01	<0.01	<0.01	<0.01	<0.01
	Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01				<0.01	<0.01	<0.01	<0.01	<0.01
	Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01				<0.01	<0.01	<0.01	<0.01	<0.01
	Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01				<0.01	0.02	0.05	0.07	<0.01
	Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01				<0.01	0.05	0.07	0.12	0.01
	4:2 Fluorotelomer sulfonic acid (4:2 FTSA)	µg/L	0.01				<0.01	<0.01	<0.01	<0.01	<0.01
	6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	µg/L	0.05				<0.05	<0.05	<0.05	<0.05	<0.05
	8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	µg/L	0.01				<0.01	<0.01	<0.01	<0.01	<0.01
	10:2 Fluorotelomer sulfonic acid (10:2 FTSA)	µg/L	0.01				<0.01	<0.01	<0.01	<0.01	<0.01
	N-Ethyl PFO sulfonamide (EtFOSA)	µg/L	0.05				<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl PFO sulfonamidoethanol (EtFOSE)	µg/L	0.05				<0.05	<0.05	<0.05	<0.05	<0.05	
N-Methyl PFO sulfonamide (MeFOSA)	µg/L	0.05				<0.05	<0.05	<0.05	<0.05	<0.05	
Perfluorooctane sulfonamide (FOSA)	µg/L	0.05				<0.05	<0.05	<0.05	<0.05	<0.05	
N-ethyl-PFO sulfonamidoacetic acid (EtFOSAA)	µg/L	0.05				<0.05	<0.05	<0.05	<0.05	<0.05	

Notes:

\*Interim Guideline on the Assessment and Management of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS), Contaminated Sites Guidelines, January 2017

\*\*Health Based Guidance Values for PFAS Department of Health April 2017

- Manually calculated using LOR value.

RPD >30% and results <5 x LOR  
 RPD >30% and results >5 x LOR

Chemical Group	Chemical Name	Units	LOR	Lab Report Number		RPD	553774		EP1707310	
				Field ID	553774		553774	Q00185-6	Q00186-01	
				Sampled Date/Time	10/07/2017		10/07/2017	10/07/2017	10/07/2017	
				Sample Type	Field Primary		Field Duplicate	Field Primary	Field Triplicate*	
<b>Sample Quality Parameters</b>	Electrical Conductivity @ 25°C	µS/cm	1	680	680	0	400	412	3	
	pH (Lab)	pH_unit	0.1 : 0.01 (Interlab)	5.3	5.3	0	4.2	4.24	1	
	Total Dissolved Solids @180°C	mg/L	10	750	690	8	570	676	17	
	Sodium	mg/L	0.5	70	69	1	40	40	0	
	Potassium	mg/L	0.5	37	37	0	18	26	36	
	Calcium	mg/L	0.5	8.5	8.3	2	3.9	5	25	
	Magnesium	mg/L	0.5	8.1	7.9	2	9.5	10	5	
	Chloride	mg/L	1	140	150	7	77	88	13	
	Sulfate (as SO <sub>4</sub> )	mg/L	5	63	62	2	30	36	18	
	Bicarbonate Alkalinity (as CaCO <sub>3</sub> )	mg/L	20	29	24	19	-	<1	-	
	Carbonate Alkalinity (as CO <sub>3</sub> )	mg/L	10	<10	<10	<30	<10	<1	<30	
	Hydroxide Alkalinity (as CaCO <sub>3</sub> )	mg/L	10 : 1 (Interlab)	<10	<10	<30	<10	<1	<30	
	Total Alkalinity (as CaCO <sub>3</sub> )	mg/L	20 : 1 (Interlab)	24	<20	82	<20	<1	<30	
	Nitrate (as N)	mg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	<30	<0.02	0.05	133	
	Nitrite (as N)	mg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	<30	<0.02	<0.01	<30	
	Nitrogen (Total Oxidised)	mg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	<30	<0.05	0.05	67	
	Ammonia (as N)	mg/L	0.01	1.3	1.3	0	1.2	0.66	58	
	Total Kjeldahl Nitrogen (as N)	mg/L	0.2 : 0.1 (Interlab)	5	6.4	25	5.5	6.6	18	
	Nitrogen (Total)	mg/L	0.2 : 0.1 (Interlab)	5	6.4	25	5.5	6.6	18	
	Reactive Phosphorus (as P)	mg/L	0.05 : 0.01 (Interlab)	3.1	3	3	11	11.7	6	
	Total Phosphorus (as P)	mg/L	0.05	2.7	2.7	0	12	11.9	0.8	
	Biological Oxygen Demand	mg/L	5 : 2 (Interlab)	<5	<5	<30	<5	25	164	
	Chemical Oxygen Demand	mg/L	25 : 10 (Interlab)	270	420	43	350	574	48	
	Total Organic Carbon	mg/L	5 : 1 (Interlab)	160	160	0	240	132	58	
	Hardness (as CaCO <sub>3</sub> )	mg/L	5	54	53	2	49	54	10	
<b>Metals</b>	Aluminium (Filtered)	mg/L	0.05 : 0.01 (Interlab)	1.7	1.6	6	0.78	0.65	18	
	Arsenic (Filtered)	mg/L	0.001	<0.001	<0.001	<30	<0.001	<0.001	<30	
	Cadmium (Filtered)	mg/L	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	<30	<0.0002	<0.0001	<30	
	Chromium (Filtered)	mg/L	0.001	0.007	0.008	13	0.004	0.005	22	
	Copper (Filtered)	mg/L	0.001	<0.001	0.001	67	<0.001	0.004	155	
	Iron (Filtered)	mg/L	0.05	2.2	2.1	5	3.1	2.84	9	
	Lead (Filtered)	mg/L	0.001	<0.001	<0.001	<30	<0.001	0.002	120	
	Mercury (Filtered)	mg/L	0.0001	<0.0001	<0.0001	<30	<0.0001	<0.0001	<30	
	Nickel (Filtered)	mg/L	0.005	0.005	0.006	18	0.004	0.004	0	
	Zinc (Filtered)	mg/L	0.005	0.016	0.017	6	0.009	0.032	112	
<b>Total Recoverable Hydrocarbons</b>	TRH C <sub>6</sub> -C <sub>9</sub> Fraction	mg/L	0.02	<0.02	<0.02	<30	<0.02	<0.02	<30	
	TRH C <sub>10</sub> -C <sub>14</sub> Fraction	mg/L	0.05	<0.05	<0.05	<30	<0.05	<0.05	<30	
	TRH C <sub>15</sub> -C <sub>28</sub> Fraction	mg/L	0.1	<0.1	<0.1	<30	<0.1	<0.1	<30	
	TRH C <sub>29</sub> -C <sub>36</sub> Fraction	mg/L	0.1 : 0.05 (Interlab)	<0.1	<0.1	<30	<0.1	<0.05	<30	
	TRH+C <sub>10</sub> -C <sub>36</sub> (Sum of total) (Lab Reported)	mg/L	0.1 : 0.05 (Interlab)	<0.1	<0.1	<30	<0.1	<0.05	<30	
	TRH C <sub>6</sub> -C <sub>10</sub> Fraction F1	mg/L	0.02	<0.02	<0.02	<30	<0.02	<0.02	<30	
	TRH C <sub>6</sub> -C <sub>10</sub> Fraction Less BTEX F1	mg/L	0.02	<0.02	<0.02	<30	<0.02	<0.02	<30	
	TRH >C <sub>10</sub> -C <sub>16</sub> Fraction F2	mg/L	0.05 : 0.1 (Interlab)	<0.05	<0.05	<30	<0.05	<0.1	<30	
	TRH >C <sub>10</sub> -C <sub>16</sub> Fraction Less Naphthalene F2	mg/L	0.05 : 0.1 (Interlab)	<0.05	<0.05	<30	<0.05	<0.1	<30	
	TRH >C <sub>16</sub> -C <sub>34</sub> Fraction F3	mg/L	0.1	<0.1	<0.1	<30	<0.1	<0.1	<30	
	TRH >C <sub>34</sub> -C <sub>40</sub> Fraction F4	mg/L	0.1	<0.1	<0.1	<30	<0.1	<0.1	<30	
<b>MAH</b>	Benzene	mg/L	0.001	<0.001	<0.001	<30	<0.001	<0.001	<30	
	Toluene	mg/L	0.001 : 0.002 (Interlab)	<0.001	<0.001	<30	<0.001	<0.002	<30	
	Ethylbenzene	mg/L	0.001 : 0.002 (Interlab)	<0.001	<0.001	<30	<0.001	<0.002	<30	
	Xylenes (m & p)	mg/L	0.002	<0.002	<0.002	<30	<0.002	<0.002	<30	
	Xylene (o)	mg/L	0.001 : 0.002 (Interlab)	<0.001	<0.001	<30	<0.001	<0.002	<30	
	Xylenes (Sum of total) (Lab Reported)	mg/L	0.003 : 0.002 (Interlab)	<0.003	<0.003	<30	<0.003	<0.002	<30	
<b>PAH</b>	Acenaphthene	mg/L	0.001	<0.001	<0.001	<30	<0.001	<0.001	<30	
	Acenaphthylene	mg/L	0.001	<0.001	<0.001	<30	<0.001	<0.001	<30	
	Anthracene	mg/L	0.001	<0.001	<0.001	<30	<0.001	<0.001	<30	
	Benz(a)anthracene	mg/L	0.001	<0.001	<0.001	<30	<0.001	<0.001	<30	
	Benzo(a)pyrene	mg/L	0.001 : 0.0005 (Interlab)	<0.001	<0.001	<30	<0.001	<0.0005	<30	
	Benzo(b)&(j)fluoranthene	mg/L	0.001	<0.001	<0.001	<30	<0.001	<0.001	<30	
	Benzo(g,h,i)perylene	mg/L	0.001	<0.001	<0.001	<30	<0.001	<0.001	<30	
	Benzo(k)fluoranthene	mg/L	0.001	<0.001	<0.001	<30	<0.001	<0.001	<30	
	Chrysene	mg/L	0.001	<0.001	<0.001	<30	<0.001	<0.001	<30	
	Dibenz(a,h)anthracene	mg/L	0.001	<0.001	<0.001	<30	<0.001	<0.001	<30	
	Fluoranthene	mg/L	0.001	<0.001	<0.001	<30	<0.001	<0.001	<30	
	Fluorene	mg/L	0.001	<0.001	<0.001	<30	<0.001	<0.001	<30	
	Indeno(1,2,3-c,d)pyrene	mg/L	0.001	<0.001	<0.001	<30	<0.001	<0.001	<30	
	Naphthalene	mg/L	0.01 : 0.005 (Interlab)	<0.01	<0.01	<30	<0.01	<0.001	<30	
	Naphthalene	mg/L	0.001 : 0.005 (Interlab)	<0.001	<0.001	<30	<0.001	<0.001	<30	
	Phenanthrene	mg/L	0.001	<0.001	<0.001	<30	<0.001	<0.001	<30	
	Pyrene	mg/L	0.001	<0.001	<0.001	<30	<0.001	<0.001	<30	
	PAH (Sum of Common 16 PAHs - Lab Reported)	mg/L	0.001 : 0.0005 (Interlab)	<0.001	<0.001	<30	<0.001	<0.0005	<30	
<b>Herbicides</b>	Dinoseb	mg/L	0.1	<0.1	<0.1	<30	<0.1	-	-	
<b>Phenolics</b>	2,4-Dimethylphenol	mg/L	0.003 : 0.001 (Interlab)	<0.003	<0.003	<30	<0.003	<0.001	<30	
	2,4-Dinitrophenol	mg/L	0.03	<0.03	<0.03	<30	<0.03	-	-	
	2-Methylphenol	mg/L	0.003 : 0.001 (Interlab)	<0.003	<0.003	<30	<0.003	<0.001	<30	
	2-Nitrophenol	mg/L	0.01 : 0.001 (Interlab)	<0.01	<0.01	<30	<0.01	<0.001	<30	
	3- & 4- Methylphenol	mg/L	0.006 : 0.002 (Interlab)	<0.006	<0.006	<30	<0.006	<0.002	<30	
	4,6-Dinitro-2-methylphenol	mg/L	0.03	<0.03	<0.03	<30	<0.03	-	-	
	4,6-Dinitro-o-cyclohexylphenol	mg/L	0.1	<0.1	<0.1	<30	<0.1	-	-	
	4-Nitrophenol	mg/L	0.03	<0.03	<0.03	<30	<0.03	-	-	
	Phenol	mg/L	0.003 : 0.001 (Interlab)	<0.003	<0.003	<30	<0.003	<0.001	<30	
	Non-Halogenated Phenols (Sum of total)	mg/L	0.1	<0.1	<0.1	<30	<0.1	-	-	
<b>Phenolics-Halogenated</b>	2,4,5-Trichlorophenol	mg/L	0.01 : 0.001 (Interlab)	<0.01	<0.01	<30	<0.01	<0.001	<30	
	2,4,6-Trichlorophenol	mg/L	0.01 : 0.001 (Interlab)	<0.01	<0.01	<30	<0.01	<0.001	<30	
	2,4-Dichlorophenol	mg/L	0.003 : 0.001 (Interlab)	<0.003	<0.003	<30	<0.003	<0.001	<30	
	2,6-Dichlorophenol	mg/L	0.003 : 0.001 (Interlab)	<0.003	<0.003	<30	<0.003	<0.001	<30	
	2-Chlorophenol	mg/L	0.003 : 0.001 (Interlab)	<0.003	<0.003	<30	<0.003	<0.001	<30	
	4-Chloro-3-methylphenol	mg/L	0.01 : 0.001 (Interlab)	<0.01	<0.01	<30	<0.01	<0.001	<30	
	Pentachlorophenol	mg/L	0.01 : 0.002 (Interlab)	<0.01	<0.01	<30	<0.01	<0.002	<30	
	Tetrachlorophenols (Sum of total)	mg/L	0.03	<0.03	<0.03	<30	<0.03	-	-	
	Halogenated Phenols (Sum of total)	mg/L	0.01	<0.01	<0.01	<30	<0.01	-	-	

RPD >30% and results <5 x LOR  
 RPD >30% and results >5 x LOR

			Lab Report Number	553774	553774	RPD	553774	EP1707310	RPD
			Field ID	Q00185-2	Q00185-3		Q00185-6	Q00186-01	
			Sampled Date/Time	10/07/2017	10/07/2017		10/07/2017	10/07/2017	
			Sample Type	Field Primary	Field Duplicate		Field Primary	Field Triplicate*	
<b>Per- and polyfluoroalkyl substances (PFAS)</b>	N-Methyl PFO sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	<30	<0.05	-	-
	Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.01	<0.01	<30	<0.01	-	-
	N-methyl-PFO sulfonamidoacetic acid (MeFOSAA)	µg/L	0.05	<0.05	<0.05	<30	<0.05	-	-
	Perfluorooctanoic Acid (PFOA)	µg/L	0.01	<0.01	<0.01	<30	<0.01	<0.01	<30
	Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<b>0.01</b>	<b>&lt;0.01</b>	<b>67</b>	<b>0.11</b>	<b>&lt;0.01</b>	<b>183</b>
	Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01 : 0.02 (Interlab)	0.01	0.01	0	<0.01	<0.02	<30
	Perfluorobutanoic acid (PFBA)	µg/L	0.05 : 0.1 (Interlab)	<0.05	<0.05	<30	<0.05	<0.1	<30
	Perfluorohexanoic acid (PFHxA)	µg/L	0.01 : 0.02 (Interlab)	0.17	0.17	0	<0.01	<0.02	<30
	Perfluoroheptanoic acid (PFHpA)	µg/L	0.01 : 0.02 (Interlab)	0.03	0.03	0	<0.01	<0.02	<30
	Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.01	<0.01	<30	<0.01	-	-
	Perfluoropentanoic acid (PFPeA)	µg/L	0.01 : 0.02 (Interlab)	0.16	0.16	0	<0.01	<0.02	<30
	Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.01	<0.01	<30	<0.01	-	-
	Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.01	<0.01	<30	<0.01	-	-
	Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01	<0.01	<0.01	<30	<0.01	-	-
	Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.01	<0.01	<30	<0.01	-	-
	Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.01	<0.01	<30	<0.01	-	-
	Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	<0.01	<0.01	<30	<0.01	-	-
	Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	<0.01	<0.01	<30	<0.01	-	-
	Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01 : 0.02 (Interlab)	<b>0.01</b>	<b>&lt;0.01</b>	<b>67</b>	<0.01	<0.02	<30
	4:2 Fluorotelomer sulfonic acid (4:2 FTSA)	µg/L	0.01 : 0.05 (Interlab)	<0.01	<0.01	<30	<0.01	<0.05	<30
	6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	µg/L	0.05	<0.05	<0.05	<30	<0.05	<0.05	<30
	8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	µg/L	0.01 : 0.05 (Interlab)	<0.01	<0.01	<30	<0.01	<0.05	<30
	10:2 Fluorotelomer sulfonic acid (10:2 FTSA)	µg/L	0.01 : 0.05 (Interlab)	<0.01	<0.01	<30	<0.01	<0.05	<30
	N-Ethyl PFO sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	<30	<0.05	-	-
	N-Ethyl PFO sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	<30	<0.05	-	-
	N-Methyl PFO sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	<30	<0.05	-	-
	Perfluorooctane sulfonamide (FOSA)	µg/L	0.05	<0.05	<0.05	<30	<0.05	-	-
	N-ethyl-PFO sulfonamidoacetic acid (EtFOSAA)	µg/L	0.05	<0.05	<0.05	<30	<0.05	-	-

Notes:  
 \*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

				Lab Report Number	552310	EP1707310	553774
				Field ID	Q13077-08	Q00186-02	Q00185-7
				Sampled Date	28/06/2017	10/07/2017	10/07/2017
				Sample Type	Rinsate	Trip_B	Trip_B
Chemical Group	Chemical Name	Units	LOR				
<b>Metals</b>	Aluminium (Filtered)	mg/L	0.01	-	-	-	-
	Arsenic (Filtered)	mg/L	0.001	<0.001	-	-	-
	Cadmium (Filtered)	mg/L	0.0001	<0.0002	-	-	-
	Chromium (Filtered)	mg/L	0.001	<0.001	-	-	-
	Copper (Filtered)	mg/L	0.001	<0.001	-	-	-
	Iron (Filtered)	mg/L	0.05	-	-	-	-
	Lead (Filtered)	mg/L	0.001	<0.001	-	-	-
	Mercury (Filtered)	mg/L	0.0001	<0.0001	-	-	-
	Nickel (Filtered)	mg/L	0.001	<0.001	-	-	-
	Zinc (Filtered)	mg/L	0.005	<0.005	-	-	-
<b>Total Recoverable Hydrocarbons</b>	TRH C <sub>6</sub> -C <sub>9</sub> Fraction	mg/L	0.02	-	<0.02	<0.02	-
	TRH C <sub>10</sub> -C <sub>14</sub> Fraction	mg/L	0.05	-	-	-	-
	TRH C <sub>15</sub> -C <sub>28</sub> Fraction	mg/L	0.1	-	-	-	-
	TRH C <sub>29</sub> -C <sub>36</sub> Fraction	mg/L	0.05	-	-	-	-
	TRH+C <sub>10</sub> -C <sub>36</sub> (Sum of total) (Lab Reported)	mg/L	0.05	-	-	-	-
	TRH+C <sub>10</sub> -C <sub>40</sub> (Sum of total) (Lab Reported)	mg/L	0.1	-	-	-	-
	TRH C <sub>6</sub> -C <sub>10</sub> Fraction F1	mg/L	0.02	-	<0.02	<0.02	-
	TRH C <sub>6</sub> -C <sub>10</sub> Fraction Less BTEX F1	mg/L	0.02	-	<0.02	<0.02	-
	TRH >C <sub>10</sub> -C <sub>16</sub> Fraction F2	mg/L	0.05	-	-	-	-
	TRH >C <sub>10</sub> -C <sub>16</sub> Fraction Less Naphthalene F2	mg/L	0.05	-	-	-	-
	TRH >C <sub>16</sub> -C <sub>34</sub> Fraction F3	mg/L	0.1	-	-	-	-
	TRH >C <sub>34</sub> -C <sub>40</sub> Fraction F4	mg/L	0.1	-	-	-	-
	<b>MAH</b>	Benzene	mg/L	0.001	-	<0.001	<0.001
Toluene		mg/L	0.001	-	<0.002	<0.001	-
Ethylbenzene		mg/L	0.001	-	<0.002	<0.001	-
Xylenes (m & p)		mg/L	0.002	-	<0.002	<0.002	-
Xylene (o)		mg/L	0.001	-	<0.002	<0.001	-
Xylenes (Sum of total) (Lab Reported)		mg/L	0.002	-	<0.002	<0.003	-
Total BTEX		mg/L	0.001	-	<0.001	-	-
<b>PAH</b>	Acenaphthene	mg/L	0.001	-	-	-	-
	Acenaphthylene	mg/L	0.001	-	-	-	-
	Anthracene	mg/L	0.001	-	-	-	-
	Benz(a)anthracene	mg/L	0.001	-	-	-	-
	Benzo(a)pyrene	mg/L	0.0005	-	-	-	-
	Benzo(a)pyrene TEQ (lower bound)*	mg/L	0.0005	-	-	-	-
	Benzo(b)&(j)fluoranthene	mg/L	0.001	-	-	-	-
	Benzo(g,h,i)perylene	mg/L	0.001	-	-	-	-
	Benzo(k)fluoranthene	mg/L	0.001	-	-	-	-
	Chrysene	mg/L	0.001	-	-	-	-
	Dibenz(a,h)anthracene	mg/L	0.001	-	-	-	-
	Fluoranthene	mg/L	0.001	-	-	-	-
	Fluorene	mg/L	0.001	-	-	-	-
	Indeno(1,2,3-c,d)pyrene	mg/L	0.001	-	-	-	-
	Naphthalene	mg/L	0.001	-	<0.005	<0.01	-
	Phenanthrene	mg/L	0.001	-	-	-	-
	Pyrene	mg/L	0.001	-	-	-	-
	PAH (Sum of Common 16 PAHs - Lab Reported)	mg/L	0.0005	-	-	-	-
	<b>Per- and polyfluoroalkyl substances (PFAS)</b>	N-Methyl PFO sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	-	-
Perfluorodecane sulfonic acid (PFDS)		µg/L	0.01	<0.01	-	-	-
N-methyl-PFO sulfonamidoacetic acid (MeFOSAA)		µg/L	0.05	<0.05	-	-	-
Perfluorooctanoic Acid (PFOA)		µg/L	0.01	<0.01	-	-	-
Perfluorooctane sulfonic acid (PFOS)		µg/L	0.01	<0.01	-	-	-
Perfluorohexane sulfonic acid (PFHxS)		µg/L	0.01	<0.01	-	-	-
Sum of PFHxS and PFOS (calculated)		µg/L	0.01	-	-	-	-
Sum of PFAS (WA DER 10, calculated)		µg/L	0.01	-	-	-	-
Perfluorobutanoic acid (PFBA)		µg/L	0.05	<0.05	-	-	-
Perfluorohexanoic acid (PFHxA)		µg/L	0.01	<0.01	-	-	-
Perfluoroheptanoic acid (PFHpA)		µg/L	0.01	<0.01	-	-	-
Perfluorodecanoic acid (PFDA)		µg/L	0.01	<0.01	-	-	-
Perfluoropentanoic acid (PFPeA)		µg/L	0.01	<0.01	-	-	-
Perfluorononanoic acid (PFNA)		µg/L	0.01	<0.01	-	-	-
Perfluorotetradecanoic acid (PFTeDA)		µg/L	0.01	<0.01	-	-	-
Perfluorotridecanoic acid (PFTrDA)		µg/L	0.01	<0.01	-	-	-
Perfluorododecanoic acid (PFDoDA)		µg/L	0.01	<0.01	-	-	-
Perfluoroundecanoic acid (PFUnDA)		µg/L	0.01	<0.01	-	-	-
Perfluoroheptane sulfonic acid (PFHpS)		µg/L	0.01	<0.01	-	-	-
Perfluoropentane sulfonic acid (PFPeS)		µg/L	0.01	<0.01	-	-	-
Perfluorobutane sulfonic acid (PFBS)		µg/L	0.01	<0.01	-	-	-
4:2 Fluorotelomer sulfonic acid (4:2 FTSA)		µg/L	0.01	<0.01	-	-	-
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)		µg/L	0.05	<0.05	-	-	-
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)		µg/L	0.01	<0.01	-	-	-
10:2 Fluorotelomer sulfonic acid (10:2 FTSA)		µg/L	0.01	<0.01	-	-	-
N-Ethyl PFO sulfonamide (EtFOSA)		µg/L	0.05	<0.05	-	-	-
N-Ethyl PFO sulfonamidoethanol (EtFOSE)		µg/L	0.05	<0.05	-	-	-
N-Methyl PFO sulfonamide (MeFOSA)		µg/L	0.05	<0.05	-	-	-
Perfluorooctane sulfonamide (FOSA)		µg/L	0.05	<0.05	-	-	-
N-ethyl-PFO sulfonamidoacetic acid (EtFOSAA)		µg/L	0.05	<0.05	-	-	-



# **APPENDIX A**

## **Borehole Logs**





## METHOD OF SOIL DESCRIPTION USED ON BOREHOLE AND TEST PIT REPORTS

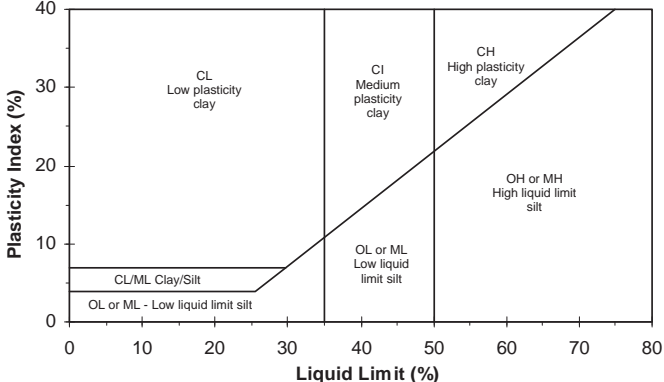
<table border="0"> <tr><td></td><td>FILL</td></tr> <tr><td></td><td>GRAVEL (GP or GW)</td></tr> <tr><td></td><td>SAND (SP or SW)</td></tr> <tr><td></td><td>SILT (ML or MH)</td></tr> </table>		FILL		GRAVEL (GP or GW)		SAND (SP or SW)		SILT (ML or MH)	<table border="0"> <tr><td></td><td>CLAY (CL, CI or CH)</td></tr> <tr><td></td><td>ORGANIC SOILS (OL or OH or Pt)</td></tr> <tr><td></td><td>COBBLES or BOULDERS</td></tr> </table>		CLAY (CL, CI or CH)		ORGANIC SOILS (OL or OH or Pt)		COBBLES or BOULDERS
	FILL														
	GRAVEL (GP or GW)														
	SAND (SP or SW)														
	SILT (ML or MH)														
	CLAY (CL, CI or CH)														
	ORGANIC SOILS (OL or OH or Pt)														
	COBBLES or BOULDERS														

Combinations of these basic symbols may be used to indicate mixed materials such as sandy clay.

### CLASSIFICATION AND INFERRED STRATIGRAPHY

Soil and Rock is classified and described in Reports of Boreholes and Test Pits using the preferred method given in AS1726 – 1993, (Amdt1 – 1994 and Amdt2 – 1994), Appendix A. The material properties are assessed in the field by visual/tactile methods.

Particle Size			Plasticity Properties	
<b>Major Division</b>	<b>Sub Division</b>	<b>Particle Size</b>		
BOULDERS		> 200 mm		
COBBLES		63 to 200 mm		
GRAVEL	Coarse	20 to 63 mm		
	Medium	6.0 to 20 mm		
	Fine	2.0 to 6.0 mm		
SAND	Coarse	0.6 to 2.0 mm		
	Medium	0.2 to 0.6 mm		
	Fine	0.075 to 0.2 mm		
SILT		0.002 to 0.075 mm		
CLAY		< 0.002 mm		

### MOISTURE CONDITION

AS1726 - 1993

Symbol	Term	Description
D	Dry	Sands and gravels are free flowing. Clays & Silts may be brittle or friable and powdery.
M	Moist	Soils are darker than in the dry condition & may feel cool. Sands and gravels tend to cohere.
W	Wet	Soils exude free water. Sands and gravels tend to cohere.

### CONSISTENCY AND DENSITY

AS1726 - 1993

Symbol	Term	Undrained Shear Strength	Symbol	Term	Density Index %	SPT "N" #
VS	Very Soft	0 to 12 kPa	VL	Very Loose	Less than 15	0 to 4
S	Soft	12 to 25 kPa	L	Loose	15 to 35	4 to 10
F	Firm	25 to 50 kPa	MD	Medium Dense	35 to 65	10 to 30
St	Stiff	50 to 100 kPa	D	Dense	65 to 85	30 to 50
VSt	Very Stiff	100 to 200 kPa	VD	Very Dense	Above 85	Above 50
H	Hard	Above 200 kPa				

In the absence of test results, consistency and density may be assessed from correlations with the observed behaviour of the material.

# SPT correlations are not stated in AS1726 – 1993, and may be subject to corrections for overburden pressure and equipment type.

**DRILLING/EXCAVATION METHOD**



AS*	Auger Screwing	RD	Rotary blade or drag bit	NQ	Diamond Core - 47 mm
AD*	Auger Drilling	RT	Rotary Tricone bit	NMLC	Diamond Core - 52 mm
*V	V-Bit	RAB	Rotary Air Blast	HQ	Diamond Core - 63 mm
*T	TC-Bit, e.g. ADT	RC	Reverse Circulation	HMLC	Diamond Core - 63mm
HA	Hand Auger	PT	Push Tube	BH	Tractor Mounted Backhoe
ADH	Hollow Auger	CT	Cable Tool Rig	EX	Tracked Hydraulic Excavator
DTC	Diatube Coring	JET	Jetting	EE	Existing Excavation
WB	Washbore or Bailer	NDD	Non-destructive digging	HAND	Excavated by Hand Methods

**PENETRATION/EXCAVATION RESISTANCE**

- L Low resistance.** Rapid penetration possible with little effort from the equipment used.
- M Medium resistance.** Excavation/possible at an acceptable rate with moderate effort from the equipment used.
- H High resistance** to penetration/excavation. Further penetration is possible at a slow rate and requires significant effort from the equipment.
- R Refusal or Practical Refusal.** No further progress possible without the risk of damage or unacceptable wear to the digging implement or machine.

These assessments are subjective and are dependent on many factors including the equipment power, weight, condition of excavation or drilling tools, and the experience of the operator.

**WATER**

	Water level at date shown		Partial water loss
	Water inflow		Complete water loss

**GROUNDWATER NOT OBSERVED**      The observation of groundwater, whether present or not, was not possible due to drilling water, surface seepage or cave in of the borehole/test pit.

**GROUNDWATER NOT ENCOUNTERED**      The borehole/test pit was dry soon after excavation. However, groundwater could be present in less permeable strata. Inflow may have been observed had the borehole/test pit been left open for a longer period.

**SAMPLING AND TESTING**

SPT	Standard Penetration Test to AS1289.6.3.1-2004
4,7,11 N=18 30/80mm	4,7,11 = Blows per 150mm. N = Blows per 300mm penetration following 150mm seating Where practical refusal occurs, the blows and penetration for that interval are reported
RW	Penetration occurred under the rod weight only
HW	Penetration occurred under the hammer and rod weight only
HB	Hammer double bouncing on anvil
DS	Disturbed sample
BDS	Bulk disturbed sample
G	Gas Sample
W	Water Sample
FP	Field permeability test over section noted
FV	Field vane shear test expressed as uncorrected shear strength ( $s_v$ = peak value, $s_r$ = residual value)
PID	Photoionisation Detector reading in ppm
PM	Pressuremeter test over section noted
PP	Pocket penetrometer test expressed as instrument reading in kPa
U63	Thin walled tube sample - number indicates nominal sample diameter in millimetres
WPT	Water pressure tests
DCP	Dynamic cone penetration test
CPT	Static cone penetration test
CPT <sub>u</sub>	Static cone penetration test with pore pressure (u) measurement

**Ranking of Visually Observable Contamination and Odour (for specific soil contamination assessment projects)**

R = 0	No visible evidence of contamination	R = A	No non-natural odours identified
R = 1	Slight evidence of visible contamination	R = B	Slight non-natural odours identified
R = 2	Visible contamination	R = C	Moderate non-natural odours identified
R = 3	Significant visible contamination	R = D	Strong non-natural odours identified

**ROCK CORE RECOVERY**

TCR = Total Core Recovery (%)	SCR = Solid Core Recovery (%)	RQD = Rock Quality Designation (%)
$= \frac{\text{Length of core recovered}}{\text{Length of core run}} \times 100$	$= \frac{\sum \text{Length of cylindrical core recovered}}{\text{Length of core run}} \times 100$	$= \frac{\sum \text{Axial lengths of core} > 100 \text{ mm}}{\text{Length of core run}} \times 100$



# TERMS FOR ROCK MATERIAL STRENGTH & WEATHERING AND ABBREVIATIONS FOR DEFECT DESCRIPTIONS

## STRENGTH

Symbol	Term	Point Load Index, $I_s(50)$ (MPa)	Field Guide
EL	Extremely Low	< 0.03	Easily remoulded by hand to a material with soil properties.
VL	Very Low	0.03 to 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 30 mm can be broken by finger pressure.
L	Low	0.1 to 0.3	Easily scored with a knife; indentations 1 mm to 3 mm show in the specimen with firm blows of pick point; has dull sound under hammer. A piece of core 150 mm long by 50 mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
M	Medium	0.3 to 1	Readily scored with a knife; a piece of core 150 mm long by 50 mm diameter can be broken by hand with difficulty.
H	High	1 to 3	A piece of core 150 mm long by 50 mm diameter cannot be broken by hand but can be broken with pick with a single firm blow; rock rings under hammer.
VH	Very High	3 to 10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
EH	Extremely High	>10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

## ROCK STRENGTH TEST RESULTS

▼	Point Load Strength Index, $I_s(50)$ , Axial test (MPa)
◀	Point Load Strength Index, $I_s(50)$ , Diametral test (MPa)
Relationship between $I_s(50)$ and UCS (unconfined compressive strength) will vary with rock type and strength, and should be determined on a site-specific basis. UCS is typically 10 to 30 x $I_s(50)$ , but can be as low as 5.	

## ROCK MATERIAL WEATHERING

Symbol	Term	Field Guide
RS	Residual Soil	Soil developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported.
EW	Extremely Weathered	Rock is weathered to such an extent that it has soil properties - i.e. it either disintegrates or can be remoulded, in water.
DW	HW	Distinctly Weathered
	MW	
SW	Slightly Weathered	Rock is slightly discoloured but shows little or no change of strength relative to fresh rock.
FR	Fresh	Rock shows no sign of decomposition or staining.

## ABBREVIATIONS FOR DEFECT TYPES AND DESCRIPTIONS

Defect Type	Coating or Infilling	Roughness
B Bedding parting	Cn Clean	Sl Slicksided
X Foliation	Sn Stain	Sm Smooth
C Contact	Vr Veneer	Ro Rough
L Cleavage	Ct Coating or Infill	
J Joint	Planarity	
SS/SZ Sheared seam/zone (Fault)	Pl Planar	<b>Vertical Boreholes</b> – The dip (inclination from horizontal) of the defect is given. <b>Inclined Boreholes</b> – The inclination is measured as the acute angle to the core axis.
CS/CZ Crushed seam/zone (Fault)	Un Undulating	
DS/DZ Decomposed seam/zone	St Stepped	
IS/IZ Infilled seam/zone		
S Schistosity		
V Vein		

## CEMENTATION CLASSIFICATION

### SIMPLIFIED CEMENTATION CLASSIFICATION SYSTEM FOR CEMENTED GRANULAR MATERIALS

**Very well cemented** - generally very hard rock, cannot be scratched easily, core can be broken with blow from hammer.

**Well cemented** - hard rock, can be scratched with thumbnail, requires substantial effort to break core.

**Moderately cemented** - soft rock, easily scratched, generally friable, rock core can be broken by hand.

**Weakly cemented** - very soft rock, crushed between fingers.

**Very weakly cemented** - near uncemented sand.



# REPORT OF BOREHOLE: VB1

SHEET: 1 OF 1

CLIENT: DWER  
 PROJECT: Groundwater Assessment  
 LOCATION: Oakford  
 JOB NO: 1779954

COORDS: 397173.5 m 6433538.7 m  
 SURFACE RL: DATUM: AHD  
 INCLINATION: 00°  
 HOLE DEPTH: 5.00 m

DRILL RIG: Geoprobe 66200DT  
 CONTRACTOR: DPP  
 LOGGED: JH DATE: 28/6/17  
 CHECKED: RT DATE: 4/8/17

Drilling				Sampling			Field Material Description			
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	PIEZOMETER DETAILS
			DEPTH RL							
			-1							
			0	0.10	0.00-0.10 m PID = 0.0ppm		SAND fine to coarse grained, sub-rounded to sub-angular, black, trace silt, trace organics (rootlets) dark grey to grey	D	L	Stick-up 0.6m
					0.40-0.50 m PID = 0.3ppm					Bentonite seal
			1		0.90-1.00 m PID = 0.3 ppm					
					1.40-1.50 m PID = 0.3 ppm					50mm Class 18 flush-threaded PVC
			2		1.90-2.00 m PID = 0.2 ppm					
				2.20			white			
				2.40	2.40-2.50 m PID = 0.4 ppm		dark grey to black			Filter pack
				2.70			grey to white			
			3		2.90-3.00 m PID = 15.5 ppm					
					3.40-3.50 m PID = 25.9 ppm					
				3.90						
			4	4.10	Q13077-06 ON HOLD 3.90-4.00 m PID = 36.1 ppm		Silty SAND black, weakly cemented grey			3mm slotted screen
				4.60	Q13077-07 ON HOLD 4.40-4.50 m PID = 44.7ppm					
					4.90-5.00 m PID = 9.8 ppm		Silty SAND black, weakly cemented			End cap
			5				END OF BOREHOLE @ 5.00 m GROUNDWATER ENCOUNTERED @ 2.70 m DEPTH PIEZOMETER INSTALLED Rotten egg smell noted while drilling. Contaminated soil ranking 0B.			End of hole
			6							

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for environmental purposes only, without attempt to consider geotechnical properties or the geotechnical significance of the materials encountered. As such it should not be relied upon for geotechnical purposes.



# REPORT OF BOREHOLE: VB2

SHEET: 1 OF 1

DRILL RIG: Geoprobe 66200DT

CONTRACTOR: DPP

LOGGED: JH DATE: 28/6/17

CHECKED: RT DATE: 4/8/17

CLIENT: DWER

COORDS: 397255.4 m 6433529.4 m

PROJECT: Groundwater Assessment

SURFACE RL: DATUM: AHD

LOCATION: Oakford

INCLINATION: 00°

JOB NO: 1779954

HOLE DEPTH: 5.00 m

Drilling				Sampling			Field Material Description			
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	PIEZOMETER DETAILS
			DEPTH RL							
			-1							
			0	0.00-0.10 m PID = 1.1 ppm	[Yellow dotted pattern]		SAND fine to coarse grained, sub-rounded to sub-angular, black, with trace silty fines and trace organics (rootlets and woodchips)	D		
			0.30	0.40-0.50 m PID = 0.2 ppm			grey			
			1	0.90-1.00 m PID = 0.2 ppm				L		
				1.40-1.50 m PID = 0.1 ppm				M		
			2	1.90-2.00 m PID = 0.1 ppm						
				2.40-2.50 m PID = 0.1 ppm						
			3	2.90-3.00 m PID = 0.3 ppm				MD		
				3.40-3.50 m PID = 0.5 ppm						
			4	3.90-4.00 m PID = 0.5 ppm				W		
			4.10					Silty SAND dark brown to black		
				4.40-4.50 m PID = 21.8 ppm			weakly cemented			
			4.50	Q13077-05 ON HOLD						
			5	4.90-5.00 m PID = 7.7 ppm			END OF BOREHOLE @ 5.00 m GROUNDWATER ENCOUNTERED @ 2.70 m DEPTH PIEZOMETER INSTALLED Contaminated soil ranking 0A.			
			6							

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for environmental purposes only, without attempt to consider geotechnical properties or the geotechnical significance of the materials encountered. As such it should not be relied upon for geotechnical purposes.



# REPORT OF BOREHOLE: VB3

SHEET: 1 OF 1

CLIENT: DWER  
 PROJECT: Groundwater Assessment  
 LOCATION: Oakford  
 JOB NO: 1779954

COORDS: 397236.1 m 6433438.0 m  
 SURFACE RL: DATUM: AHD  
 INCLINATION: 00°  
 HOLE DEPTH: 5.00 m

DRILL RIG: Geoprobe 66200DT  
 CONTRACTOR: DPP  
 LOGGED: JH DATE: 28/6/17  
 CHECKED: RT DATE: 4/8/17

Drilling				Sampling			Field Material Description			
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	PIEZOMETER DETAILS
			DEPTH RL							
			-1							
			0	0.00-0.10 m PID = 0.0 ppm			SAND fine to coarse grained, sub-rounded to sub-angular, black, trace silty fines and trace organics (roots/wood chips)	D		Stick-up 0.6m
			0.50	0.40-0.50 m PID = 0.0 ppm			grey to dark grey	L		Bentonite seal
			1	0.90-1.00 m PID = 0.0 ppm				M		50mm class 18 flush-threaded PVC
			1.40-1.50 m	PID = 0.0 ppm						
			2	1.90-2.00 m PID = 0.1 ppm						
			2.40-2.50 m	PID = 0.1 ppm						Filter pack
			3	2.90-3.00 m PID = 0.5 ppm				MD		
			3.40	3.40-3.50 m PID = 2.3 ppm			Silty SAND fine to medium grained, dark brown to black, weakly cemented			
			4	3.90-4.00 m PID = 0.3 ppm			grey	W		3mm slotted screen
			4.30	4.40-4.50 m PID = 1.3 ppm			Silty SAND fine to coarse grained, dark brown to black			
			5	4.90-5.00 m PID = 11.2 ppm			END OF BOREHOLE @ 5.00 m GROUNDWATER ENCOUNTERED @ 2.70 m DEPTH PIEZOMETER INSTALLED Contaminated soil ranking 0A.			End cap End of hole
			6							

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for environmental purposes only, without attempt to consider geotechnical properties or the geotechnical significance of the materials encountered. As such it should not be relied upon for geotechnical purposes.





# REPORT OF BOREHOLE: VB4

SHEET: 1 OF 1

DRILL RIG: Geoprobe 66200DT

CONTRACTOR: DPP

LOGGED: JH DATE: 28/6/17

CHECKED: RT DATE: 4/8/17

CLIENT: DWER

COORDS: 397567.1 m 6433481.0 m

PROJECT: Groundwater Assessment

SURFACE RL: DATUM: AHD

LOCATION: Oakford

INCLINATION: 00°

JOB NO: 1779954

HOLE DEPTH: 4.50 m

Drilling				Sampling			Field Material Description			
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	PIEZOMETER DETAILS
			DEPTH RL							
			-1							
			0	0.00-0.05 m PID = 0.0 ppm	[Yellow dotted pattern]		SAND medium to coarse grained, sub-rounded to sub-angular, black, with trace silty fines and trace organics (wood chips)			
			0.30				black to grey			
			0.80	0.50-0.60 m PID = 0.0 ppm			grey			
			1	0.90-1.00 m PID = 0.0 ppm						
			2	1.40-1.50 m PID = 0.1 ppm			brown			
			2.00	1.90-2.00 m PID = 0.7 ppm						
			2.70	Q13077-03 ON HOLD 2.40-2.50 m PID = 3.4 ppm		white to grey				
			3	Q13077-01 ON HOLD 2.90-3.00 m PID = 48.6 ppm						
			4	3.40-3.50 m PID = 0.3 ppm						
			4.10	Q13077-02 ON HOLD 3.90-4.00 m PID = 62.8 ppm			Silty SAND fine to medium grained, dark brown to black, weakly cemented			
			4.40-4.50 m PID = 10.4 ppm							
			5	END OF BOREHOLE @ 4.50 m GROUNDWATER ENCOUNTERED @ 2.70 m DEPTH PIEZOMETER INSTALLED Rotten egg smell noted while drilling. Contaminated soil ranking 0B.						
			6							

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for environmental purposes only, without attempt to consider geotechnical properties or the geotechnical significance of the materials encountered. As such it should not be relied upon for geotechnical purposes.



# REPORT OF BOREHOLE: VB5

SHEET: 1 OF 1

CLIENT: DWER  
 PROJECT: Groundwater Assessment  
 LOCATION: Oakford  
 JOB NO: 1779954

COORDS: 397569.0 m 6433228.6 m  
 SURFACE RL: DATUM: AHD  
 INCLINATION: 00°  
 HOLE DEPTH: 5.00 m

DRILL RIG: Geoprobe 66200DT  
 CONTRACTOR: DPP  
 LOGGED: JH DATE: 28/6/17  
 CHECKED: RT DATE: 4/8/17

Drilling				Sampling			Field Material Description			
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	PIEZOMETER DETAILS
			DEPTH RL							
			-1							
			0	0.00-0.10 m PID = 0.1ppm			SAND medium to coarse grained, sub-rounded to sub-angular, black, with trace silty fines and trace organics (wood chips)			Stick-up 0.6m
			0.50	0.40-0.50 m PID = 0.2ppm			grey to pale brown, trace silty fines			Backfill
			1	0.90-1.00 m PID = 0.3ppm						Bentonite seal
				1.40-1.50 m PID = 0.3ppm						50mm Class 18 flush-threaded PVC
			2	1.90-2.00 m PID = 15.6 ppm						
				2.40-2.50 m PID = 28.2ppm						Filter pack
			3	Q13077-04 ON HOLD 2.90-3.00 m PID = 46.6ppm						3mm slotted screen
			3.30	3.30-3.40 m PID = 8.8 ppm			Silty SAND fine to coarse grained, black to dark brown, weak to medium cementation			
			4	4.00-4.10 m PID = 15.4 ppm			brown to grey			
				4.40-4.50 m PID = 4.1 ppm						
			5	4.90-5.00 m PID = 9.0 ppm			END OF BOREHOLE @ 5.00 m GROUNDWATER ENCOUNTERED @ 2.70 m DEPTH PIEZOMETER INSTALLED Rotten egg smell noted while drilling. Contaminated soil ranking 0B.			End cap End of hole
			6							

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for environmental purposes only, without attempt to consider geotechnical properties or the geotechnical significance of the materials encountered. As such it should not be relied upon for geotechnical purposes.



# **APPENDIX B**

## **Calibration Certificates**



# AES

## ACTIVE ENVIRONMENTAL SOLUTIONS

### Calibration Report

#### Multi-Parameter Water Quality Instrument

Customer: Golder  
Contact: Jess

Manufacturer: YSI  
Instrument: Professional Plus with Quatro cable  
Serial #: 13J100087  
Cable length: 1m

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 60 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	4.0.0
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor housing	Condition	✓	
<b>pH</b>			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range	0 mV ± 50 mV	✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	168.40 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
<b>ORP</b>			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV 1 mV
<b>Conductivity</b>			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant	5.0 ± 1.0 in GLP file	✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µS/cm
<b>Dissolved Oxygen</b>			
Condition		✓	Good, clean
DO sensor in use		✓	Galvanic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

This is to certify that the above instrument has been calibrated to the following specifications:

Parameter	Standards	Reference	Calibration Point	Span	Units	Instrument Readings		
						Before	After	Units
Temperature	Center 370 Thermometer	Room Temp	20.5	-0.2	°C	NA	20.3	°C
pH	pH 7.00	NF1971	7.01	-58.90	mV	7.03	7.01	pH
pH	pH 4.00	NF1636	4.00	109.50	mV	3.94	4.00	pH
Conductivity	2760 µS/cm at 25°C	NF2046	2760	GLP	5.14	2720	2760	µS/cm
ORP (Reference check only)	Zobell A & B	NG1334/1335	239	239	mV	228.8	238.2	mV
Zero Dissolved Oxygen	NaSO <sub>3</sub> in distilled water	1504192304	0.0	NA	NA	1.4	0.0	%
100% Dissolved Oxygen	100% Air Saturation	Air	100.0	4.96	uA	105.2	100	%

Calibrated by: Gaurav Kanwar

Calibration Date: 06-Jun-17

Next Due: 06-Jul-17

**Melbourne Head Office**  
Sydney S14 Lvl 2  
Perth Unit 6  
Brisbane Unit 17

2 Merchant Avenue  
6-8 Holden Street  
41 Holder Way  
23 Ashtan Place

THOMASTOWN VIC 3074  
ASHFIELD NSW 2131  
MALAGA WA 6090  
BANYO QLD 4014

T: +(613) 9464 2300  
T: +(612) 9716 5966  
T: +(618) 9249 5663  
T: +(617) 3267 1433

F: +(613) 9464 3421  
F: +(612) 9716 5988  
F: +(618) 9249 5362  
F: +(617) 3267 3559

sales@aesolutions.com.au

ISO Certified  
9001:2008

www.aesolutions.com.au



# AES

## ACTIVE ENVIRONMENTAL SOLUTIONS

### Calibration Report

#### MiniRAE 3000 - VOC

**Customer:**  
**Contact:**

**Manufacturer:** RAE Systems  
**Instrument:** MiniRAE 3000  
**Model:** PGM-7320  
**Serial #:** 592-915478

Item	Test	Pass	Comments
Battery	Li Ion	✓	4.2v/3300mAH rechargeable Lithium-Ion battery pack
Charger	Charger, Power supply	✓	
	Cradle, travel charger	✓	
Filter	Filter, fitting, etc	✓	
Alarms	Alarm Mode	✓	Auto Reset
	Buzzer & Light	✓	Both On
Datalogger	Datalog	✓	Cleared
	Interval	✓	60 secs
	Data Selection	✓	Minimum, Average, Maximum
	Datalog Type	✓	Auto
Display	Operation	✓	
Switches	Operation	✓	
PCB	Operation - Main	✓	
Connectors	Charging port	✓	
Firmware	Version	✓	2.14
Monitor	Operation mode	✓	Hygiene mode
	User mode	✓	Advanced
	Time	✓	24 hour
	Pump Duty Cycle	✓	100%
	Pump Speed	✓	High
	Pump Flow Rate	✓	>400 ml/min
	Temperature	✓	Degree Celsius
	Real Time Protocol	✓	P2P (cable)
	Power on Zero	✓	Off
	Lamp ID	✓	10.6 eV
Monitor housing	Condition	✓	Clean
Case	Rubber boot	✓	Yellow

Alarms				
Sensors	High	Low	STEL	TWA
VOC	100 ppm	50 ppm	25 ppm	10 ppm

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Lamp ID	Span Gas	Concentration	Cyl. No.	CF	Zero	Span
VOC		Isobutylene	100 ppm	W0137773-1	1	0.0 ppm	100.0 ppm

**Calibrated by:** Gaurav Kanwar

**Calibration Date:** 07-Jun-17

**Next Due:** 07-Jul-17

**Melbourne Head Office**  
**Sydney** S14 Lvl 2  
**Perth** Unit 6  
**Brisbane** Unit 17

2 Merchant Avenue  
6-8 Holden Street  
41 Holder Way  
23 Ashtan Place

THOMASTOWN VIC 3074  
ASHFIELD NSW 2131  
MALAGA WA 6090  
BANYO QLD 4014

T: +(613) 9464 2300  
T: +(612) 9716 5966  
T: +(618) 9249 5663  
T: +(617) 3267 1433

F: +(613) 9464 3421  
F: +(612) 9716 5988  
F: +(618) 9249 5362  
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)



# Water Quality Meter Calibration Sheet

Job 1779954  
 Date and time 10/Jul/17  
 Name Malt 4

WQ meter make/model YSI  
 WQ meter serial number 1SK10032S

Parameter	Standard Solution	Pre-sampling reading		Acceptable range	Calibration Required (y/n)		Post-sampling Reading	
Temperature	°C	10		± 0.5°C	N/A		16°	
pH	4	3.96		3.9 - 4.1	N		3.98	
	7	7.02		6.9 - 7.1	N		7.06	
Conductivity	<del>2760</del> 12.88 m S/cm@25°C	2738		±5%	N		2746	
	35 m S/cm@25°C	N/A		±5%	N/A		N/A	
Dissolved Oxygen	0% saturation solution	0.0		±0.1 ppm	N		0.0	
	Ambient Air	9.88		± 0.5 ppm of value on Table A overleaf	N/A		9.88	
Redox	240 mV@ 25 °C	238		±10mV	N.		235.	





# **APPENDIX C**

## **Waste Disposal Certificate**



## CERTIFICATE OF DISPOSAL

**CERTIFICATE NUMBER: 0187747**

This is to certify that Toxfree Australia Pty Ltd (TES Kwinana) has treated and disposed of the material as detailed below at Lot 4, Mason Road Kwinana. This plant is licensed by The Department of Environmental Conservation for the treatment of such material. Licence No: L6297/1993/11.

Details of material destroyed:

**Source of material:** **GOLDER ASSOCIATES**  
**Project No.: 1779954**

**Material:** 1 x 205L Drum of Purged Ground Water - Class III or Less  
1 x 20L Drum of Purged Ground Water – Class III or Less  
1 x 205L Drum of Drilling Soil – Class III or Less

**Date received:** 26/07/2017

Signed on behalf of Tox Free:

Name:  
Position:  
Date:

  
Steve Ashton  
Operations Manager  
26/07/2017

**NOTE THAT THE ABOVE RECORDS CAN BE VERIFIED BY REFERENCE TO THE PLANT PRODUCTION LOGS RETAINED AT TOX FREE AUSTRALIA PTY LTD PREMISES IN KWINANA.**



# **APPENDIX D**

## **Chain of Custody Documentation**





1 Havelock Street  
West Perth, WA 6005 Australia  
Telephone +61 8 9213 7600 Fax +61 8 9213 7611

# CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

Q 13077 page 1 of 1

Project Number: 1779954		Laboratory Name: Eurofins M&T	
Golder Contact: Sarah Garvey		Golder Email Address: sgarvey@golder.com.au	
Address: Unit 2, 91 Leach Hwy Leederville		Telephone/Fax: 92519600	Contact:

Address where reports should be sent to

PO Box 1914  
West Perth, WA 6872  
Telephone (61 8) 9213 7600  
Fax (61 8) 9213 7611

Other  
 Jess Hay  
 email: jhay@...  
 Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Sample Control Number (SCN)	Sample Matrix (over)	Date Sampled (D/M/Y)	Number of Containers	Analyses Required										RUSH	Remarks (over)		
				PFAS suite (28)	Total metals (8)												
13077-01	S	28/6/17	1	X													
-02			1	X													
-03			1	X													
-04			1	X													
-05			1	X													
-06			1	X													
-07			1	X													
-08	W		1	X	X												
-09																	
-10																	
-11																	
-12																	

29/6

Sampler's Signature:	Relinquished by: Signature	Company: Golder	Date: 29/6/17	Time:	Received by: Signature	Company:
Sample Storage (°C): ICE	Relinquished by: Signature	Company:	Date:	Time:	Received by: Signature	Company:
Comments:	Method of Shipment:	Waybill No:	Received for Lab by:		Date: 29/6	Time: 1p
	Shipped by:	Shipment Condition: Seal intact:	Temp (°C):	Cooler opened by:	Date:	Time:

WHITE: Golder Copy YELLOW: Lab Copy PINK: Lab Returns with Final Report

552310





1 Havelock Street  
 West Perth, WA 6005 Australia  
 Telephone +61 8 9213 7600 Fax +61 8 9213 7611

# CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

Q 00185 page 1 of 1

Project Number: 1779954		Laboratory Name: Golder	
Golder Contact: Survey		Golder Email Address: @golder.com.au	
Address:		Telephone/Fax:	
Contact:		Contact:	

Address where reports should be sent to

PO Box 1914  
 West Perth, WA 6872  
 Telephone (61 8) 9213 7600  
 Fax (61 8) 9213 7611

Other @mbellaid

Phone \_\_\_\_\_ Fax \_\_\_\_\_

Sample Control Number (SCN)	Sample Matrix (over)	Date Sampled (D/M/Y)	Number of Containers	Analyses Required										Remarks (over)		
				See Attached	Quake #170424GdLW	Water Sample	Trip Blank	Waste class	RUSH							
- 01	W	10/7	10	✓												
- 02	W		9													
- 03	W		9													
- 04	W		9													
- 05	W		9													
- 06	W		9													
- 07	W		2													
- 08	S		2													
- 09																
- 10																
- 11																
- 12																

Quake = # 170424 GdLW

Sampler's Signature: [Signature]	Relinquished by: Signature [Signature]	Company: Golder	Date: 10/7	Time:	Received by: Signature	Company:
Sample Storage (°C):	Relinquished by: Signature	Company:	Date:	Time:	Received by: Signature	Company:
Comments:	Method of Shipment:	Waybill No:	Received for Lab by: Amy	Date: 10/7/17	Time: 14:58	
	Shipped by:	Shipment Condition: Seal intact:	Temp (°C): 10.8	Cooler opened by: Amy	Date:	Time:

WHITE: Golder Copy YELLOW: Lab Copy PINK: Lab Returns with Final Report

553774







1 Havelock Street  
West Perth, WA 6005 Australia  
Telephone +61 8 9213 7600 Fax +61 8 9213 7611

# CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

Q 00185

page 1 of 1

Project Number: <b>1779954</b>		Laboratory Name: <b>Golder</b>	
Short Title: <b>Oakford</b>		Address:	
Golder Contact: <b>Sweeney</b>	Golder Email Address: <b>@golder.com.au</b>	Telephone/Fax:	Contact:

Address where reports should be sent to

PO Box 1914  
West Perth, WA 6872  
Telephone (61 8) 9213 7600  
Fax (61 8) 9213 7611

Other **@mhallow**

Phone \_\_\_\_\_ Fax \_\_\_\_\_

Sample Control Number (SCN)	Sample Location	Sa#	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D/M/Y)	Time Sampled (HH/MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	Analyses Required						Remarks (over)	
											See Attached. <b>1779954 G&amp;W</b>	Water Sinks	TIC Blank	Waste class	RUSH			
<b>Q00185 - 01</b>	<b>VB4</b>			<b>W</b>	<b>10/7</b>					<b>1</b>								
<b>- 02</b>	<b>VB5</b>			<b>W</b>						<b>1</b>								
<b>- 03</b>	<b>FD</b>			<b>W</b>				<b>FD Q00185 - 02</b>		<b>1</b>								
<b>- 04</b>	<b>VB3</b>			<b>W</b>						<b>1</b>								
<b>- 05</b>	<b>VB2</b>			<b>W</b>						<b>1</b>								
<b>- 06</b>	<b>VB1</b>			<b>W</b>						<b>1</b>								
<b>- 07</b>	<b>TB</b>			<b>W</b>						<b>2</b>								
<b>- 08</b>	<b>Soil</b>			<b>S</b>						<b>2</b>								
<b>- 09</b>	<del>Soil</del>			<del>S</del>														
<b>- 10</b>																		
<b>- 11</b>																		
<b>- 12</b>																		

Sampler's Signature: <b>[Signature]</b>	Relinquished by: Signature <b>[Signature]</b>	Company <b>Golder</b>	Date <b>10/7</b>	Time	Received by: Signature	Company
Sample Storage (°C)	Relinquished by: Signature <b>[Signature]</b>	Company	Date	Time	Received by: Signature	Company
Comments:	Method of Shipment:	Waybill No:	Received for Lab by:		Date	Time
	Shipped by:	Shipment Condition: Seal intact:	Temp (°C)	Cooler opened by:	Date	Time

Code = #170424 G&W





1 Havelock Street  
West Perth, WA 6005 Australia  
Telephone +61 8 9213 7600 Fax +61 8 9213 7611

# CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

**Q 00186**

page 1 of 1

Project Number: <b>1779984</b>	Laboratory Name: <b>ALS</b>
Short Title: <b>oakford</b>	Address: <b>10 Hobdaway</b>
Golder Contact: <b>S Garvey</b>	Golder Email Address: <b>@golder.com.au</b>
Telephone/Fax:	Contact: <b>Shrek</b>

Address where reports should be sent to  PO Box 1914  
West Perth, WA 6872  
Telephone (61 8) 9213 7600  
Fax (61 8) 9213 7611

Other **@mholland**  
**email**

Phone \_\_\_\_\_ Fax \_\_\_\_\_

**Analyses Required**

Sample Control Number (SCN)	Sample Location	Sa#	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D/M/Y)	Time Sampled (HH/MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	Analyses Required										Remarks (over)
<b>Q00186-01</b>	<b>FT</b>			<b>W</b>	<b>10/7</b>			<b>Q00186-06</b>		<b>11</b>	<b>(See Attached 11) (for suite) (Tr. Blank. 1st. 6tex. (6-C110))</b>										
<b>-02</b>	<b>TB</b>			<b>W</b>	<b>10/7</b>			<b>TB</b>		<b>1</b>											
<b>-03</b>																					
<b>-04</b>																					
<b>-05</b>																					
<b>-06</b>																					
<b>-07</b>																					
<b>-08</b>																					
<b>-09</b>																					
<b>-10</b>																					
<b>-11</b>																					
<b>-12</b>																					

Sampler's Signature: <b>[Signature]</b>	Relinquished by: Signature <b>[Signature]</b>	Company: <b>Golder</b>	Date: <b>10/7</b>	Time:	Received by: Signature	Company:	
Sample Storage (°C)	Relinquished by: Signature	Company:	Date:	Time:	Received by: Signature	Company:	
Comments:	Method of Shipment:	Waybill No:		Received for Lab by:		Date:	Time:
	Shipped by:	Shipment Condition: Seal intact:		Temp (°C):	Cooler opened by:	Date:	Time:



1 Havelock Street  
West Perth, WA 6005 Australia  
Telephone +61 8 9213 7600 Fax +61 8 9213 7611

# CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

Q 00186

page 1 of 1

Project Number: 1779954		Laboratory Name: ACS	
Golder Contact: S Garvey		Address: 10 Hobd Way	
Golder Email Address: @golder.com.au		Telephone/Fax:	Contact: Shake

Address where reports should be sent to  PO Box 1914 West Perth, WA 6872 Telephone (61 8) 9213 7600 Fax (61 8) 9213 7611

Other: email

Phone \_\_\_\_\_ Fax \_\_\_\_\_

Analyses Required

Sample Control Number (SCN)	Sample Matrix (over)	Date Sampled (D/M/Y)	Number of Containers	Remarks (over)
1000186-01	W	10/7	11 (See Attached)	
-02	W	10/7	1 (for suite)	
<del>-03</del>				
-04				
-05				
-06				
-07				
-08				
-09				
-10				
-11				
-12				

Environmental Division  
Perth  
Work Order Reference  
**EP1707310**

Telephone : + 61-8-9209 7656

Relinquished by: Signature <u>[Signature]</u>	Relinquished by: Signature <u>[Signature]</u>	Company <u>Golder</u>	Date <u>10/7</u>	Time <u>17:00</u>	Received by: Signature <u>[Signature]</u>	Company <u>ACS</u>
Temperature Storage (°C)	Relinquished by: Signature <u>[Signature]</u>	Company <u>Golder</u>	Date <u>10/7</u>	Time	Received by: Signature	Company
Notes:	Method of Shipment:	Waybill No:	Received for Lab by:		Date	Time
	Shipped by:	Shipment Condition: Seal intact:	Temp (°C)	Cooler opened by:	Date	Time

WHITE: Golder Copy YELLOW: Lab Copy PINK: Lab Returns with Final Report

### ATTACHMENT 3

#### Groundwater Sample Analysis Parameters

Parameter
pH
Electrical conductivity
Total nitrogen as N
Total kjeldahl nitrogen as N
Ammonia (NH <sub>3</sub> )
Nitrate (NO <sub>3</sub> )
Nitrite (NO <sub>2</sub> )
Nitrate + Nitrite as N
Total phosphorus
Reactive phosphorus
Total dissolved solids
hardness
Total organic carbon
Biochemical oxygen demand
Chemical oxygen demand
Alkalinity
Major cations / anions
Arsenic (dissolved)
Cadmium (dissolved)
Chromium (dissolved)
Copper (dissolved)
Lead (dissolved)
Nickel (dissolved)
Zinc (dissolved)
Mercury (dissolved)
Iron (dissolved)
Aluminium (dissolved)
Calcium (dissolved)
Total recoverable hydrocarbons (NEPM fractions)
Total recoverable hydrocarbons (silica gel cleanup)
Benzene
Toluene
Ethylbenzene
Xylenes
Phenols
Polycyclic aromatic hydrocarbons
PFAS <sup>1</sup>

<sup>1</sup> As per the minimum requirements set out in Table 3 (page 10) of *Interim Guideline on the Assessment and Management of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)* (DER, 2017)



# **APPENDIX E**

## **Groundwater Sampling Sheets**

**GROUNDWATER SAMPLING RECORD FORM**



**PROJECT INFORMATION**

Project Number: 1779954  
 Client: OGA/DER  
 Site Location: OGA/DER

Date: 10/7  
 Sampled By: [Signature]

**GROUNDWATER WELL DATA**

**Information recorded on site**

Diameter of standpipe (mm)	<u>50</u>
Standpipe stick up (m)	<u>-</u>
Time	<u>12:45</u>
Interface probe used?	<u>N</u>
Depth to product (mbRP)	<u>-</u>
Depth to water (mbRP)	<u>2.884</u>
Thickness of product (interface probe) (m)	<u>-</u>
Total depth of well (mbRP)	<u>3.375</u>
Bailed Thickness (m)	<u>-</u>

**BORE ID** VB1

**Information from file**

Surveyed reference point	-
Depth of well (from log)	-
Standard flow rate (L/min)	-
Depth of pump intake (mbRP)	-
Length of hose (m)	-
Volume in hose (L)	-

Note: Standard reference point is top of PVC standpipe  
 mbRP - metres below top of reference point  
 Hose volume - 0.1 L/m of 12mm internal diameter hose  
 Hose volume - 0.05 L/m of 8mm internal diameter hose  
 Hose volume - 0.03 L/m of 6.35mm internal diameter hose

Condition: New

**EQUIPMENT RECORD**

Purging & Sampling Method: Peristaltic Pump  
 WQM Model: (Hire)

Calibrated by: [Signature] Serial Number: 15K100328

**PURGING RECORD**

Time	Volume Purged (L)	Conductivity (uS/cm)	Temp (°C)	pH	Redox Potential (mV)	Dissolved Oxygen (ppm)	Depth to Water (mbRP)	Drawdown (m)	Appearance (colour, turbidity, odour, etc)
Stabilisation Range		± 5%	± 0.5 °C	± 0.1	± 10 mV	± 10%			
12:50		435.8	18.2	4.70	-13.1	0.96	2.884	-	Brown.
12:55		398.6	18.3	4.21	-38.6	0.25	-	-	Brown
13:00		402.9	18.3	4.16	-48.6	0.23	2.884	-	file brown.
13:05		404.8	18.3	4.15	-50.2	0.24	" "	-	" "
13:10		404.3	18.3	4.13	-51.3	0.25	" "	-	" "
Flow Rate (mL/min)									

**SAMPLING RECORD**

Time sampled: 13:10 Sample ID: Q00185-06  
 Sample Appearance: Pale Brown / orange Duplicate sample taken? / Dup ID.: kw Tripled Q00186-01  
 Colour: Pale Brown / orange Turbidity: kw Tripled  
 Odour: kw Tripled Hydrocarbon sheen/LNAPL?: No

Sample Container and Preservation: (F = Filtered, UNF = Unfiltered, P = Preserved, UP = Unpreserved)

2 Vials (UP)	1 Metals (F) (UP)	1/2 0.125L Plastic
1L Amber	COD/NH3/Phenols (F/UNF) (P/UP)	0.5L Plastic
0.1L Amber	Cyanide (P)	Ferrous (F) (P)

Flow 1 9

**OBSERVATIONS**

Weather Conditions: Temperature: \_\_\_\_\_ Precipitation: \_\_\_\_\_  
 Notes: \_\_\_\_\_

GROUNDWATER SAMPLING RECORD FORM



PROJECT INFORMATION

Project Number: 1779954  
 Client: DEP  
 Site Location: Oakford

Date: 10/7/17  
 Sampled By: [Signature]

GROUNDWATER WELL DATA

BORE ID: VB2

Information recorded on site

Diameter of standpipe (mm)	50
Standpipe stick up (m)	-
Time	12.10
Interface probe used?	N
Depth to product (mbRP)	-
Depth to water (mbRP)	2.622
Thickness of product (interface probe) (m)	-
Total depth of well (mbRP)	5.41
Bailed Thickness (m)	-

Information from file

Surveyed reference point	-
Depth of well (from log)	-
Standard flow rate (L/min)	-
Depth of pump intake (mbRP)	-
Length of hose (m)	-
Volume in hose (L)	-

Note: Standard reference point is top of PVC standpipe  
 mbRP - metres below top of reference point  
 Hose volume - 0.1 L/m of 12mm internal diameter hose  
 Hose volume - 0.05 L/m of 8mm internal diameter hose  
 Hose volume - 0.03 L/m of 6.35mm internal diameter hose

Condition: Good/New

EQUIPMENT RECORD

Purging & Sampling Method: Peristaltic Pump  
 WQM Model: (Hire)

Calibrated by: [Signature] Serial Number: 15k100325

PURGING RECORD

Time	Volume Purged (L)	Conductivity (uS/cm)	Temp (°C)	pH	Redox Potential (mV)	Dissolved Oxygen (ppm)	Depth to Water (mbRP)	Drawdown (m)	Appearance (colour, turbidity, odour, etc)
Stabilisation Range		± 5%	± 0.5 °C	± 0.1	± 10 mV	± 10%			
12.15		880	20.2	5.27	-29.0	0.19	2.622	-	Pale Brown / some turbidity
12.20		891	20.4	5.09	-29.2	0.19	" "	-	Pale Brown.
12.25		904	20.2	5.07	-29.6	0.22	" "	-	" "
12.30		912	20.1	5.06	-30.7	0.24	" "	-	" "
12.35		911	20.1	5.06	-31.4	0.24	" "	-	" "
Flow Rate (mL/min)							2000		

SAMPLING RECORD

Time sampled: 12.35  
 Sample Appearance: Pale orange/brown  
 Colour: Pale orange/brown  
 Odour: Nil  
 Sample Container and Preservation: (F = Filtered, UNF = Unfiltered, P = Preserved, UP = Unpreserved)  
 2 Vials (UP) 1 Metals (F)(UP)  
 1L Amber COD/NH3/Phenols (F/UNF) (P/UP)  
 2 0.1L Amber Cyanide (P)  
 Sample ID: Q00185-05  
 Duplicate sample taken? / Dup ID.:  
 Turbidity: Nil  
 Hydrocarbon sheen/LNAPL?: Nil  
 1 0.125L Plastic  
 2 0.5L Plastic  
 Ferrous (F) (P)

OBSERVATIONS

Weather Conditions: Temperature: Precipitation:  
 Notes:



GROUNDWATER SAMPLING RECORD FORM



PROJECT INFORMATION

Project Number: 779954  
 Client: DEC  
 Site Location: ORHC

Date: 10/7  
 Sampled By: [Signature]

GROUNDWATER WELL DATA

Information recorded on site

Diameter of standpipe (mm)	<u>50mm</u>
Standpipe stick up (m)	
Time	<u>11:32</u>
Interface probe used?	<u>NO</u>
Depth to product (mbRP)	<u>-</u>
Depth to water (mbRP)	<u>2.816</u>
Thickness of product (interface probe) (m)	<u>-</u>
Total depth of well (mbRP)	<u>5.38</u>
Bailed Thickness (m)	<u>-</u>

BORE ID: VB3

Information from file

Surveyed reference point	-
Depth of well (from log)	-
Standard flow rate (L/min)	-
Depth of pump intake (mbRP)	-
Length of hose (m)	-
Volume in hose (L)	-

Note: Standard reference point is top of PVC standpipe  
 mbRP - metres below top of reference point  
 Hose volume - 0.1 L/m of 12mm internal diameter hose  
 Hose volume - 0.05 L/m of 8mm internal diameter hose  
 Hose volume - 0.03 L/m of 6.35mm internal diameter hose

Condition: Good/New

EQUIPMENT RECORD

Purging & Sampling Method: Peristaltic Pump  
 WQM Model: \_\_\_\_\_ (Hire)

Calibrated by: [Signature] Serial Number: 156100325

PURGING RECORD

Time	Volume Purged (L)	Conductivity (uS/cm)	Temp (°C)	pH	Redox Potential (mV)	Dissolved Oxygen (ppm)	Depth to Water (mbRP)	Drawdown (m)	Appearance (colour, turbidity, odour, etc)
Stabilisation Range		± 5%	± 0.5 °C	± 0.1	± 10 mV	± 10%			
<u>11:35</u>		<u>786</u>	<u>18.8</u>	<u>5.42</u>	<u>-77.3</u>	<u>3.16</u>	<u>2.816</u>	-	<u>the brown / grey</u>
<u>11:40</u>		<u>826</u>	<u>19.5</u>	<u>5.63</u>	<u>-63.6</u>	<u>2.32</u>	<u>2.816</u>	-	<u>" "</u>
<u>11:45</u>		<u>829</u>	<u>19.6</u>	<u>5.74</u>	<u>-41.8</u>	<u>2.05</u>	<u>" "</u>	-	<u>" "</u>
<u>11:50</u>		<u>826</u>	<u>19.5</u>	<u>5.77</u>	<u>-32.8</u>	<u>2.07</u>	<u>" "</u>	-	<u>" "</u>
<u>11:55</u>		<u>824</u>	<u>19.5</u>	<u>5.76</u>	<u>-30.1</u>	<u>2.04</u>	<u>" "</u>	-	<u>" "</u>
Flow Rate (mL/min)							<u>200</u>		

SAMPLING RECORD

Time sampled: 11:55 Sample ID: P00185-04  
 Sample Appearance: Ble brown / grey Duplicate sample taken? / Dup ID.: \_\_\_\_\_  
 Colour: \_\_\_\_\_ Turbidity: low  
 Odour: \_\_\_\_\_ Hydrocarbon sheen/LNAPL?: NO

Sample Container and Preservation: (F = Filtered, UNF = Unfiltered, P = Preserved, UP = Unpreserved)

<u>2</u> Vials (UP)	<u>1</u> Metals (F)(UP)	<u>1</u> 0.125L Plastic
<u>2</u> 1L Amber	<u>2</u> COD/NH3/Phenols (F/UNF) (P/UP)	<u>2</u> 0.5L Plastic
<u>2</u> 0.1L Amber	<u>2</u> Cyanide (P)	<u>2</u> Ferrous (F) (P)

PFAS = 1. (9)

OBSERVATIONS

Weather Conditions: \_\_\_\_\_ Temperature: \_\_\_\_\_ Precipitation: \_\_\_\_\_  
 Notes: \_\_\_\_\_



GROUNDWATER SAMPLING RECORD FORM



PROJECT INFORMATION

Project Number: 1  
 Client: Deer oakford  
 Site Location: oakford

Date: 10/1/17  
 Sampled By: MA

GROUNDWATER WELL DATA

Information recorded on site

Diameter of standpipe (mm)	<u>50</u>
Standpipe stick up (m)	
Time	<u>9:00</u>
Interface probe used?	<u>N</u>
Depth to product (mbRP)	<u>N/A</u>
Depth to water (mbRP)	<u>2.257</u>
Thickness of product (interface probe) (m)	<u>-</u>
Total depth of well (mbRP)	<u>5.10</u>
Bailed Thickness (m)	<u>-</u>

BORE ID: VB4

Information from file

Surveyed reference point	-
Depth of well (from log)	-
Standard flow rate (L/min)	-
Depth of pump intake (mbRP)	-
Length of hose (m)	-
Volume in hose (L)	-

Note: Standard reference point is top of PVC standpipe  
 mbRP - metres below top of reference point  
 Hose volume - 0.1 L/m of 12mm internal diameter hose  
 Hose volume - 0.05 L/m of 8mm internal diameter hose  
 Hose volume - 0.03 L/m of 6.35mm internal diameter hose

Condition: New/Good

EQUIPMENT RECORD

Purging & Sampling Method: Peristaltic Pump  
 WQM Model: \_\_\_\_\_ (Hire)

Calibrated by: MA Serial Number: FSL100328

PURGING RECORD

Time	Volume Purged (L)	Conductivity (uS/cm)	Temp (°C)	pH	Redox Potential (mV)	Dissolved Oxygen (ppm)	Depth to Water (mbRP)	Drawdown (m)	Appearance (colour, turbidity, odour, etc)
Stabilisation Range		± 5%	± 0.5 °C	± 0.1	± 10 mV	± 10%			
<u>09:10</u>		<u>1372</u>	<u>17.6</u>	<u>6.00</u>	<u>42.6</u>	<u>0.40</u>	<u>2.257</u>		<u>Pale Brown</u>
<u>09:15</u>		<u>1355</u>	<u>18.7</u>	<u>5.87</u>	<u>26.9</u>	<u>0.18</u>	<u>2.257</u>		<u>Pale Brown</u>
<u>9:20</u>		<u>1330</u>	<u>19.2</u>	<u>5.82</u>	<u>-48.7</u>	<u>0.28</u>	<u>2.257</u>		<u>Pale Brown LT.</u>
<u>9:25</u>		<u>1326</u>	<u>19.3</u>	<u>5.87</u>	<u>-154.9</u>	<u>0.30</u>	<u>2.257</u>		
<u>9:30</u>		<u>1300</u>	<u>19.2</u>	<u>5.87</u>	<u>-157.9</u>	<u>0.31</u>	<u>2.257</u>		
Flow Rate (mL/min)							<u>200</u>		

SAMPLING RECORD

Time sampled: 9:30 Sample ID: Q00185-01  
 Sample Appearance: Pale brown Duplicate sample taken? / Dup ID.: \_\_\_\_\_  
 Colour: \_\_\_\_\_ Turbidity: low  
 Odour: \_\_\_\_\_ Hydrocarbon sheen/LNAPL?: NO

Sample Container and Preservation: (F = Filtered, UNF = Unfiltered, P = Preserved, UP = Unpreserved)

<u>2</u> Vials (UP)	<u>1</u> Metals (F) (UP)	<u>1</u> 0.125L Plastic
<u>1</u> 1L Amber	<u>1</u> COD/NH3/Phenols (F/UNF) (P/UP)	<u>2</u> 0.5L Plastic
<u>2</u> 0.1L Amber	<u>1</u> Cyanide (P)	<u>1</u> Ferrous (F) (P)

PLASTIC 9

OBSERVATIONS

Weather Conditions: Temperature: \_\_\_\_\_ Precipitation: \_\_\_\_\_  
 Notes: \_\_\_\_\_

GROUNDWATER SAMPLING RECORD FORM



PROJECT INFORMATION

Project Number:   
 Client: *PER Oakford*   
 Site Location:

Date: *10/7/07*   
 Sampled By: *[Signature]*

GROUNDWATER WELL DATA

Information recorded on site

Diameter of standpipe (mm)	<i>50</i>
Standpipe stick up (m)	
Time	<i>10:16</i>
Interface probe used?	<i>N</i>
Depth to product (mbRP)	
Depth to water (mbRP)	<i>2.207</i>
Thickness of product (interface probe) (m)	
Total depth of well (mbRP)	<i>5.65</i>
Bailed Thickness (m)	

BORE ID: *V65*

Information from file

Surveyed reference point	-
Depth of well (from log)	-
Standard flow rate (L/min)	-
Depth of pump intake (mbRP)	-
Length of hose (m)	-
Volume in hose (L)	-

Note: Standard reference point is top of PVC standpipe   
 mbRP - metres below top of reference point   
 Hose volume - 0.1 L/m of 12mm internal diameter hose   
 Hose volume - 0.05 L/m of 8mm internal diameter hose   
 Hose volume - 0.03 L/m of 6.35mm internal diameter hose

Condition: *Good/New*

EQUIPMENT RECORD

Purging & Sampling Method: *Peristaltic Pump*   
 WQM Model: (Hire)

Calibrated by: *[Signature]* Serial Number: *15k100328*

PURGING RECORD

Time	Volume Purged (L)	Conductivity (uS/cm)	Temp (°C)	pH	Redox Potential (mV)	Dissolved Oxygen (ppm)	Depth to Water (mbRP)	Drawdown (m)	Appearance (colour, turbidity, odour, etc)
Stabilisation Range		± 5%	± 0.5 °C	± 0.1	± 10 mV	± 10%			
<i>10:24</i>		<i>737</i>	<i>18.2</i>	<i>5.44</i>	<i>-138.8</i>	<i>0.38</i>	<i>2.207</i>	<i>-</i>	<i>Pale brown, turbid</i>
<i>10:29</i>		<i>732</i>	<i>18.3</i>	<i>5.31</i>	<i>-145.9</i>	<i>0.28</i>	<i>2.207</i>	<i>-</i>	<i>"</i>
<i>10:34</i>		<i>728</i>	<i>18.3</i>	<i>5.26</i>	<i>-148.6</i>	<i>0.25</i>	<i>2.207</i>	<i>-</i>	<i>"</i>
<i>10:40</i>		<i>720</i>	<i>18.2</i>	<i>5.24</i>	<i>-154.8</i>	<i>0.22</i>	<i>2.207</i>	<i>-</i>	<i>"</i>
<i>10:45</i>		<i>715</i>	<i>18.2</i>	<i>5.23</i>	<i>-158.6</i>	<i>0.25</i>	<i>2.207</i>	<i>-</i>	<i>"</i>
Flow Rate (mL/min)							<i>200 ml.</i>		

SAMPLING RECORD

Time sampled: *10:45* Sample ID: *Q00155-02*   
 Sample Appearance: *Pale Brown* Duplicate sample taken? / Dup ID.: *Q00155-03*   
 Colour: *Pale Brown* Turbidity: *low*   
 Odour: Hydrocarbon sheen/LNAPL?:   
 Sample Container and Preservation: (F = Filtered, UNF = Unfiltered, P = Preserved, UP = Unpreserved)   
 2 Vials (UP) 1 Metals (F) (UP) 1 0.125L Plastic   
 1L Amber COD/NH3/Phenols (F/UNF) (P/UP) 2 0.5L Plastic   
 2 0.1L Amber Cyanide (P) 1 Ferrous (F) (P)   
*PPAS x1* *9*

OBSERVATIONS

Weather Conditions: Temperature: Precipitation:   
 Notes:



# **APPENDIX F**

## **Laboratory Analytical Reports**





1 Havelock Street  
West Perth, WA 6005 Australia  
Telephone +61 8 9213 7600 Fax +61 8 9213 7611

# CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

Q 13077 page 1 of 1

Project Number: 1779954		Laboratory Name: Eurofins M&T	
Golder Contact: Sarah Garvey		Golder Email Address: sgarvey@golder.com.au	
Address: Unit 2, 91 Leach Hwy Leederville		Telephone/Fax: 92519600	Contact:

Address where reports should be sent to

PO Box 1914  
West Perth, WA 6872  
Telephone (61 8) 9213 7600  
Fax (61 8) 9213 7611

Other  
 Jess Hay  
 email: jhay@...  
 Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Sample Control Number (SCN)	Sample Matrix (over)	Date Sampled (D/M/Y)	Analyses Required										RUSH	Remarks (over)		
			Number of Containers	PFAS suite (28)	Total metals (8)											
13077-01	S	28/6/17	1	X												
-02			1	X												
-03			1	X												
-04			1	X												
-05			1	X												
-06			1	X												
-07			1	X												
-08	W		1	X	X											
-09																
-10																
-11																
-12																

29/6

Sampler's Signature:	Relinquished by: Signature	Company: Golder	Date: 29/6/17	Time:	Received by: Signature	Company:
Sample Storage (°C): ICE	Relinquished by: Signature	Company:	Date:	Time:	Received by: Signature	Company:
Comments:	Method of Shipment:	Waybill No:	Received for Lab by:		Date: 29/6	Time: 1pm
	Shipped by:	Shipment Condition: Seal intact:	Temp (°C):	Cooler opened by:	Date:	Time:

WHITE: Golder Copy YELLOW: Lab Copy PINK: Lab Returns with Final Report

552310



## Sample Receipt Advice

Company name: **Golder Associates Pty Ltd (WA)**

Contact name: Jessica Hay  
Project ID: 1779954  
COC number: Not provided  
Turn around time: 5 Day  
Date/Time received: Jun 29, 2017 1:00 PM  
Eurofins | mgt reference: **552310**

### 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.
- Sample containers for volatile analysis received with zero headspace.
- 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:

Robert Johnston on Phone : or by e.mail: RobertJohnston@eurofins.com

Results will be delivered electronically via e.mail to Jessica Hay - jhay@golder.com.au.



**Golder Associates Pty Ltd (WA)**  
**Level 3, 1 Havelock Street**  
**West Perth**  
**WA 6005**



**NATA Accredited**  
**Accreditation Number 1261**  
**Site Number 1254**

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

**Attention:** **Jessica Hay**

**Report** **552310-W**  
 Project name  
 Project ID 1779954  
 Received Date Jun 29, 2017

Client Sample ID	LOR	Unit	Q13077-08
<b>Sample Matrix</b>			<b>Water</b>
<b>Eurofins   mgt Sample No.</b>			<b>M17-Jn31968</b>
<b>Date Sampled</b>			<b>Jun 28, 2017</b>
Test/Reference	LOR	Unit	
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>			
Perfluorobutanoic acid (PFBA)	0.05	ug/L	< 0.05
Perfluoropentanoic acid (PFPeA)	0.01	ug/L	< 0.01
Perfluorohexanoic acid (PFHxA)	0.01	ug/L	< 0.01
Perfluoroheptanoic acid (PFHpA)	0.01	ug/L	< 0.01
Perfluorooctanoic acid (PFOA)	0.01	ug/L	< 0.01
Perfluorononanoic acid (PFNA)	0.01	ug/L	< 0.01
Perfluorodecanoic acid (PFDA)	0.01	ug/L	< 0.01
Perfluoroundecanoic acid (PFUnA)	0.01	ug/L	< 0.01
Perfluorododecanoic acid (PFDoA)	0.01	ug/L	< 0.01
Perfluorotridecanoic acid (PFTTrDA)	0.01	ug/L	< 0.01
Perfluorotetradecanoic acid (PFTeDA)	0.01	ug/L	< 0.01
13C4-PFBA (surr.)	1	%	86
13C5-PFPeA (surr.)	1	%	108
13C5-PFHxA (surr.)	1	%	90
13C4-PFHpA (surr.)	1	%	86
13C8-PFOA (surr.)	1	%	94
13C5-PFNA (surr.)	1	%	119
13C6-PFDA (surr.)	1	%	94
13C2-PFUnDA (surr.)	1	%	62
13C2-PFDoDA (surr.)	1	%	53
13C2-PFTeDA (surr.)	1	%	31
<b>Perfluoroalkane sulfonamides (PFASAs)</b>			
Perfluorooctane sulfonamide (FOSA)	0.05	ug/L	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	0.05	ug/L	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	0.05	ug/L	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	0.05	ug/L	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	0.05	ug/L	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	0.05	ug/L	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	0.05	ug/L	< 0.05
13C8-FOSA (surr.)	1	%	86
D3-N-MeFOSA (surr.)	1	%	45
D5-N-EtFOSA (surr.)	1	%	41
D7-N-MeFOSE (surr.)	1	%	36

<b>Client Sample ID</b>			<b>Q13077-08</b>
<b>Sample Matrix</b>			<b>Water</b>
<b>Eurofins   mgt Sample No.</b>			<b>M17-Jn31968</b>
<b>Date Sampled</b>			<b>Jun 28, 2017</b>
Test/Reference	LOR	Unit	
<b>Perfluoroalkane sulfonamides (PFASAs)</b>			
D9-N-EtFOSE (surr.)	1	%	35
D5-N-EtFOSAA (surr.)	1	%	94
D3-N-MeFOSAA (surr.)	1	%	89
<b>Perfluoroalkane sulfonic acids &amp; Perfluoroalkane sulfonates (PFSAAs)</b>			
Perfluorobutanesulfonic acid (PFBS)	0.01	ug/L	< 0.01
Perfluoropentanesulfonic acid (PFPeS)	0.01	ug/L	< 0.01
Perfluorohexanesulfonic acid (PFHxS)	0.01	ug/L	< 0.01
Perfluoroheptanesulfonic acid (PFHpS)	0.01	ug/L	< 0.01
Perfluorooctanesulfonic acid (PFOS) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluorodecanesulfonic acid (PFDS)	0.01	ug/L	< 0.01
13C3-PFBS (surr.)	1	%	97
18O2-PFHxS (surr.)	1	%	93
13C8-PFOS (surr.)	1	%	75
<b>n:2 Fluorotelomer sulfonic acids</b>			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	0.05	ug/L	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	0.01	ug/L	< 0.01
13C2-4:2 FTS (surr.)	1	%	103
13C2-6:2 FTS (surr.)	1	%	90
13C2-8:2 FTS (surr.)	1	%	78
<b>Heavy Metals</b>			
Arsenic (filtered)	0.001	mg/L	< 0.001
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001
Copper (filtered)	0.001	mg/L	< 0.001
Lead (filtered)	0.001	mg/L	< 0.001
Mercury (filtered)	0.0001	mg/L	< 0.0001
Nickel (filtered)	0.001	mg/L	< 0.001
Zinc (filtered)	0.005	mg/L	< 0.005

### 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
<b>Per- and Polyfluorinated Alkyl Substances (PFASs)</b>			
Perfluoroalkyl carboxylic acids (PFCAs) - Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS	Brisbane	Jul 05, 2017	14 Day
Perfluoroalkane sulfonamides (PFASAs) - Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS	Brisbane	Jul 05, 2017	14 Day
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs) - Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS	Brisbane	Jul 05, 2017	14 Day
n:2 Fluorotelomer sulfonic acids - Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS	Brisbane	Jul 05, 2017	14 Day
<b>Metals M8 filtered</b> - Method: LTM-MET-3040 Metals in Waters by ICP-MS	Melbourne	Jun 30, 2017	28 Day

<b>Company Name:</b> Golder Associates Pty Ltd (WA) <b>Address:</b> Level 3, 1 Havelock Street West Perth WA 6005  <b>Project Name:</b> <b>Project ID:</b> 1779954	<b>Order No.:</b> <b>Report #:</b> 552310 <b>Phone:</b> 08 9213 7600 <b>Fax:</b> 03 8862 3501	<b>Received:</b> Jun 29, 2017 1:00 PM <b>Due:</b> Jul 6, 2017 <b>Priority:</b> 5 Day <b>Contact Name:</b> Sarah Garvey
Eurofins   mgt Analytical Services Manager : Natalie Krasselt		

Sample Detail						HOLD	Metals M8 filtered	Per- and Polyfluorinated Alkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794								X
Perth Laboratory - NATA Site # 18217								
External Laboratory								
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID			
1	Q13077-08	Jun 28, 2017		Water	M17-Jn31968		X	X
2	Q13077-01	Jun 28, 2017		Soil	M17-Jn31969	X		
3	Q13077-02	Jun 28, 2017		Soil	M17-Jn31970	X		
4	Q13077-03	Jun 28, 2017		Soil	M17-Jn31971	X		
5	Q13077-04	Jun 28, 2017		Soil	M17-Jn31972	X		
6	Q13077-05	Jun 28, 2017		Soil	M17-Jn31973	X		
7	Q13077-06	Jun 28, 2017		Soil	M17-Jn31974	X		
8	Q13077-07	Jun 28, 2017		Soil	M17-Jn31975	X		
<b>Test Counts</b>						7	1	1

## 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. All biota results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. 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

**mg/L:** milligrams per litre

**ug/L:** micrograms per litre

**ppm:** Parts per million

**ppb:** Parts per billion

**%:** Percentage

**org/100mL:** Organisms per 100 millilitres

**NTU:** Nephelometric Turbidity Units

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

### Terms

<b>Dry</b>	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
<b>LOR</b>	Limit of Reporting.
<b>SPIKE</b>	Addition of the analyte to the sample and reported as percentage recovery.
<b>RPD</b>	Relative Percent Difference between two Duplicate pieces of analysis.
<b>LCS</b>	Laboratory Control Sample - reported as percent recovery.
<b>CRM</b>	Certified Reference Material - reported as percent recovery.
<b>Method Blank</b>	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
<b>Surr - Surrogate</b>	The addition of a like compound to the analyte target and reported as percentage recovery.
<b>Duplicate</b>	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
<b>USEPA</b>	United States Environmental Protection Agency
<b>APHA</b>	American Public Health Association
<b>TCLP</b>	Toxicity Characteristic Leaching Procedure
<b>COC</b>	Chain of Custody
<b>SRA</b>	Sample Receipt Advice
<b>QSM</b>	Quality Systems Manual ver 5.1 US Department of Defense
<b>CP</b>	Client Parent - QC was performed on samples pertaining to this report
<b>NCP</b>	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.
<b>TEQ</b>	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 & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

### 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
<b>Method Blank</b>						
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>						
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05		0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01		0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01		0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01		0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01		0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01		0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01		0.01	Pass	
Perfluoroundecanoic acid (PFUnA)	ug/L	< 0.01		0.01	Pass	
Perfluorododecanoic acid (PFDoA)	ug/L	< 0.01		0.01	Pass	
Perfluorotridecanoic acid (PFTTrDA)	ug/L	< 0.01		0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01		0.01	Pass	
<b>Method Blank</b>						
<b>Perfluoroalkane sulfonamides (PFASAs)</b>						
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05		0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05		0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05		0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05		0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05		0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05		0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05		0.05	Pass	
<b>Method Blank</b>						
<b>Perfluoroalkane sulfonic acids &amp; Perfluoroalkane sulfonates (PFSAAs)</b>						
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01		0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01		0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01		0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01		0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01		0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01		0.01	Pass	
<b>Method Blank</b>						
<b>n:2 Fluorotelomer sulfonic acids</b>						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	ug/L	< 0.01		0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	ug/L	< 0.05		0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	ug/L	< 0.01		0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	ug/L	< 0.01		0.01	Pass	
<b>Method Blank</b>						
<b>Heavy Metals</b>						
Arsenic (filtered)	mg/L	< 0.001		0.001	Pass	
Cadmium (filtered)	mg/L	< 0.0002		0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001		0.001	Pass	
Copper (filtered)	mg/L	< 0.001		0.001	Pass	
Lead (filtered)	mg/L	< 0.001		0.001	Pass	
Mercury (filtered)	mg/L	< 0.0001		0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001		0.001	Pass	
Zinc (filtered)	mg/L	< 0.005		0.005	Pass	
<b>LCS - % Recovery</b>						
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>						
Perfluorobutanoic acid (PFBA)	%	90		50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	102		50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	103		50-150	Pass	

Test	Units	Result 1	Acceptance Limits	Pass Limits	Qualifying Code		
Perfluoroheptanoic acid (PFHpA)	%	104	50-150	Pass			
Perfluorooctanoic acid (PFOA)	%	105	50-150	Pass			
Perfluorononanoic acid (PFNA)	%	92	50-150	Pass			
Perfluorodecanoic acid (PFDA)	%	91	50-150	Pass			
Perfluoroundecanoic acid (PFUnA)	%	106	50-150	Pass			
Perfluorododecanoic acid (PFDoA)	%	101	50-150	Pass			
Perfluorotridecanoic acid (PFTrDA)	%	93	50-150	Pass			
Perfluorotetradecanoic acid (PFTeDA)	%	103	50-150	Pass			
<b>LCS - % Recovery</b>							
<b>Perfluoroalkane sulfonamides (PFASAs)</b>							
Perfluorooctane sulfonamide (FOSA)	%	92	50-150	Pass			
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	109	50-150	Pass			
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	109	50-150	Pass			
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	103	50-150	Pass			
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	98	50-150	Pass			
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	98	50-150	Pass			
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	103	50-150	Pass			
<b>LCS - % Recovery</b>							
<b>Perfluoroalkane sulfonic acids &amp; Perfluoroalkane sulfonates (PFSAs)</b>							
Perfluorobutanesulfonic acid (PFBS)	%	101	50-150	Pass			
Perfluoropentanesulfonic acid (PFPeS)	%	113	50-150	Pass			
Perfluorohexanesulfonic acid (PFHxS)	%	101	50-150	Pass			
Perfluoroheptanesulfonic acid (PFHpS)	%	96	50-150	Pass			
Perfluorooctanesulfonic acid (PFOS)	%	106	50-150	Pass			
Perfluorodecanesulfonic acid (PFDS)	%	76	50-150	Pass			
<b>LCS - % Recovery</b>							
<b>n:2 Fluorotelomer sulfonic acids</b>							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	%	99	50-150	Pass			
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	%	101	50-150	Pass			
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	%	94	50-150	Pass			
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	%	61	50-150	Pass			
<b>LCS - % Recovery</b>							
<b>Heavy Metals</b>							
Arsenic (filtered)	%	101	80-120	Pass			
Cadmium (filtered)	%	102	80-120	Pass			
Chromium (filtered)	%	98	80-120	Pass			
Copper (filtered)	%	98	80-120	Pass			
Lead (filtered)	%	100	80-120	Pass			
Mercury (filtered)	%	101	70-130	Pass			
Nickel (filtered)	%	98	80-120	Pass			
Zinc (filtered)	%	104	80-120	Pass			
Test	Lab Sample ID	QA Source	Units	Result 1	Acceptance Limits	Pass Limits	Qualifying Code
<b>Spike - % Recovery</b>							
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>							
Perfluorobutanoic acid (PFBA)	M17-Jn30868	NCP	%	90	50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M17-Jn30868	NCP	%	92	50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M17-Jn30868	NCP	%	101	50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M17-Jn30868	NCP	%	101	50-150	Pass	
Perfluorooctanoic acid (PFOA)	M17-Jn30868	NCP	%	95	50-150	Pass	
Perfluorononanoic acid (PFNA)	M17-Jn30868	NCP	%	92	50-150	Pass	
Perfluorodecanoic acid (PFDA)	M17-Jn30868	NCP	%	86	50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	M17-Jn30868	NCP	%	98	50-150	Pass	
Perfluorododecanoic acid (PFDoA)	M17-Jn30868	NCP	%	98	50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Perfluorotridecanoic acid (PFTrDA)	M17-Jn30868	NCP	%	72		50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M17-Jn30868	NCP	%	100		50-150	Pass	
<b>Spike - % Recovery</b>								
<b>Perfluoroalkane sulfonamides (PFASAs)</b>				Result 1				
Perfluorooctane sulfonamide (FOSA)	M17-Jn30868	NCP	%	90		50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M17-Jn30868	NCP	%	104		50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M17-Jn30868	NCP	%	102		50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M17-Jn30868	NCP	%	105		50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M17-Jn30868	NCP	%	102		50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M17-Jn30868	NCP	%	98		50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M17-Jn30868	NCP	%	97		50-150	Pass	
<b>Spike - % Recovery</b>								
<b>Perfluoroalkane sulfonic acids &amp; Perfluoroalkane sulfonates (PFSAs)</b>				Result 1				
Perfluorobutanesulfonic acid (PFBS)	M17-Jn30868	NCP	%	100		50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M17-Jn30868	NCP	%	110		50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M17-Jn30868	NCP	%	102		50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M17-Jn30868	NCP	%	95		50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M17-Jn30868	NCP	%	105		50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M17-Jn30868	NCP	%	56		50-150	Pass	
<b>Spike - % Recovery</b>								
<b>n:2 Fluorotelomer sulfonic acids</b>				Result 1				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	M17-Jn30868	NCP	%	96		50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	M17-Jn30868	NCP	%	99		50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	M17-Jn30868	NCP	%	92		50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	M17-Jn30868	NCP	%	50		50-150	Pass	
<b>Spike - % Recovery</b>								
<b>Heavy Metals</b>				Result 1				
Arsenic (filtered)	M17-Jn30370	NCP	%	110		70-130	Pass	
Cadmium (filtered)	M17-Jn30370	NCP	%	102		70-130	Pass	
Chromium (filtered)	M17-Jn30370	NCP	%	103		70-130	Pass	
Copper (filtered)	M17-Jn30370	NCP	%	99		70-130	Pass	
Lead (filtered)	M17-Jn30370	NCP	%	101		70-130	Pass	
Mercury (filtered)	M17-Jn30370	NCP	%	108		70-130	Pass	
Nickel (filtered)	M17-Jn30370	NCP	%	99		70-130	Pass	
Zinc (filtered)	M17-Jn30370	NCP	%	106		70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
<b>Duplicate</b>									
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	M17-Jn30869	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M17-Jn30869	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M17-Jn30869	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M17-Jn30869	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	M17-Jn30869	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	M17-Jn30869	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	M17-Jn30869	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnA)	M17-Jn30869	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoA)	M17-Jn30869	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	M17-Jn30869	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M17-Jn30869	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
<b>Duplicate</b>									
<b>Perfluoroalkane sulfonamides (PFASAs)</b>				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	M17-Jn30869	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M17-Jn30869	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M17-Jn30869	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M17-Jn30869	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M17-Jn30869	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M17-Jn30869	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M17-Jn30869	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
<b>Duplicate</b>									
<b>Perfluoroalkane sulfonic acids &amp; Perfluoroalkane sulfonates (PFSAs)</b>				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	M17-Jn30869	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M17-Jn30869	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M17-Jn30869	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M17-Jn30869	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	M17-Jn30869	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	M17-Jn30869	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
<b>Duplicate</b>									
<b>n:2 Fluorotelomer sulfonic acids</b>				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	M17-Jn30869	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	M17-Jn30869	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	M17-Jn30869	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	M17-Jn30869	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	



Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Arsenic (filtered)	M17-Jn30370	NCP	mg/L	0.002	0.002	4.0	30%	Pass
Cadmium (filtered)	M17-Jn30370	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass
Chromium (filtered)	M17-Jn30370	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Copper (filtered)	M17-Jn30370	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Lead (filtered)	M17-Jn30370	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Mercury (filtered)	M17-Jn30370	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass
Nickel (filtered)	M17-Jn30370	NCP	mg/L	0.008	0.010	15	30%	Pass
Zinc (filtered)	M17-Jn30370	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass

### Comments

Some surrogate recoveries were recorded in excess of the QC limit designated in QSM 5.1 of 50-150%. Since no positive results were reported for any PFAS compounds for any of the Samples in this case no data was affected.

### 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	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

### Qualifier Codes/Comments

Code	Description
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds. Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

### Authorised By

Robert Johnston	Analytical Services Manager
Alex Petridis	Senior Analyst-Metal (VIC)
Jonathon Angell	Senior Analyst-Organic (QLD)



### 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

Measurement uncertainty of test data is available on request or please [click here](#).

Eurofins | mgt shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins | mgt be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.



1 Havelock Street  
 West Perth, WA 6005 Australia  
 Telephone +61 8 9213 7600 Fax +61 8 9213 7611

# CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

Q 00185

page 1 of 1

Project Number: 1779954		Laboratory Name: Golder	
Golder Contact: Survey		Golder Email Address: @golder.com.au	
Address:		Telephone/Fax:	
Contact:		Contact:	

Address where reports should be sent to

PO Box 1914  
 West Perth, WA 6872  
 Telephone (61 8) 9213 7600  
 Fax (61 8) 9213 7611

Other @mbellaid

Phone \_\_\_\_\_ Fax \_\_\_\_\_

Sample Control Number (SCN)	Sample Matrix (over)	Date Sampled (D/M/Y)	Number of Containers	Analyses Required										Remarks (over)		
				See Attached	1770424 GdLW	Water Sample	Trip Blank	Waste class	RUSH							
- 01	W	10/7	10	✓												
- 02	W		9													
- 03	W		9													
- 04	W		9													
- 05	W		9													
- 06	W		9													
- 07	W		2													
- 08	S		2													
- 09																
- 10																
- 11																
- 12																

Dude = # 170424 GdLW

Sampler's Signature: [Signature]	Relinquished by: Signature [Signature]	Company: Golder	Date: 10/7	Time:	Received by: Signature	Company:
Sample Storage (°C):	Relinquished by: Signature [Signature]	Company:	Date:	Time:	Received by: Signature	Company:
Comments:	Method of Shipment:	Waybill No:	Received for Lab by: Amy	Date: 10/7/17	Time: 14:58	
	Shipped by:	Shipment Condition: Seal intact:	Temp (°C): 10.8	Cooler opened by: Amy	Date:	Time:

WHITE: Golder Copy YELLOW: Lab Copy PINK: Lab Returns with Final Report

553774

## Sample Receipt Advice

Company name: **Golder Associates Pty Ltd (WA)**

Contact name: Sarah Garvey  
Project ID: 1779954  
COC number: Not provided  
Turn around time: 5 Day  
Date/Time received: Jul 10, 2017 2:58 PM  
Eurofins | mgt reference: **553774**

### 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.
- Sample containers for volatile analysis received with zero headspace.
- 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:

Robert Johnston on Phone : or by e.mail: RobertJohnston@eurofins.com

Results will be delivered electronically via e.mail to Sarah Garvey - SGarvey@golder.com.au.



# Certificate of Analysis

**Golder Associates Pty Ltd (WA)**  
**Level 3, 1 Havelock Street**  
**West Perth**  
**WA 6005**



**NATA Accredited**  
**Accreditation Number 1261**  
**Site Number 1254**

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

**Attention:** Sarah Garvey

**Report** 553774-W  
 Project name  
 Project ID 1779954  
 Received Date Jul 10, 2017

Client Sample ID			Q00185-1	Q00185-2	Q00185-3	Q00185-4
Sample Matrix			Water	Water	Water	Water
Eurofins   mgt Sample No.			M17-JI11959	M17-JI11960	M17-JI11961	M17-JI11962
Date Sampled			Jul 10, 2017	Jul 10, 2017	Jul 10, 2017	Jul 10, 2017
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
<b>BTEX</b>						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	120	109	132	100
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
TRH C6-C10 less BTEX (F1) <sup>N04</sup>	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
<b>Polycyclic Aromatic Hydrocarbons</b>						
Acenaphthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Acenaphthylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benz(a)anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(a)pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(b&j)fluoranthene <sup>N07</sup>	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(g,h,i)perylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(k)fluoranthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Chrysene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibenz(a,h)anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Fluoranthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Fluorene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Indeno(1.2.3-cd)pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001



Client Sample ID			Q00185-1	Q00185-2	Q00185-3	Q00185-4
Sample Matrix			Water	Water	Water	Water
Eurofins   mgt Sample No.			M17-JI11959	M17-JI11960	M17-JI11961	M17-JI11962
Date Sampled			Jul 10, 2017	Jul 10, 2017	Jul 10, 2017	Jul 10, 2017
Test/Reference	LOR	Unit				
<b>Polycyclic Aromatic Hydrocarbons</b>						
Naphthalene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Phenanthrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Total PAH*	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
2-Fluorobiphenyl (surr.)	1	%	90	62	59	55
p-Terphenyl-d14 (surr.)	1	%	108	92	125	126
<b>Phenols (Halogenated)</b>						
2-Chlorophenol	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
2,4-Dichlorophenol	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
2,4,5-Trichlorophenol	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
2,4,6-Trichlorophenol	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
2,6-Dichlorophenol	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Chloro-3-methylphenol	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Pentachlorophenol	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Tetrachlorophenols - Total	0.03	mg/L	< 0.03	< 0.03	< 0.03	< 0.03
Total Halogenated Phenol*	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
<b>Phenols (non-Halogenated)</b>						
2-Cyclohexyl-4,6-dinitrophenol	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
2-Methyl-4,6-dinitrophenol	0.03	mg/L	< 0.03	< 0.03	< 0.03	< 0.03
2-Methylphenol (o-Cresol)	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
2-Nitrophenol	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
2,4-Dimethylphenol	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
2,4-Dinitrophenol	0.03	mg/L	< 0.03	< 0.03	< 0.03	< 0.03
3&4-Methylphenol (m&p-Cresol)	0.006	mg/L	< 0.006	< 0.006	< 0.006	< 0.006
4-Nitrophenol	0.03	mg/L	< 0.03	< 0.03	< 0.03	< 0.03
Dinoseb	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Phenol	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
Total Non-Halogenated Phenol*	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Phenol-d6 (surr.)	1	%	38	39	59	48
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>						
Perfluorobutanoic acid (PFBA)	0.05	ug/L	0.53	< 0.05	< 0.05	0.26
Perfluoropentanoic acid (PFPeA)	0.01	ug/L	2.6	0.16	0.16	1.3
Perfluorohexanoic acid (PFHxA)	0.01	ug/L	2.6	0.17	0.17	1.7
Perfluoroheptanoic acid (PFHpA)	0.01	ug/L	0.65	0.03	0.03	0.48
Perfluorooctanoic acid (PFOA)	0.01	ug/L	<sup>NO9</sup> 0.08	< 0.01	< 0.01	<sup>NO9</sup> 0.07
Perfluorononanoic acid (PFNA)	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA)	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnA)	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoA)	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTTrDA)	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	75	73	76	80
13C5-PFPeA (surr.)	1	%	83	86	90	85
13C5-PFHxA (surr.)	1	%	75	81	81	78
13C4-PFHpA (surr.)	1	%	97	95	95	95
13C8-PFOA (surr.)	1	%	138	103	115	113
13C5-PFNA (surr.)	1	%	119	102	94	99
13C6-PFDA (surr.)	1	%	109	86	82	84
13C2-PFUnDA (surr.)	1	%	95	80	79	73

Client Sample ID			Q00185-1	Q00185-2	Q00185-3	Q00185-4
Sample Matrix			Water	Water	Water	Water
Eurofins   mgt Sample No.			M17-JI11959	M17-JI11960	M17-JI11961	M17-JI11962
Date Sampled			Jul 10, 2017	Jul 10, 2017	Jul 10, 2017	Jul 10, 2017
Test/Reference	LOR	Unit				
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>						
13C2-PFDoDA (surr.)	1	%	95	71	70	68
13C2-PFTEdA (surr.)	1	%	76	65	70	58
<b>Perfluoroalkane sulfonamides (PFASAs)</b>						
Perfluorooctane sulfonamide (FOSA)	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	97	82	78	81
D3-N-MeFOSA (surr.)	1	%	74	49	57	60
D5-N-EtFOSA (surr.)	1	%	74	51	61	64
D7-N-MeFOSE (surr.)	1	%	39	26	31	31
D9-N-EtFOSE (surr.)	1	%	55	34	39	41
D5-N-EtFOSAA (surr.)	1	%	78	59	58	58
D3-N-MeFOSAA (surr.)	1	%	80	68	69	63
<b>Perfluoroalkane sulfonic acids &amp; Perfluoroalkane sulfonates (PFSAAs)</b>						
Perfluorobutanesulfonic acid (PFBS)	0.01	ug/L	0.12	0.01	< 0.01	0.07
Perfluoropentanesulfonic acid (PFPeS)	0.01	ug/L	<sup>N09</sup> 0.07	< 0.01	< 0.01	<sup>N09</sup> 0.05
Perfluorohexanesulfonic acid (PFHxS)	0.01	ug/L	<sup>N09</sup> 0.15	<sup>N09</sup> 0.01	<sup>N09</sup> 0.01	<sup>N09</sup> 0.11
Perfluoroheptanesulfonic acid (PFHpS)	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS) <sup>N11</sup>	0.01	ug/L	<sup>N09</sup> 0.02	<sup>N09</sup> 0.01	< 0.01	<sup>N09</sup> 0.04
Perfluorodecanesulfonic acid (PFDS)	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	97	93	92	96
18O2-PFHxS (surr.)	1	%	96	86	84	88
13C8-PFOS (surr.)	1	%	91	76	72	70
<b>n:2 Fluorotelomer sulfonic acids</b>						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C2-4:2 FTS (surr.)	1	%	173	161	141	161
13C2-6:2 FTS (surr.)	1	%	199	165	161	174
13C2-8:2 FTS (surr.)	1	%	142	117	107	111
<b>Ammonia (as N)</b>						
Ammonia (as N)	0.01	mg/L	1.1	1.3	1.3	0.36
<b>Biochemical Oxygen Demand (BOD-5 Day)</b>						
Biochemical Oxygen Demand (BOD-5 Day)	5	mg/L	< 5	< 5	< 5	< 5
<b>Chemical Oxygen Demand (COD)</b>						
Chemical Oxygen Demand (COD)	25	mg/L	480	270	420	260
<b>Chloride</b>						
Chloride	1	mg/L	140	140	150	44
<b>Conductivity (at 25°C)</b>						
Conductivity (at 25°C)	1	uS/cm	1100	680	680	780
<b>Nitrate &amp; Nitrite (as N)</b>						
Nitrate & Nitrite (as N)	0.05	mg/L	25	< 0.05	< 0.05	33
<b>Nitrate (as N)</b>						
Nitrate (as N)	0.02	mg/L	24	< 0.02	< 0.02	33
<b>Nitrite (as N)</b>						
Nitrite (as N)	0.02	mg/L	0.67	< 0.02	< 0.02	0.04
<b>pH</b>						
pH	0.1	pH Units	6.2	5.3	5.3	6.2
<b>Phosphate total (as P)</b>						
Phosphate total (as P)	0.05	mg/L	5.3	2.7	2.7	2.0

Client Sample ID			Q00185-1	Q00185-2	Q00185-3	Q00185-4
Sample Matrix			Water	Water	Water	Water
Eurofins   mgt Sample No.			M17-JI11959	M17-JI11960	M17-JI11961	M17-JI11962
Date Sampled			Jul 10, 2017	Jul 10, 2017	Jul 10, 2017	Jul 10, 2017
Test/Reference	LOR	Unit				
Phosphorus reactive (as P)	0.05	mg/L	5.1	3.1	3.0	2.4
Sulphate (as SO4)	5	mg/L	190	63	62	130
Total Dissolved Solids	10	mg/L	1100	750	690	630
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	14	5.0	6.4	8.1
Total Nitrogen (as N)	0.2	mg/L	39	5.0	6.4	41
Total Organic Carbon	5	mg/L	200	160	160	110
<b>Alkalinity (speciated)</b>						
Bicarbonate Alkalinity (as HCO3)	20	mg/L	110	29	24	68
Carbonate Alkalinity (as CO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Total Alkalinity (as CaCO3)	20	mg/L	92	24	< 20	56
<b>Alkali Metals</b>						
Calcium	0.5	mg/L	41	8.5	8.3	42
Magnesium	0.5	mg/L	17	8.1	7.9	16
Potassium	0.5	mg/L	86	37	37	49
Sodium	0.5	mg/L	91	70	69	35
<b>Heavy Metals</b>						
Aluminium (filtered)	0.05	mg/L	0.42	1.7	1.6	0.38
Arsenic (filtered)	0.001	mg/L	0.004	< 0.001	< 0.001	0.003
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chromium (filtered)	0.001	mg/L	0.004	0.007	0.008	0.002
Copper (filtered)	0.001	mg/L	0.007	< 0.001	0.001	0.016
Iron (filtered)	0.05	mg/L	2.8	2.2	2.1	1.0
Lead (filtered)	0.001	mg/L	0.002	< 0.001	< 0.001	0.001
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Nickel (filtered)	0.001	mg/L	0.007	0.005	0.006	0.009
Zinc (filtered)	0.005	mg/L	0.034	0.016	0.017	0.028
<b>Hardness Set</b>						
Hardness mg equivalent CaCO3/L	5	mg/L	170	54	53	170

Client Sample ID			Q00185-5	Q00185-6	Q00185-7	
Sample Matrix			Water	Water	Water	
Eurofins   mgt Sample No.			M17-JI11963	M17-JI11964	M17-JI11965	
Date Sampled			Jul 10, 2017	Jul 10, 2017	Jul 10, 2017	
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	-	
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	-	
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	-	
TRH C10-36 (Total)	0.1	mg/L	< 0.1	< 0.1	-	
<b>BTEX</b>						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	

Client Sample ID			Q00185-5	Q00185-6	Q00185-7
Sample Matrix			Water	Water	Water
Eurofins   mgt Sample No.			M17-JI11963	M17-JI11964	M17-JI11965
Date Sampled			Jul 10, 2017	Jul 10, 2017	Jul 10, 2017
Test/Reference	LOR	Unit			
<b>BTEX</b>					
Xylenes - Total	0.003	mg/L	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	104	107	117
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>					
Naphthalene <sup>N02</sup>	0.01	mg/L	< 0.01	< 0.01	< 0.01
TRH C6-C10 less BTEX (F1) <sup>N04</sup>	0.02	mg/L	< 0.02	< 0.02	< 0.02
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	-
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	0.05	mg/L	< 0.05	< 0.05	-
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	-
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	-
<b>Polycyclic Aromatic Hydrocarbons</b>					
Acenaphthene	0.001	mg/L	< 0.001	< 0.001	-
Acenaphthylene	0.001	mg/L	< 0.001	< 0.001	-
Anthracene	0.001	mg/L	< 0.001	< 0.001	-
Benz(a)anthracene	0.001	mg/L	< 0.001	< 0.001	-
Benzo(a)pyrene	0.001	mg/L	< 0.001	< 0.001	-
Benzo(b&j)fluoranthene <sup>N07</sup>	0.001	mg/L	< 0.001	< 0.001	-
Benzo(g,h,i)perylene	0.001	mg/L	< 0.001	< 0.001	-
Benzo(k)fluoranthene	0.001	mg/L	< 0.001	< 0.001	-
Chrysene	0.001	mg/L	< 0.001	< 0.001	-
Dibenz(a,h)anthracene	0.001	mg/L	< 0.001	< 0.001	-
Fluoranthene	0.001	mg/L	< 0.001	< 0.001	-
Fluorene	0.001	mg/L	< 0.001	< 0.001	-
Indeno(1,2,3-cd)pyrene	0.001	mg/L	< 0.001	< 0.001	-
Naphthalene	0.001	mg/L	< 0.001	< 0.001	-
Phenanthrene	0.001	mg/L	< 0.001	< 0.001	-
Pyrene	0.001	mg/L	< 0.001	< 0.001	-
Total PAH*	0.001	mg/L	< 0.001	< 0.001	-
2-Fluorobiphenyl (surr.)	1	%	104	64	-
p-Terphenyl-d14 (surr.)	1	%	130	101	-
<b>Phenols (Halogenated)</b>					
2-Chlorophenol	0.003	mg/L	< 0.003	< 0.003	-
2,4-Dichlorophenol	0.003	mg/L	< 0.003	< 0.003	-
2,4,5-Trichlorophenol	0.01	mg/L	< 0.01	< 0.01	-
2,4,6-Trichlorophenol	0.01	mg/L	< 0.01	< 0.01	-
2,6-Dichlorophenol	0.003	mg/L	< 0.003	< 0.003	-
4-Chloro-3-methylphenol	0.01	mg/L	< 0.01	< 0.01	-
Pentachlorophenol	0.01	mg/L	< 0.01	< 0.01	-
Tetrachlorophenols - Total	0.03	mg/L	< 0.03	< 0.03	-
Total Halogenated Phenol*	0.01	mg/L	< 0.01	< 0.01	-
<b>Phenols (non-Halogenated)</b>					
2-Cyclohexyl-4,6-dinitrophenol	0.1	mg/L	< 0.1	< 0.1	-
2-Methyl-4,6-dinitrophenol	0.03	mg/L	< 0.03	< 0.03	-
2-Methylphenol (o-Cresol)	0.003	mg/L	< 0.003	< 0.003	-
2-Nitrophenol	0.01	mg/L	< 0.01	< 0.01	-
2,4-Dimethylphenol	0.003	mg/L	< 0.003	< 0.003	-
2,4-Dinitrophenol	0.03	mg/L	< 0.03	< 0.03	-
3&4-Methylphenol (m&p-Cresol)	0.006	mg/L	< 0.006	< 0.006	-
4-Nitrophenol	0.03	mg/L	< 0.03	< 0.03	-

Client Sample ID			Q00185-5	Q00185-6	Q00185-7
Sample Matrix			Water	Water	Water
Eurofins   mgt Sample No.			M17-JI11963	M17-JI11964	M17-JI11965
Date Sampled			Jul 10, 2017	Jul 10, 2017	Jul 10, 2017
Test/Reference	LOR	Unit			
<b>Phenols (non-Halogenated)</b>					
Dinoseb	0.1	mg/L	< 0.1	< 0.1	-
Phenol	0.003	mg/L	< 0.003	< 0.003	-
Total Non-Halogenated Phenol*	0.1	mg/L	< 0.1	< 0.1	-
Phenol-d6 (surr.)	1	%	37	35	-
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>					
Perfluorobutanoic acid (PFBA)	0.05	ug/L	0.49	< 0.05	-
Perfluoropentanoic acid (PFPeA)	0.01	ug/L	2.1	< 0.01	-
Perfluorohexanoic acid (PFHxA)	0.01	ug/L	1.0	< 0.01	-
Perfluoroheptanoic acid (PFHpA)	0.01	ug/L	0.20	< 0.01	-
Perfluorooctanoic acid (PFOA)	0.01	ug/L	<sup>N09</sup> 0.02	< 0.01	-
Perfluorononanoic acid (PFNA)	0.01	ug/L	< 0.01	< 0.01	-
Perfluorodecanoic acid (PFDA)	0.01	ug/L	< 0.01	< 0.01	-
Perfluoroundecanoic acid (PFUnA)	0.01	ug/L	< 0.01	< 0.01	-
Perfluorododecanoic acid (PFDoA)	0.01	ug/L	< 0.01	< 0.01	-
Perfluorotridecanoic acid (PFTTrDA)	0.01	ug/L	< 0.01	< 0.01	-
Perfluorotetradecanoic acid (PFTeDA)	0.01	ug/L	< 0.01	< 0.01	-
13C4-PFBA (surr.)	1	%	66	73	-
13C5-PFPeA (surr.)	1	%	66	90	-
13C5-PFHxA (surr.)	1	%	73	85	-
13C4-PFHpA (surr.)	1	%	91	96	-
13C8-PFOA (surr.)	1	%	94	103	-
13C5-PFNA (surr.)	1	%	90	92	-
13C6-PFDA (surr.)	1	%	80	85	-
13C2-PFUnDA (surr.)	1	%	82	77	-
13C2-PFDoDA (surr.)	1	%	75	81	-
13C2-PFTeDA (surr.)	1	%	74	55	-
<b>Perfluoroalkane sulfonamides (PFASAs)</b>					
Perfluorooctane sulfonamide (FOSA)	0.05	ug/L	< 0.05	< 0.05	-
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	0.05	ug/L	< 0.05	< 0.05	-
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	0.05	ug/L	< 0.05	< 0.05	-
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	0.05	ug/L	< 0.05	< 0.05	-
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	0.05	ug/L	< 0.05	< 0.05	-
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	0.05	ug/L	< 0.05	< 0.05	-
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	0.05	ug/L	< 0.05	< 0.05	-
13C8-FOSA (surr.)	1	%	70	67	-
D3-N-MeFOSA (surr.)	1	%	66	57	-
D5-N-EtFOSA (surr.)	1	%	69	57	-
D7-N-MeFOSE (surr.)	1	%	27	27	-
D9-N-EtFOSE (surr.)	1	%	43	35	-
D5-N-EtFOSAA (surr.)	1	%	57	61	-
D3-N-MeFOSAA (surr.)	1	%	62	75	-
<b>Perfluoroalkane sulfonic acids &amp; Perfluoroalkane sulfonates (PFSAs)</b>					
Perfluorobutanesulfonic acid (PFBS)	0.01	ug/L	0.05	< 0.01	-
Perfluoropentanesulfonic acid (PFPeS)	0.01	ug/L	<sup>N09</sup> 0.02	< 0.01	-
Perfluorohexanesulfonic acid (PFHxS)	0.01	ug/L	<sup>N09</sup> 0.04	< 0.01	-
Perfluoroheptanesulfonic acid (PFHpS)	0.01	ug/L	< 0.01	< 0.01	-



Client Sample ID			Q00185-5	Q00185-6	Q00185-7
Sample Matrix			Water	Water	Water
Eurofins   mgt Sample No.			M17-JI11963	M17-JI11964	M17-JI11965
Date Sampled			Jul 10, 2017	Jul 10, 2017	Jul 10, 2017
Test/Reference	LOR	Unit			
<b>Perfluoroalkane sulfonic acids &amp; Perfluoroalkane sulfonates (PFSA's)</b>					
Perfluorooctanesulfonic acid (PFOS) <sup>N11</sup>	0.01	ug/L	< 0.01	<sup>N09</sup> 0.11	-
Perfluorodecanesulfonic acid (PFDS)	0.01	ug/L	< 0.01	< 0.01	-
13C3-PFBS (surr.)	1	%	94	93	-
18O2-PFHxS (surr.)	1	%	86	87	-
13C8-PFOS (surr.)	1	%	71	71	-
<b>n:2 Fluorotelomer sulfonic acids</b>					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	0.01	ug/L	< 0.01	< 0.01	-
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	0.05	ug/L	< 0.05	< 0.05	-
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	0.01	ug/L	< 0.01	< 0.01	-
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	0.01	ug/L	< 0.01	< 0.01	-
13C2-4:2 FTS (surr.)	1	%	159	151	-
13C2-6:2 FTS (surr.)	1	%	167	156	-
13C2-8:2 FTS (surr.)	1	%	112	115	-
<b>Ammonia (as N)</b>					
Ammonia (as N)	0.01	mg/L	2.5	1.2	-
<b>Biochemical Oxygen Demand (BOD-5 Day)</b>					
Biochemical Oxygen Demand (BOD-5 Day)	5	mg/L	< 5	< 5	-
<b>Chemical Oxygen Demand (COD)</b>					
Chemical Oxygen Demand (COD)	25	mg/L	300	350	-
<b>Chloride</b>					
Chloride	1	mg/L	150	77	-
<b>Conductivity (at 25°C)</b>					
Conductivity (at 25°C)	1	uS/cm	870	400	-
<b>Nitrate &amp; Nitrite (as N)</b>					
Nitrate & Nitrite (as N)	0.05	mg/L	4.2	< 0.05	-
<b>Nitrate (as N)</b>					
Nitrate (as N)	0.02	mg/L	4.1	< 0.02	-
<b>Nitrite (as N)</b>					
Nitrite (as N)	0.02	mg/L	0.16	< 0.02	-
<b>pH</b>					
pH	0.1	pH Units	5.5	4.2	-
<b>Phosphate total (as P)</b>					
Phosphate total (as P)	0.05	mg/L	1.4	12	-
<b>Phosphorus reactive (as P)</b>					
Phosphorus reactive (as P)	0.05	mg/L	1.3	11	-
<b>Sulphate (as SO4)</b>					
Sulphate (as SO4)	5	mg/L	180	31	-
<b>Total Dissolved Solids</b>					
Total Dissolved Solids	10	mg/L	690	570	-
<b>Total Kjeldahl Nitrogen (as N)</b>					
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	4.8	5.5	-
<b>Total Nitrogen (as N)</b>					
Total Nitrogen (as N)	0.2	mg/L	9.0	5.5	-
<b>Total Organic Carbon</b>					
Total Organic Carbon	5	mg/L	120	240	-
<b>Alkalinity (speciated)</b>					
Bicarbonate Alkalinity (as HCO3)	20	mg/L	25	< 20	-
Carbonate Alkalinity (as CO3)	10	mg/L	< 10	< 10	-
Hydroxide Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	-
Total Alkalinity (as CaCO3)	20	mg/L	20	< 20	-
<b>Alkali Metals</b>					
Calcium	0.5	mg/L	35	3.9	-
Magnesium	0.5	mg/L	25	9.5	-
Potassium	0.5	mg/L	29	18	-
Sodium	0.5	mg/L	60	40	-
<b>Heavy Metals</b>					
Aluminium (filtered)	0.05	mg/L	0.72	0.78	-
Arsenic (filtered)	0.001	mg/L	< 0.001	< 0.001	-
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	-
Chromium (filtered)	0.001	mg/L	0.002	0.004	-
Copper (filtered)	0.001	mg/L	0.010	< 0.001	-
Iron (filtered)	0.05	mg/L	3.5	3.1	-
Lead (filtered)	0.001	mg/L	0.002	< 0.001	-

Client Sample ID			Q00185-5	Q00185-6	Q00185-7
Sample Matrix			Water	Water	Water
Eurofins   mgt Sample No.			M17-JI11963	M17-JI11964	M17-JI11965
Date Sampled			Jul 10, 2017	Jul 10, 2017	Jul 10, 2017
Test/Reference	LOR	Unit			
<b>Heavy Metals</b>					
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	-
Nickel (filtered)	0.001	mg/L	0.006	0.004	-
Zinc (filtered)	0.005	mg/L	0.032	0.009	-
<b>Hardness Set</b>					
Hardness mg equivalent CaCO3/L	5	mg/L	190	49	-

### 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
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C36	Melbourne	Jul 13, 2017	7 Day
BTEX - Method: TRH C6-C40 - LTM-ORG-2010	Melbourne	Jul 12, 2017	14 Day
Volatile Organics - Method: LTM-ORG-2150 VOCs in Soils Liquid and other Aqueous Matrices	Melbourne	Jul 12, 2017	7 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: TRH C6-C40 - LTM-ORG-2010	Melbourne	Jul 12, 2017	7 Day
Total Recoverable Hydrocarbons - Method: TRH C6-C40 - LTM-ORG-2010	Melbourne	Jul 12, 2017	7 Day
NSW DECC - Waste Classification Table 1			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: TRH C6-C40 - LTM-ORG-2010	Melbourne	Jul 13, 2017	7 Day
Polycyclic Aromatic Hydrocarbons - Method: LTM-ORG-2130 PAH and Phenols in Water by GCMS	Melbourne	Jul 13, 2017	7 Day
Phenols (Halogenated) - Method: LTM-ORG-2130 PAH and Phenols in Water by GCMS	Melbourne	Jul 13, 2017	7 Days
Phenols (non-Halogenated) - Method: LTM-ORG-2130 PAH and Phenols in Water by GCMS	Melbourne	Jul 13, 2017	7 Day
Per- and Polyfluorinated Alkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs) - Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS	Brisbane	Jul 13, 2017	14 Day
Perfluoroalkane sulfonamides (PFASAs) - Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS	Brisbane	Jul 13, 2017	14 Day
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs) - Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS	Brisbane	Jul 13, 2017	14 Day
n:2 Fluorotelomer sulfonic acids - Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS	Brisbane	Jul 13, 2017	14 Day
Ammonia (as N) - Method: APHA 4500-NH3 Ammonia Nitrogen by FIA	Melbourne	Jul 12, 2017	28 Day
Biochemical Oxygen Demand (BOD-5 Day) - Method: LTM-INO-4010 Biochemical Oxygen Demand (BOD5) in Water	Melbourne	Jul 12, 2017	2 Day
Chemical Oxygen Demand (COD) - Method: LTM-INO-4220 Determination of COD in Water	Melbourne	Jul 12, 2017	28 Days
Chloride - Method: LTM-INO-4090 Chloride by Discrete Analyser	Melbourne	Jul 12, 2017	28 Day
Conductivity (at 25°C) - Method: LTM-INO-4030	Melbourne	Jul 12, 2017	28 Day
Nitrate (as N) - Method: APHA 4500-NO3 Nitrate Nitrogen by FIA	Melbourne	Jul 12, 2017	7 Day
Nitrite (as N) - Method: APHA 4500-NO2 Nitrite Nitrogen by FIA	Melbourne	Jul 12, 2017	2 Day
pH - Method: LTM-GEN-7090 pH in water by ISE	Melbourne	Jul 12, 2017	0 Hours
Phosphate total (as P) - Method: APHA 4500-P E. Phosphorous	Melbourne	Jul 12, 2017	28 Day
Phosphorus reactive (as P) - Method: APHA4500-PO4	Melbourne	Jul 12, 2017	2 Day
Sulphate (as SO4) - Method: LTM-INO-4110 Sulfate by Discrete Analyser	Melbourne	Jul 12, 2017	28 Day

<b>Description</b>	<b>Testing Site</b>	<b>Extracted</b>	<b>Holding Time</b>
<b>Total Dissolved Solids</b> - Method: LM-LTM-INO-4110 (Total Dissolved Solids @ 178°C - 182°C)	Melbourne	Jul 12, 2017	7 Day
<b>Total Organic Carbon</b> - Method: APHA 5310B Total Organic Carbon	Melbourne	Jul 13, 2017	28 Day
<b>Alkalinity (speciated)</b> - Method: APHA 2320 Alkalinity by Titration	Melbourne	Jul 12, 2017	14 Day
<b>Hardness Set</b>			
<b>Calcium</b> - Method: LTM-MET-3010 Alkali Metals, S, Si and P by ICP-AES	Melbourne	Jul 12, 2017	180 Day
<b>Magnesium</b> - Method: LTM-MET-3010 Alkali Metals, S, Si and P by ICP-AES	Melbourne	Jul 12, 2017	180 Day
<b>Alkali Metals</b> - Method: USEPA 6010 Alkali Metals	Melbourne	Jul 12, 2017	180 Day
<b>Heavy Metals (filtered)</b> - Method: LTM-MET-3040 Metals in Waters by ICP-MS	Melbourne	Jul 12, 2017	180 Day
<b>Metals M8 filtered</b> - Method: LTM-MET-3040 Metals in Waters by ICP-MS	Melbourne	Jul 12, 2017	28 Day
<b>Hardness mg equivalent CaCO<sub>3</sub>/L</b> - Method: APHA 2340B Hardness by Calculation	Melbourne	Jul 12, 2017	28 Day
<b>Total Nitrogen Set (as N)</b>			
<b>Nitrate &amp; Nitrite (as N)</b> - Method: APHA 4500-NO <sub>3</sub> /NO <sub>2</sub> Nitrate-Nitrite Nitrogen by FIA	Melbourne	Jul 12, 2017	28 Day
<b>Total Kjeldahl Nitrogen (as N)</b> - Method: APHA 4500 TKN	Melbourne	Jul 12, 2017	7 Day



<b>Company Name:</b> Golder Associates Pty Ltd (WA)	<b>Order No.:</b>	<b>Received:</b> Jul 10, 2017 2:58 PM
<b>Address:</b> Level 3, 1 Havelock Street West Perth WA 6005	<b>Report #:</b> 553774	<b>Due:</b> Jul 17, 2017
	<b>Phone:</b> 08 9213 7600	<b>Priority:</b> 5 Day
	<b>Fax:</b> 03 8862 3501	<b>Contact Name:</b> Sarah Garvey
<b>Project Name:</b>		
<b>Project ID:</b> 1779954		

**Eurofins | mgt Analytical Services Manager : Robert Johnston**

Sample Detail						Aluminium (filtered)	Ammonia (as N)	Bicarbonate Alkalinity (as HCO3)	Biochemical Oxygen Demand (BOD-5 Day)	Chemical Oxygen Demand (COD)	Chloride	Conductivity (at 25°C)	Hydroxide Alkalinity (as CaCO3)	Iron (filtered)	Nitrate (as N)	Nitrite (as N)	pH	Phosphate total (as P)	Phosphorus reactive (as P)	Potassium	Sodium	Sulphate (as SO4)	Total Alkalinity (as CaCO3)	Total Dissolved Solids	Total Organic Carbon	Polycyclic Aromatic Hydrocarbons	Metals M8 filtered	Phenols (WFRG 621)	Total Nitrogen Set (as N)	Hardness Set	BTEX and Naphthalene	Moisture Set	Total Recoverable Hydrocarbons	NSW DECC - Waste Classification Table 1	BTEX and Volatile TRH	Per- and Polyfluorinated Alkyl Substances (PFASs)				
<b>Melbourne Laboratory - NATA Site # 1254 &amp; 14271</b>						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
<b>Sydney Laboratory - NATA Site # 18217</b>																																								
<b>Brisbane Laboratory - NATA Site # 20794</b>																																						X		
<b>Perth Laboratory - NATA Site # 18217</b>																																								
<b>External Laboratory</b>																																								
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID																																			
1	Q00185-1	Jul 10, 2017		Water	M17-JI11959	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
2	Q00185-2	Jul 10, 2017		Water	M17-JI11960	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
3	Q00185-3	Jul 10, 2017		Water	M17-JI11961	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
4	Q00185-4	Jul 10, 2017		Water	M17-JI11962	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
5	Q00185-5	Jul 10, 2017		Water	M17-JI11963	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
6	Q00185-6	Jul 10, 2017		Water	M17-JI11964	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
7	Q00185-7	Jul 10, 2017		Water	M17-JI11965																															X				
8	Q00185-8	Jul 10, 2017		Soil	M17-JI11966																													X	X					
<b>Test Counts</b>						6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	1	6	1	1	6

## Internal Quality Control Review and Glossary

### General

- 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.
- All soil results are reported on a dry basis, unless otherwise stated.
- All biota results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- 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

**mg/L:** milligrams per litre

**ug/L:** micrograms per litre

**ppm:** Parts per million

**ppb:** Parts per billion

**%:** Percentage

**org/100mL:** Organisms per 100 millilitres

**NTU:** Nephelometric Turbidity Units

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

### Terms

<b>Dry</b>	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
<b>LOR</b>	Limit of Reporting.
<b>SPIKE</b>	Addition of the analyte to the sample and reported as percentage recovery.
<b>RPD</b>	Relative Percent Difference between two Duplicate pieces of analysis.
<b>LCS</b>	Laboratory Control Sample - reported as percent recovery.
<b>CRM</b>	Certified Reference Material - reported as percent recovery.
<b>Method Blank</b>	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
<b>Surr - Surrogate</b>	The addition of a like compound to the analyte target and reported as percentage recovery.
<b>Duplicate</b>	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
<b>USEPA</b>	United States Environmental Protection Agency
<b>APHA</b>	American Public Health Association
<b>TCLP</b>	Toxicity Characteristic Leaching Procedure
<b>COC</b>	Chain of Custody
<b>SRA</b>	Sample Receipt Advice
<b>QSM</b>	Quality Systems Manual ver 5.1 US Department of Defense
<b>CP</b>	Client Parent - QC was performed on samples pertaining to this report
<b>NCP</b>	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.
<b>TEQ</b>	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 & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

### QC Data General Comments

- 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.
- 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.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
- 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.
- 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.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- 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
<b>Method Blank</b>							
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
<b>Method Blank</b>							
<b>BTEX</b>							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total	mg/L	< 0.003			0.003	Pass	
<b>Method Blank</b>							
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
<b>Method Blank</b>							
<b>Polycyclic Aromatic Hydrocarbons</b>							
Acenaphthene	mg/L	< 0.001			0.001	Pass	
Acenaphthylene	mg/L	< 0.001			0.001	Pass	
Anthracene	mg/L	< 0.001			0.001	Pass	
Benz(a)anthracene	mg/L	< 0.001			0.001	Pass	
Benzo(a)pyrene	mg/L	< 0.001			0.001	Pass	
Benzo(b&j)fluoranthene	mg/L	< 0.001			0.001	Pass	
Benzo(g,h,i)perylene	mg/L	< 0.001			0.001	Pass	
Benzo(k)fluoranthene	mg/L	< 0.001			0.001	Pass	
Chrysene	mg/L	< 0.001			0.001	Pass	
Dibenz(a,h)anthracene	mg/L	< 0.001			0.001	Pass	
Fluoranthene	mg/L	< 0.001			0.001	Pass	
Fluorene	mg/L	< 0.001			0.001	Pass	
Indeno(1,2,3-cd)pyrene	mg/L	< 0.001			0.001	Pass	
Naphthalene	mg/L	< 0.001			0.001	Pass	
Phenanthrene	mg/L	< 0.001			0.001	Pass	
Pyrene	mg/L	< 0.001			0.001	Pass	
<b>Method Blank</b>							
<b>Phenols (Halogenated)</b>							
2-Chlorophenol	mg/L	< 0.003			0.003	Pass	
2,4-Dichlorophenol	mg/L	< 0.003			0.003	Pass	
2,4,5-Trichlorophenol	mg/L	< 0.01			0.01	Pass	
2,4,6-Trichlorophenol	mg/L	< 0.01			0.01	Pass	
2,6-Dichlorophenol	mg/L	< 0.003			0.003	Pass	
4-Chloro-3-methylphenol	mg/L	< 0.01			0.01	Pass	
Pentachlorophenol	mg/L	< 0.01			0.01	Pass	
Tetrachlorophenols - Total	mg/L	< 0.03			0.03	Pass	
<b>Method Blank</b>							
<b>Phenols (non-Halogenated)</b>							
2-Cyclohexyl-4,6-dinitrophenol	mg/L	< 0.1			0.1	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
2-Methyl-4,6-dinitrophenol	mg/L	< 0.03			0.03	Pass	
2-Methylphenol (o-Cresol)	mg/L	< 0.003			0.003	Pass	
2-Nitrophenol	mg/L	< 0.01			0.01	Pass	
2,4-Dimethylphenol	mg/L	< 0.003			0.003	Pass	
2,4-Dinitrophenol	mg/L	< 0.03			0.03	Pass	
3&4-Methylphenol (m&p-Cresol)	mg/L	< 0.006			0.006	Pass	
4-Nitrophenol	mg/L	< 0.03			0.03	Pass	
Dinoseb	mg/L	< 0.1			0.1	Pass	
Phenol	mg/L	< 0.003			0.003	Pass	
<b>Method Blank</b>							
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
<b>Method Blank</b>							
<b>Perfluoroalkane sulfonamides (PFASAs)</b>							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
<b>Method Blank</b>							
<b>Perfluoroalkane sulfonic acids &amp; Perfluoroalkane sulfonates (PFSAs)</b>							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
<b>Method Blank</b>							
<b>n:2 Fluorotelomer sulfonic acids</b>							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	ug/L	< 0.01			0.01	Pass	
<b>Method Blank</b>							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Biochemical Oxygen Demand (BOD-5 Day)	mg/L	< 5			5	Pass	
Chemical Oxygen Demand (COD)	mg/L	< 25			25	Pass	
Chloride	mg/L	< 1			1	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	
Phosphate total (as P)	mg/L	< 0.05			0.05	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Sulphate (as SO <sub>4</sub> )	mg/L	< 5			5	Pass	
Total Dissolved Solids	mg/L	< 10			10	Pass	
Total Kjeldahl Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Total Organic Carbon	mg/L	< 5			5	Pass	
<b>Method Blank</b>							
<b>Alkalinity (speciated)</b>							
Bicarbonate Alkalinity (as HCO <sub>3</sub> )	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CO <sub>3</sub> )	mg/L	< 10			10	Pass	
Hydroxide Alkalinity (as CaCO <sub>3</sub> )	mg/L	< 10			10	Pass	
Total Alkalinity (as CaCO <sub>3</sub> )	mg/L	< 20			20	Pass	
<b>Method Blank</b>							
<b>Alkali Metals</b>							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
<b>Method Blank</b>							
<b>Heavy Metals</b>							
Aluminium (filtered)	mg/L	< 0.05			0.05	Pass	
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
<b>LCS - % Recovery</b>							
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>							
TRH C6-C9	%	105			70-130	Pass	
<b>LCS - % Recovery</b>							
<b>BTEX</b>							
Benzene	%	110			70-130	Pass	
Toluene	%	98			70-130	Pass	
Ethylbenzene	%	77			70-130	Pass	
m&p-Xylenes	%	72			70-130	Pass	
Xylenes - Total	%	78			70-130	Pass	
<b>LCS - % Recovery</b>							
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>							
Naphthalene	%	71			70-130	Pass	
TRH C6-C10	%	104			70-130	Pass	
<b>LCS - % Recovery</b>							
<b>Polycyclic Aromatic Hydrocarbons</b>							
Acenaphthene	%	99			70-130	Pass	
Acenaphthylene	%	105			70-130	Pass	
Anthracene	%	109			70-130	Pass	
Benz(a)anthracene	%	104			70-130	Pass	
Benzo(a)pyrene	%	108			70-130	Pass	
Benzo(b&j)fluoranthene	%	107			70-130	Pass	
Benzo(g,h,i)perylene	%	116			70-130	Pass	
Benzo(k)fluoranthene	%	100			70-130	Pass	
Chrysene	%	98			70-130	Pass	
Dibenz(a,h)anthracene	%	114			70-130	Pass	



Test	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Fluoranthene	%	93		70-130	Pass	
Fluorene	%	106		70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	115		70-130	Pass	
Naphthalene	%	95		70-130	Pass	
Phenanthrene	%	109		70-130	Pass	
Pyrene	%	95		70-130	Pass	
<b>LCS - % Recovery</b>						
<b>Phenols (Halogenated)</b>						
2-Chlorophenol	%	96		30-130	Pass	
2.4-Dichlorophenol	%	93		30-130	Pass	
2.4.5-Trichlorophenol	%	106		30-130	Pass	
2.4.6-Trichlorophenol	%	100		30-130	Pass	
2.6-Dichlorophenol	%	91		30-130	Pass	
4-Chloro-3-methylphenol	%	103		30-130	Pass	
Pentachlorophenol	%	121		30-130	Pass	
Tetrachlorophenols - Total	%	98		30-130	Pass	
<b>LCS - % Recovery</b>						
<b>Phenols (non-Halogenated)</b>						
2-Cyclohexyl-4.6-dinitrophenol	%	105		30-130	Pass	
2-Methyl-4.6-dinitrophenol	%	100		30-130	Pass	
2-Methylphenol (o-Cresol)	%	86		30-130	Pass	
2-Nitrophenol	%	91		30-130	Pass	
2.4-Dimethylphenol	%	75		30-130	Pass	
2.4-Dinitrophenol	%	65		30-130	Pass	
3&4-Methylphenol (m&p-Cresol)	%	84		30-130	Pass	
4-Nitrophenol	%	52		30-130	Pass	
Dinoseb	%	113		30-130	Pass	
Phenol	%	51		30-130	Pass	
<b>LCS - % Recovery</b>						
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>						
Perfluorobutanoic acid (PFBA)	%	86		50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	110		50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	121		50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	100		50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	116		50-150	Pass	
Perfluorononanoic acid (PFNA)	%	103		50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	99		50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	%	91		50-150	Pass	
Perfluorododecanoic acid (PFDoA)	%	94		50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	112		50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	99		50-150	Pass	
<b>LCS - % Recovery</b>						
<b>Perfluoroalkane sulfonamides (PFASAs)</b>						
Perfluorooctane sulfonamide (FOSA)	%	87		50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	101		50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	87		50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	100		50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	103		50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	99		50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	94		50-150	Pass	
<b>LCS - % Recovery</b>						
<b>Perfluoroalkane sulfonic acids &amp; Perfluoroalkane sulfonates (PFSAs)</b>						
Perfluorobutanesulfonic acid (PFBS)	%	88		50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	96		50-150	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code	
Perfluorohexanesulfonic acid (PFHxS)	%	97			50-150	Pass		
Perfluoroheptanesulfonic acid (PFHpS)	%	80			50-150	Pass		
Perfluorooctanesulfonic acid (PFOS)	%	94			50-150	Pass		
Perfluorodecanesulfonic acid (PFDS)	%	79			50-150	Pass		
<b>LCS - % Recovery</b>								
<b>n:2 Fluorotelomer sulfonic acids</b>								
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	%	97			50-150	Pass		
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	%	117			50-150	Pass		
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	%	113			50-150	Pass		
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	%	97			50-150	Pass		
<b>LCS - % Recovery</b>								
Ammonia (as N)	%	113			70-130	Pass		
Chemical Oxygen Demand (COD)	%	96			70-130	Pass		
Chloride	%	101			70-130	Pass		
Nitrate & Nitrite (as N)	%	104			70-130	Pass		
Nitrate (as N)	%	104			70-130	Pass		
Nitrite (as N)	%	106			70-130	Pass		
Phosphate total (as P)	%	91			70-130	Pass		
Sulphate (as SO4)	%	116			70-130	Pass		
Total Dissolved Solids	%	91			70-130	Pass		
Total Kjeldahl Nitrogen (as N)	%	98			70-130	Pass		
Total Organic Carbon	%	90			70-130	Pass		
<b>LCS - % Recovery</b>								
<b>Alkalinity (speciated)</b>								
Total Alkalinity (as CaCO3)	%	91			70-130	Pass		
<b>LCS - % Recovery</b>								
<b>Alkali Metals</b>								
Calcium	%	108			70-130	Pass		
Magnesium	%	109			70-130	Pass		
Potassium	%	104			70-130	Pass		
Sodium	%	105			70-130	Pass		
<b>LCS - % Recovery</b>								
<b>Heavy Metals</b>								
Aluminium (filtered)	%	107			80-120	Pass		
Arsenic (filtered)	%	101			80-120	Pass		
Cadmium (filtered)	%	102			80-120	Pass		
Chromium (filtered)	%	101			80-120	Pass		
Copper (filtered)	%	102			80-120	Pass		
Iron (filtered)	%	104			80-120	Pass		
Lead (filtered)	%	102			80-120	Pass		
Mercury (filtered)	%	80			70-130	Pass		
Nickel (filtered)	%	101			80-120	Pass		
Zinc (filtered)	%	103			80-120	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1				
TRH C6-C9	M17-JI09756	NCP	%	89		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>BTEX</b>				Result 1				
Benzene	M17-JI09756	NCP	%	119		70-130	Pass	
Toluene	M17-JI09756	NCP	%	109		70-130	Pass	
Ethylbenzene	M17-JI09756	NCP	%	91		70-130	Pass	
m&p-Xylenes	M17-JI09756	NCP	%	73		70-130	Pass	
o-Xylene	M17-JI09756	NCP	%	84		70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Xylenes - Total	M17-JI09756	NCP	%	77		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1				
Naphthalene	M17-JI09756	NCP	%	81		70-130	Pass	
TRH C6-C10	M17-JI09756	NCP	%	88		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>				Result 1				
Perfluorobutanoic acid (PFBA)	M17-JI06880	NCP	%	88		50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M17-JI06880	NCP	%	112		50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M17-JI06880	NCP	%	124		50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M17-JI06880	NCP	%	102		50-150	Pass	
Perfluorooctanoic acid (PFOA)	M17-JI06880	NCP	%	112		50-150	Pass	
Perfluorononanoic acid (PFNA)	M17-JI06880	NCP	%	100		50-150	Pass	
Perfluorodecanoic acid (PFDA)	M17-JI06880	NCP	%	93		50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	M17-JI06880	NCP	%	87		50-150	Pass	
Perfluorododecanoic acid (PFDoA)	M17-JI06880	NCP	%	97		50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	M17-JI06880	NCP	%	110		50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M17-JI06880	NCP	%	97		50-150	Pass	
<b>Spike - % Recovery</b>								
<b>Perfluoroalkane sulfonamides (PFASAs)</b>				Result 1				
Perfluorooctane sulfonamide (FOSA)	M17-JI06880	NCP	%	84		50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M17-JI06880	NCP	%	97		50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M17-JI06880	NCP	%	89		50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M17-JI06880	NCP	%	116		50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M17-JI06880	NCP	%	108		50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M17-JI06880	NCP	%	95		50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M17-JI06880	NCP	%	98		50-150	Pass	
<b>Spike - % Recovery</b>								
<b>Perfluoroalkane sulfonic acids &amp; Perfluoroalkane sulfonates (PFSAs)</b>				Result 1				
Perfluorobutanesulfonic acid (PFBS)	M17-JI06880	NCP	%	91		50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M17-JI06880	NCP	%	98		50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M17-JI06880	NCP	%	102		50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M17-JI06880	NCP	%	86		50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M17-JI06880	NCP	%	84		50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M17-JI06880	NCP	%	80		50-150	Pass	
<b>Spike - % Recovery</b>								
<b>n:2 Fluorotelomer sulfonic acids</b>				Result 1				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	M17-JI06880	NCP	%	103		50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	M17-JI06880	NCP	%	111		50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	M17-JI06880	NCP	%	108		50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	M17-JI06880	NCP	%	87		50-150	Pass	
<b>Spike - % Recovery</b>								
				Result 1				
Ammonia (as N)	M17-JI11516	NCP	%	102		70-130	Pass	
Chemical Oxygen Demand (COD)	M17-Jn00120	NCP	%	88		70-130	Pass	
Nitrate & Nitrite (as N)	M17-JI11655	NCP	%	102		70-130	Pass	
Nitrate (as N)	M17-JI11655	NCP	%	102		70-130	Pass	
Nitrite (as N)	M17-JI11516	NCP	%	106		70-130	Pass	
Phosphate total (as P)	B17-JI11051	NCP	%	87		70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M17-JI14067	NCP	%	109		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Alkalinity (speciated)</b>				Result 1				
Total Alkalinity (as CaCO3)	M17-JI12123	NCP	%	120		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Alkali Metals</b>				Result 1				
Calcium	M17-JI11653	NCP	%	92		70-130	Pass	
Magnesium	M17-JI11653	NCP	%	97		70-130	Pass	
Potassium	M17-JI10861	NCP	%	108		70-130	Pass	
Sodium	M17-JI11653	NCP	%	94		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Heavy Metals</b>				Result 1				
Aluminium (filtered)	B17-JI13224	NCP	%	104		75-125	Pass	
Arsenic (filtered)	B17-JI13224	NCP	%	100		70-130	Pass	
Cadmium (filtered)	B17-JI13224	NCP	%	96		70-130	Pass	
Chromium (filtered)	B17-JI13224	NCP	%	97		70-130	Pass	
Copper (filtered)	B17-JI13224	NCP	%	94		70-130	Pass	
Iron (filtered)	B17-JI13224	NCP	%	97		70-130	Pass	
Lead (filtered)	B17-JI13224	NCP	%	95		70-130	Pass	
Mercury (filtered)	B17-JI13224	NCP	%	94		70-130	Pass	
Nickel (filtered)	B17-JI13224	NCP	%	91		70-130	Pass	
Zinc (filtered)	B17-JI11539	NCP	%	102		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Polycyclic Aromatic Hydrocarbons</b>				Result 1				
Acenaphthene	M17-JI11962	CP	%	97		70-130	Pass	
Acenaphthylene	M17-JI11962	CP	%	106		70-130	Pass	
Anthracene	M17-JI11962	CP	%	119		70-130	Pass	
Benz(a)anthracene	M17-JI11962	CP	%	126		70-130	Pass	
Benzo(a)pyrene	M17-JI11962	CP	%	126		70-130	Pass	
Benzo(b&i)fluoranthene	M17-JI11962	CP	%	128		70-130	Pass	
Benzo(g,h,i)perylene	M17-JI11962	CP	%	117		70-130	Pass	
Benzo(k)fluoranthene	M17-JI11962	CP	%	125		70-130	Pass	
Chrysene	M17-JI11962	CP	%	118		70-130	Pass	
Dibenz(a,h)anthracene	M17-JI11962	CP	%	117		70-130	Pass	
Fluoranthene	M17-JI11962	CP	%	107		70-130	Pass	
Fluorene	M17-JI11962	CP	%	107		70-130	Pass	
Indeno(1.2.3-cd)pyrene	M17-JI11962	CP	%	123		70-130	Pass	
Naphthalene	M17-JI11962	CP	%	85		70-130	Pass	
Phenanthrene	M17-JI11962	CP	%	117		70-130	Pass	
Pyrene	M17-JI11962	CP	%	109		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Phenols (Halogenated)</b>				Result 1				

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
2-Chlorophenol	M17-JI11962	CP	%	56			30-130	Pass	
2,4-Dichlorophenol	M17-JI11962	CP	%	89			30-130	Pass	
2,4,5-Trichlorophenol	M17-JI11962	CP	%	108			30-130	Pass	
2,4,6-Trichlorophenol	M17-JI11962	CP	%	101			30-130	Pass	
2,6-Dichlorophenol	M17-JI11962	CP	%	87			30-130	Pass	
4-Chloro-3-methylphenol	M17-JI11962	CP	%	111			30-130	Pass	
Pentachlorophenol	M17-JI11962	CP	%	125			30-130	Pass	
Tetrachlorophenols - Total	M17-JI11962	CP	%	112			30-130	Pass	
<b>Spike - % Recovery</b>									
<b>Phenols (non-Halogenated)</b>				Result 1					
2-Cyclohexyl-4,6-dinitrophenol	M17-JI11962	CP	%	121			30-130	Pass	
2-Methyl-4,6-dinitrophenol	M17-JI11962	CP	%	109			30-130	Pass	
2-Methylphenol (o-Cresol)	M17-JI11962	CP	%	79			30-130	Pass	
2-Nitrophenol	M17-JI11962	CP	%	82			30-130	Pass	
2,4-Dimethylphenol	M17-JI11962	CP	%	86			30-130	Pass	
2,4-Dinitrophenol	M17-JI11962	CP	%	42			30-130	Pass	
3&4-Methylphenol (m&p-Cresol)	M17-JI11962	CP	%	87			30-130	Pass	
4-Nitrophenol	M17-JI11962	CP	%	68			30-130	Pass	
Dinoseb	M17-JI11962	CP	%	125			30-130	Pass	
Phenol	M17-JI11962	CP	%	47			30-130	Pass	
<b>Spike - % Recovery</b>									
				Result 1					
Phosphorus reactive (as P)	M17-JI11964	CP	%	82			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
<b>Duplicate</b>									
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	B17-JI11642	NCP	ug/L	0.09	0.09	1.0	30%	Pass	
Perfluoropentanoic acid (PFPeA)	B17-JI11642	NCP	ug/L	0.12	0.12	2.0	30%	Pass	
Perfluorohexanoic acid (PFHxA)	B17-JI11642	NCP	ug/L	0.16	0.16	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	B17-JI11642	NCP	ug/L	0.09	0.09	2.0	30%	Pass	
Perfluorooctanoic acid (PFOA)	B17-JI11642	NCP	ug/L	0.24	0.23	5.0	30%	Pass	
Perfluorononanoic acid (PFNA)	B17-JI11642	NCP	ug/L	0.03	0.03	3.0	30%	Pass	
Perfluorodecanoic acid (PFDA)	B17-JI11642	NCP	ug/L	0.01	0.01	12	30%	Pass	
Perfluoroundecanoic acid (PFUnA)	B17-JI11642	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoA)	B17-JI11642	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTTrDA)	B17-JI11642	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B17-JI11642	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
<b>Duplicate</b>									
<b>Perfluoroalkane sulfonamides (PFASAs)</b>				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	B17-JI11642	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B17-JI11642	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B17-JI11642	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B17-JI11642	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B17-JI11642	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B17-JI11642	NCP	ug/L	0.05	0.05	1.0	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B17-JI11642	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	



<b>Duplicate</b>								
<b>Perfluoroalkane sulfonic acids &amp; Perfluoroalkane sulfonates (PFSA's)</b>				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	B17-JI11642	NCP	ug/L	0.02	0.02	2.0	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	B17-JI11642	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	B17-JI11642	NCP	ug/L	0.02	0.02	2.0	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	B17-JI11642	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	B17-JI11642	NCP	ug/L	0.26	0.27	1.0	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	B17-JI11642	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
<b>Duplicate</b>								
<b>n:2 Fluorotelomer sulfonic acids</b>				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	B17-JI11642	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	B17-JI11642	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	B17-JI11642	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	B17-JI11642	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
<b>Duplicate</b>								
				Result 1	Result 2	RPD		
Ammonia (as N)	M17-JI11516	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass
Biochemical Oxygen Demand (BOD-5 Day)	M17-JI10183	NCP	mg/L	< 5	< 5	<1	30%	Pass
Chemical Oxygen Demand (COD)	M17-JI11959	CP	mg/L	480	370	25	30%	Pass
Chloride	M17-JI11959	CP	mg/L	140	150	2.0	30%	Pass
Conductivity (at 25°C)	M17-JI11959	CP	uS/cm	1100	1200	3.0	30%	Pass
Nitrate & Nitrite (as N)	M17-JI11655	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Nitrate (as N)	M17-JI11655	NCP	mg/L	0.05	0.05	5.0	30%	Pass
Nitrite (as N)	M17-JI11516	NCP	mg/L	0.04	0.04	3.0	30%	Pass
pH	M17-JI11959	CP	pH Units	6.2	6.1	pass	30%	Pass
Phosphate total (as P)	B17-JI11777	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Sulphate (as SO4)	M17-JI11959	CP	mg/L	190	190	<1	30%	Pass
Total Dissolved Solids	M17-JI11959	CP	mg/L	1100	1100	2.0	30%	Pass
Total Kjeldahl Nitrogen (as N)	M17-JI14064	NCP	mg/L	330	340	2.3	30%	Pass
Total Organic Carbon	M17-JI11959	CP	mg/L	200	210	4.0	30%	Pass
<b>Duplicate</b>								
<b>Alkalinity (speciated)</b>				Result 1	Result 2	RPD		
Bicarbonate Alkalinity (as HCO3)	M17-JI11959	CP	mg/L	110	110	2.0	30%	Pass
Carbonate Alkalinity (as CO3)	M17-JI11959	CP	mg/L	< 10	< 10	<1	30%	Pass
Hydroxide Alkalinity (as CaCO3)	M17-JI11959	CP	mg/L	< 10	< 10	<1	30%	Pass
Total Alkalinity (as CaCO3)	M17-JI11959	CP	mg/L	92	94	2.0	30%	Pass
<b>Duplicate</b>								
<b>Alkali Metals</b>				Result 1	Result 2	RPD		
Calcium	M17-JI11653	NCP	mg/L	100	89	11	30%	Pass
Magnesium	M17-JI11653	NCP	mg/L	220	190	10	30%	Pass
Potassium	M17-JI11653	NCP	mg/L	< 5	< 5	<1	30%	Pass
Sodium	M17-JI11653	NCP	mg/L	1100	950	10	30%	Pass

Duplicate								
<b>Heavy Metals</b>				Result 1	Result 2	RPD		
Aluminium (filtered)	B17-JI13224	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Arsenic (filtered)	B17-JI13224	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Cadmium (filtered)	B17-JI13224	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass
Chromium (filtered)	B17-JI13224	NCP	mg/L	0.001	< 0.001	24	30%	Pass
Copper (filtered)	B17-JI13224	NCP	mg/L	0.003	0.003	5.0	30%	Pass
Iron (filtered)	B17-JI13224	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Lead (filtered)	B17-JI13224	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Mercury (filtered)	B17-JI13224	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass
Nickel (filtered)	B17-JI13224	NCP	mg/L	0.015	0.016	5.0	30%	Pass
Zinc (filtered)	B17-JI11539	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Duplicate								
<b>Hardness Set</b>				Result 1	Result 2	RPD		
Hardness mg equivalent CaCO3/L	M17-JI11653	NCP	mg/L	1100	1000	10	30%	Pass
Duplicate								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1	Result 2	RPD		
TRH C10-C14	M17-JI11961	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass
TRH C15-C28	M17-JI11961	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass
TRH C29-C36	M17-JI11961	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass
Duplicate								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1	Result 2	RPD		
TRH >C10-C16	M17-JI11961	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass
TRH >C16-C34	M17-JI11961	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass
TRH >C34-C40	M17-JI11961	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass
Duplicate								
<b>Polycyclic Aromatic Hydrocarbons</b>				Result 1	Result 2	RPD		
Acenaphthene	M17-JI11961	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Acenaphthylene	M17-JI11961	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Anthracene	M17-JI11961	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Benz(a)anthracene	M17-JI11961	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Benzo(a)pyrene	M17-JI11961	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Benzo(b&j)fluoranthene	M17-JI11961	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Benzo(g,h,i)perylene	M17-JI11961	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Benzo(k)fluoranthene	M17-JI11961	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Chrysene	M17-JI11961	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Dibenz(a,h)anthracene	M17-JI11961	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Fluoranthene	M17-JI11961	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Fluorene	M17-JI11961	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Indeno(1,2,3-cd)pyrene	M17-JI11961	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Naphthalene	M17-JI11961	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Phenanthrene	M17-JI11961	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Pyrene	M17-JI11961	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Duplicate								
<b>Phenols (Halogenated)</b>				Result 1	Result 2	RPD		
2-Chlorophenol	M17-JI11961	CP	mg/L	< 0.003	< 0.003	<1	30%	Pass
2,4-Dichlorophenol	M17-JI11961	CP	mg/L	< 0.003	< 0.003	<1	30%	Pass
2,4,5-Trichlorophenol	M17-JI11961	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass
2,4,6-Trichlorophenol	M17-JI11961	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass
2,6-Dichlorophenol	M17-JI11961	CP	mg/L	< 0.003	< 0.003	<1	30%	Pass
4-Chloro-3-methylphenol	M17-JI11961	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass
Pentachlorophenol	M17-JI11961	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass
Tetrachlorophenols - Total	M17-JI11961	CP	mg/L	< 0.03	< 0.03	<1	30%	Pass

<b>Duplicate</b>								
<b>Phenols (non-Halogenated)</b>				Result 1	Result 2	RPD		
2-Cyclohexyl-4,6-dinitrophenol	M17-JI11961	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass
2-Methyl-4,6-dinitrophenol	M17-JI11961	CP	mg/L	< 0.03	< 0.03	<1	30%	Pass
2-Methylphenol (o-Cresol)	M17-JI11961	CP	mg/L	< 0.003	< 0.003	<1	30%	Pass
2-Nitrophenol	M17-JI11961	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass
2,4-Dimethylphenol	M17-JI11961	CP	mg/L	< 0.003	< 0.003	<1	30%	Pass
2,4-Dinitrophenol	M17-JI11961	CP	mg/L	< 0.03	< 0.03	<1	30%	Pass
3&4-Methylphenol (m&p-Cresol)	M17-JI11961	CP	mg/L	< 0.006	< 0.006	<1	30%	Pass
4-Nitrophenol	M17-JI11961	CP	mg/L	< 0.03	< 0.03	<1	30%	Pass
Dinoseb	M17-JI11961	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass
Phenol	M17-JI11961	CP	mg/L	< 0.003	< 0.003	<1	30%	Pass
<b>Duplicate</b>								
				Result 1	Result 2	RPD		
Phosphorus reactive (as P)	M17-JI11963	CP	mg/L	1.3	1.3	<1	30%	Pass
<b>Duplicate</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1	Result 2	RPD		
TRH C6-C9	M17-JI11965	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass
<b>Duplicate</b>								
<b>BTEX</b>				Result 1	Result 2	RPD		
Benzene	M17-JI11965	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Toluene	M17-JI11965	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Ethylbenzene	M17-JI11965	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
m&p-Xylenes	M17-JI11965	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass
o-Xylene	M17-JI11965	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Xylenes - Total	M17-JI11965	CP	mg/L	< 0.003	< 0.003	<1	30%	Pass
<b>Duplicate</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1	Result 2	RPD		
Naphthalene	M17-JI11965	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass
TRH C6-C10	M17-JI11965	CP	mg/L	< 0.02	< 0.02	<1	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	Yes
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
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds. Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

**Authorised By**

Robert Johnston	Analytical Services Manager
Alex Petridis	Senior Analyst-Metal (VIC)
Alex Petridis	Senior Analyst-Organic (VIC)
Harry Bacalis	Senior Analyst-Volatile (VIC)
Huong Le	Senior Analyst-Inorganic (VIC)
Jonathon Angell	Senior Analyst-Organic (QLD)
Joseph Edouard	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

Measurement uncertainty of test data is available on request or please [click here](#).

Eurofins | mgt shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins | mgt be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

## CERTIFICATE OF ANALYSIS

<b>Work Order</b>	<b>: EP1707310</b>	<b>Page</b>	<b>: 1 of 8</b>
<b>Client</b>	<b>: GOLDER ASSOCIATES</b>	<b>Laboratory</b>	<b>: Environmental Division Perth</b>
<b>Contact</b>	<b>: SARAH GARVEY</b>	<b>Contact</b>	<b>: Luke Jones</b>
<b>Address</b>	<b>: PO BOX 1914</b>	<b>Address</b>	<b>: 10 Hod Way Malaga WA Australia 6090</b>
	<b>WEST PERTH WA 6872</b>		
<b>Telephone</b>	<b>: +61 08 9213 7600</b>	<b>Telephone</b>	<b>: 08 9209 7631</b>
<b>Project</b>	<b>: 1779954</b>	<b>Date Samples Received</b>	<b>: 10-Jul-2017 17:00</b>
<b>Order number</b>	<b>: 1779954 [Q00186]</b>	<b>Date Analysis Commenced</b>	<b>: 10-Jul-2017</b>
<b>C-O-C number</b>	<b>: Q00186</b>	<b>Issue Date</b>	<b>: 18-Jul-2017 16:05</b>
<b>Sampler</b>	<b>: ----</b>		
<b>Site</b>	<b>: ----</b>		
<b>Quote number</b>	<b>: EN/002/16 v2</b>		
<b>No. of samples received</b>	<b>: 2</b>		
<b>No. of samples analysed</b>	<b>: 2</b>		



Accreditation No. 825  
Accredited for compliance with  
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ashesh Patel	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Efua Wilson	Metals Chemist	Perth Inorganics, Malaga, WA
Greg Vogel	Laboratory Manager	Brisbane Organics, Stafford, QLD
Indra Astuty	Instrument Chemist	Perth Inorganics, Malaga, WA
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
ShukHui Li	Client Services - Technical Manager	Perth Organics, Malaga, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA





## General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

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

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.  
LOR = Limit of reporting  
^ = This result is computed from individual analyte detections at or above the level of reporting  
ø = ALS is not NATA accredited for these tests.  
~ = Indicates an estimated value.

- PFAS and chemical oxygen demand analyses conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EA015H (Total Dissolved Solids): TDS for sample 'Q00186-01' biasing high due to possible sample matrix interferences.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID			Q00186-01	Q00186-02	----	----	----
		Client sampling date / time			10-Jul-2017 00:00	10-Jul-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP1707310-001	EP1707310-002	-----	-----	-----	
				Result	Result	----	----	----	
<b>EA005P: pH by PC Titrator</b>									
pH Value	----	0.01	pH Unit	4.24	----	----	----	----	----
<b>EA010P: Conductivity by PC Titrator</b>									
Electrical Conductivity @ 25°C	----	1	µS/cm	412	----	----	----	----	----
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>									
Total Dissolved Solids @180°C	----	10	mg/L	676	----	----	----	----	----
<b>EA065: Total Hardness as CaCO3</b>									
Total Hardness as CaCO3	----	1	mg/L	54	----	----	----	----	----
<b>ED037P: Alkalinity by PC Titrator</b>									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	----	----	----	----	----
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	36	----	----	----	----	----
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	88	----	----	----	----	----
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	5	----	----	----	----	----
Magnesium	7439-95-4	1	mg/L	10	----	----	----	----	----
Sodium	7440-23-5	1	mg/L	40	----	----	----	----	----
Potassium	7440-09-7	1	mg/L	26	----	----	----	----	----
<b>EG020F: Dissolved Metals by ICP-MS</b>									
Aluminium	7429-90-5	0.01	mg/L	0.65	----	----	----	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	0.005	----	----	----	----	----
Copper	7440-50-8	0.001	mg/L	0.004	----	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	0.004	----	----	----	----	----
Lead	7439-92-1	0.001	mg/L	0.002	----	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	0.032	----	----	----	----	----
Iron	7439-89-6	0.05	mg/L	2.84	----	----	----	----	----
<b>EG035F: Dissolved Mercury by FIMS</b>									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----	----



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID			Q00186-01	Q00186-02	----	----	----
Client sampling date / time					10-Jul-2017 00:00	10-Jul-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP1707310-001	EP1707310-002	-----	-----	-----	
				Result	Result	----	----	----	
<b>EK055G: Ammonia as N by Discrete Analyser</b>									
Ammonia as N	7664-41-7	0.01	mg/L	0.66	----	----	----	----	----
<b>EK057G: Nitrite as N by Discrete Analyser</b>									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	----	----	----	----	----
<b>EK058G: Nitrate as N by Discrete Analyser</b>									
Nitrate as N	14797-55-8	0.01	mg/L	0.05	----	----	----	----	----
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>									
Nitrite + Nitrate as N	----	0.01	mg/L	0.05	----	----	----	----	----
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	6.6	----	----	----	----	----
<b>EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser</b>									
^ Total Nitrogen as N	----	0.1	mg/L	6.6	----	----	----	----	----
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>									
Total Phosphorus as P	----	0.01	mg/L	11.9	----	----	----	----	----
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	11.7	----	----	----	----	----
<b>EN055: Ionic Balance</b>									
Total Anions	----	0.01	meq/L	3.23	----	----	----	----	----
Total Cations	----	0.01	meq/L	3.48	----	----	----	----	----
Ionic Balance	----	0.01	%	3.66	----	----	----	----	----
<b>EP005: Total Organic Carbon (TOC)</b>									
Total Organic Carbon	----	1	mg/L	132	----	----	----	----	----
<b>EP026SP: Chemical Oxygen Demand (Spectrophotometric)</b>									
Chemical Oxygen Demand	----	10	mg/L	574	----	----	----	----	----
<b>EP030: Biochemical Oxygen Demand (BOD)</b>									
Biochemical Oxygen Demand	----	2	mg/L	25	----	----	----	----	----
<b>EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup</b>									
C10 - C14 Fraction	----	50	µg/L	<50	----	----	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	----	----	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	----	----	----	----	----
<b>EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup</b>									
>C10 - C16 Fraction	----	100	µg/L	<100	----	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	----	----	----	----	----



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Q00186-01	Q00186-02	----	----	----
Client sampling date / time				10-Jul-2017 00:00	10-Jul-2017 00:00	----	----	----	
Compound	CAS Number	LOR	Unit	EP1707310-001	EP1707310-002	-----	-----	-----	
				Result	Result	----	----	----	
<b>EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup - Continued</b>									
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	----	----	----	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	----	----	----	----	----
<b>EP075(SIM)A: Phenolic Compounds</b>									
Phenol	108-95-2	1	µg/L	<1.0	----	----	----	----	----
2-Chlorophenol	95-57-8	1	µg/L	<1.0	----	----	----	----	----
2-Methylphenol	95-48-7	1	µg/L	<1.0	----	----	----	----	----
3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	----	----	----	----	----
2-Nitrophenol	88-75-5	1	µg/L	<1.0	----	----	----	----	----
2,4-Dimethylphenol	105-67-9	1	µg/L	<1.0	----	----	----	----	----
2,4-Dichlorophenol	120-83-2	1	µg/L	<1.0	----	----	----	----	----
2,6-Dichlorophenol	87-65-0	1	µg/L	<1.0	----	----	----	----	----
4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	----	----	----	----	----
2,4,6-Trichlorophenol	88-06-2	1	µg/L	<1.0	----	----	----	----	----
2,4,5-Trichlorophenol	95-95-4	1	µg/L	<1.0	----	----	----	----	----
Pentachlorophenol	87-86-5	2	µg/L	<2.0	----	----	----	----	----
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>									
Naphthalene	91-20-3	1	µg/L	<1.0	----	----	----	----	----
Acenaphthylene	208-96-8	1	µg/L	<1.0	----	----	----	----	----
Acenaphthene	83-32-9	1	µg/L	<1.0	----	----	----	----	----
Fluorene	86-73-7	1	µg/L	<1.0	----	----	----	----	----
Phenanthrene	85-01-8	1	µg/L	<1.0	----	----	----	----	----
Anthracene	120-12-7	1	µg/L	<1.0	----	----	----	----	----
Fluoranthene	206-44-0	1	µg/L	<1.0	----	----	----	----	----
Pyrene	129-00-0	1	µg/L	<1.0	----	----	----	----	----
Benz(a)anthracene	56-55-3	1	µg/L	<1.0	----	----	----	----	----
Chrysene	218-01-9	1	µg/L	<1.0	----	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	----	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	----	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	----	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	----	----	----	----	----
Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	----	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----	----



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID		Q00186-01	Q00186-02	----	----	----
Client sampling date / time				10-Jul-2017 00:00	10-Jul-2017 00:00	----	----	----	----	----
Compound	CAS Number	LOR	Unit	EP1707310-001	EP1707310-002	-----	-----	-----	-----	-----
				Result	Result	----	----	----	----	----
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued</b>										
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	----	----	----	----	----	----
<b>EP080/071: Total Petroleum Hydrocarbons</b>										
C6 - C9 Fraction	----	20	µg/L	<20	<20	----	----	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	----	----	----	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	----	----	----	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	----	----	----	----	----	----
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>										
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	----	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	----	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	----	----	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	----	----	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	----	----	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	----	----	----	----	----	----
<b>EP080: BTEXN</b>										
Benzene	71-43-2	1	µg/L	<1	<1	----	----	----	----	----
Toluene	108-88-3	2	µg/L	<2	<2	----	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	----	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	----	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	----	----	----	----	----
^ Total Xylenes	1330-20-7	2	µg/L	<2	<2	----	----	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	<1	----	----	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	----	----	----	----	----
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>										
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	----	----	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	----	----	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	----	----	----	----	----	----
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>										





## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Q00186-01	Q00186-02	----	----	----
Client sampling date / time				10-Jul-2017 00:00	10-Jul-2017 00:00	----	----	----	
Compound	CAS Number	LOR	Unit	EP1707310-001	EP1707310-002	-----	-----	-----	
				Result	Result	----	----	----	
<b>EP231B: Perfluoroalkyl Carboxylic Acids - Continued</b>									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	----	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	----	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	----	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	----	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	----	----	----	----	----
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	----	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	----	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	----	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	----	----	----	----	----
<b>EP231P: PFAS Sums</b>									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	----	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----	----
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>									
Phenol-d6	13127-88-3	1	%	18.0	----	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1	%	66.8	----	----	----	----	----
2,4,6-Tribromophenol	118-79-6	1	%	78.8	----	----	----	----	----
<b>EP075(SIM)T: PAH Surrogates</b>									
2-Fluorobiphenyl	321-60-8	1	%	64.0	----	----	----	----	----
Anthracene-d10	1719-06-8	1	%	73.6	----	----	----	----	----
4-Terphenyl-d14	1718-51-0	1	%	93.1	----	----	----	----	----
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	2	%	97.2	98.0	----	----	----	----
Toluene-D8	2037-26-5	2	%	97.3	98.0	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	102	101	----	----	----	----
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.02	%	82.3	----	----	----	----	----



## Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>			
Phenol-d6	13127-88-3	10	67
2-Chlorophenol-D4	93951-73-6	29	120
2,4,6-Tribromophenol	118-79-6	10	131
<b>EP075(SIM)T: PAH Surrogates</b>			
2-Fluorobiphenyl	321-60-8	34	131
Anthracene-d10	1719-06-8	43	127
4-Terphenyl-d14	1718-51-0	41	142
<b>EP080S: TPH(V)/BTEX Surrogates</b>			
1,2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125
<b>EP231S: PFAS Surrogate</b>			
13C4-PFOS	----	60	130

## QUALITY CONTROL REPORT

<b>Work Order</b>	: <b>EP1707310</b>	<b>Page</b>	: 1 of 13
<b>Client</b>	: <b>GOLDER ASSOCIATES</b>	<b>Laboratory</b>	: Environmental Division Perth
<b>Contact</b>	: SARAH GARVEY	<b>Contact</b>	: Luke Jones
<b>Address</b>	: PO BOX 1914 WEST PERTH WA 6872	<b>Address</b>	: 10 Hod Way Malaga WA Australia 6090
<b>Telephone</b>	: +61 08 9213 7600	<b>Telephone</b>	: 08 9209 7631
<b>Project</b>	: 1779954	<b>Date Samples Received</b>	: 10-Jul-2017
<b>Order number</b>	: 1779954 [Q00186]	<b>Date Analysis Commenced</b>	: 10-Jul-2017
<b>C-O-C number</b>	: Q00186	<b>Issue Date</b>	: 18-Jul-2017
<b>Sampler</b>	: ----		
<b>Site</b>	: ----		
<b>Quote number</b>	: EN/002/16 v2		
<b>No. of samples received</b>	: 2		
<b>No. of samples analysed</b>	: 2		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

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

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ashesh Patel	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Efua Wilson	Metals Chemist	Perth Inorganics, Malaga, WA
Greg Vogel	Laboratory Manager	Brisbane Organics, Stafford, QLD
Indra Astuty	Instrument Chemist	Perth Inorganics, Malaga, WA
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
ShukHui Li	Client Services - Technical Manager	Perth Organics, Malaga, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Malaga, WA
Vanessa Nguyen	Organic Chemist	Perth Organics, Malaga, WA



## General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key :  
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot  
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.  
 LOR = Limit of reporting  
 RPD = Relative Percentage Difference  
 # = Indicates failed QC

## Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EA005P: pH by PC Titrator (QC Lot: 989778)</b>									
EP1707280-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.92	6.95	0.432	0% - 20%
EP1707316-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.68	7.71	0.390	0% - 20%
<b>EA010P: Conductivity by PC Titrator (QC Lot: 989774)</b>									
EP1707255-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	<1	0.00	No Limit
EP1707266-003	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	67	66	0.00	0% - 20%
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 999377)</b>									
EP1707310-001	Q00186-01	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	676	670	0.892	0% - 20%
EP1707367-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	4970	4950	0.444	0% - 20%
<b>ED037P: Alkalinity by PC Titrator (QC Lot: 989779)</b>									
EP1707316-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	120	118	2.04	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	120	118	2.04	0% - 20%
EP1707321-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	285	300	5.05	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	285	300	5.05	0% - 20%
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 988774)</b>									
EP1707303-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1430	1500	4.41	0% - 20%
EP1707314-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	32	31	3.25	0% - 20%
<b>ED045G: Chloride by Discrete Analyser (QC Lot: 988770)</b>									
EP1707297-007	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	177	177	0.00	0% - 20%
EP1707314-004	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	116	113	3.02	0% - 20%
<b>ED093F: Dissolved Major Cations (QC Lot: 997062)</b>									



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>ED093F: Dissolved Major Cations (QC Lot: 997062) - continued</b>									
EP1707072-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	30	30	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	30	30	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	150	148	1.02	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	13	13	0.00	0% - 50%
EP1707367-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	44	44	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	157	158	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	1530	1530	0.105	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	64	65	0.00	0% - 20%
<b>EG020F: Dissolved Metals by ICP-MS (QC Lot: 997063)</b>									
EP1707367-008	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.103	0.100	2.75	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.027	0.029	6.58	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP1707263-007	Anonymous	EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
EP1707263-007	Anonymous	EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
<b>EG035F: Dissolved Mercury by FIMS (QC Lot: 997064)</b>									
EP1707367-007	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP1707263-007	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
<b>EK055G: Ammonia as N by Discrete Analyser (QC Lot: 988776)</b>									
EP1707307-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.05	0.05	0.00	No Limit
<b>EK057G: Nitrite as N by Discrete Analyser (QC Lot: 988773)</b>									
EP1707303-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.54	0.54	0.00	0% - 20%
EP1707314-004	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 988775)</b>									
EP1707286-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.02	0.02	0.00	No Limit
EP1707307-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.48	0.50	3.45	0% - 20%
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 996952)</b>									





Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 996952) - continued</b>									
EP1707332-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	8.0	9.0	11.8	0% - 20%
EP1707353-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.00	No Limit
<b>EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 996951)</b>									
EP1707332-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	2.77	2.94	6.13	0% - 20%
EP1707353-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.02	72.2	No Limit
<b>EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 988771)</b>									
EP1707297-007	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.03	0.03	0.00	No Limit
EP1707314-004	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.08	0.08	0.00	No Limit
<b>EP005: Total Organic Carbon (TOC) (QC Lot: 999174)</b>									
EB1714415-003	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	4040	3990	1.12	0% - 20%
<b>EP026SP: Chemical Oxygen Demand (Spectrophotometric) (QC Lot: 998649)</b>									
EP1707310-001	Q00186-01	EP026SP: Chemical Oxygen Demand	----	10	mg/L	574	574	0.00	0% - 20%
ES1717064-002	Anonymous	EP026SP: Chemical Oxygen Demand	----	10	mg/L	3320	3320	0.00	0% - 20%
<b>EP030: Biochemical Oxygen Demand (BOD) (QC Lot: 993352)</b>									
EP1707328-002	Anonymous	EP030: Biochemical Oxygen Demand	----	2	mg/L	<2	<2	0.00	No Limit
EP1707332-005	Anonymous	EP030: Biochemical Oxygen Demand	----	2	mg/L	19	17	9.97	No Limit
<b>EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QC Lot: 990521)</b>									
EP1707310-001	Q00186-01	EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
<b>EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QC Lot: 990521)</b>									
EP1707310-001	Q00186-01	EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
<b>EP075(SIM)A: Phenolic Compounds (QC Lot: 990519)</b>									
EP1707310-001	Q00186-01	EP075(SIM): Phenol	108-95-2	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2,4-Dimethylphenol	105-67-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2,4-Dichlorophenol	120-83-2	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2,6-Dichlorophenol	87-65-0	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	<2.0	0.00	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	µg/L	<2.0	<2.0	0.00	No Limit
		<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 990519)</b>							



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 990519) - continued</b>									
EP1707310-001	Q00186-01	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	0.00	No Limit
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	0.00	No Limit		
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	<1.0	0.00	No Limit		
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 990520)</b>									
EP1707310-001	Q00186-01	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 990557)</b>									
EP1707322-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<0.02 mg/L	<20	0.00	No Limit
EP1707325-007	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 990520)</b>									
EP1707310-001	Q00186-01	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 990557)</b>									
EP1707322-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<0.02 mg/L	<20	0.00	No Limit
EP1707325-007	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
<b>EP080: BTEXN (QC Lot: 990557)</b>									
EP1707322-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<0.001 mg/L	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<0.002 mg/L	<2	0.00	No Limit



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)	
<b>EP080: BTEXN (QC Lot: 990557) - continued</b>										
EP1707322-001	Anonymous	EP080: ortho-Xylene	95-47-6	2	µg/L	<0.002 mg/L	<2	0.00	No Limit	
		EP080: Naphthalene	91-20-3	5	µg/L	<0.005 mg/L	<5	0.00	No Limit	
EP1707325-007	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit	
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit	
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit	
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit	
			106-42-3							
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit	
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit	
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 996761)</b>										
EP1707263-007	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit	
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit	
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit	
ES1717169-002	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit	
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit	
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit	
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 996761)</b>										
EP1707263-007	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit	
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit	
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit	
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit	
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit	
ES1717169-002	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit	
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit	
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit	
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit	
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 996761)</b>										
EP1707263-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit	
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit	
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit	
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit	
ES1717169-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit	
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit	

Page : 7 of 13  
 Work Order : EP1707310  
 Client : GOLDER ASSOCIATES  
 Project : 1779954



Sub-Matrix: **WATER**

*Laboratory Duplicate (DUP) Report*

<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Method: Compound</i>	<i>CAS Number</i>	<i>LOR</i>	<i>Unit</i>	<i>Original Result</i>	<i>Duplicate Result</i>	<i>RPD (%)</i>	<i>Recovery Limits (%)</i>
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 996761) - continued</b>									
ES1717169-002	Anonymous	EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit



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

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
<b>EA005P: pH by PC Titrator (QCLot: 989778)</b>									
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.8	99	102	
				----	7 pH Unit	100	99	102	
<b>EA010P: Conductivity by PC Titrator (QCLot: 989774)</b>									
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	24800 µS/cm	99.6	95	105	
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 999377)</b>									
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	99.8	83	111	
				<10	1000 mg/L	88.2	70	130	
<b>ED037P: Alkalinity by PC Titrator (QCLot: 989779)</b>									
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----	
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----	
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----	
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	99.6	76	126	
				<1	200 mg/L	93.9	90	106	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 988774)</b>									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	100	89	113	
				<1	100 mg/L	96.4	79	121	
<b>ED045G: Chloride by Discrete Analyser (QCLot: 988770)</b>									
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	94.3	84	120	
				<1	1000 mg/L	104	84	110	
<b>ED093F: Dissolved Major Cations (QCLot: 997062)</b>									
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.7	91	109	
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	101	90	108	
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	105	87	111	
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	103	90	110	
<b>EG020F: Dissolved Metals by ICP-MS (QCLot: 997063)</b>									
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	93.1	84	116	
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	99.6	84	108	
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.5	86	108	
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	93.7	85	109	
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	92.2	84	110	
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	95.3	85	107	
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	94.0	84	112	
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	93.5	89	115	





Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
<b>EG020F: Dissolved Metals by ICP-MS (QCLot: 997063) - continued</b>									
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	96.7	84	112	
<b>EG035F: Dissolved Mercury by FIMS (QCLot: 997064)</b>									
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	114	92	116	
<b>EK055G: Ammonia as N by Discrete Analyser (QCLot: 988776)</b>									
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	108	87	115	
<b>EK057G: Nitrite as N by Discrete Analyser (QCLot: 988773)</b>									
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	100	86	112	
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 988775)</b>									
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	103	92	112	
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 996952)</b>									
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	83.8	82	110	
<b>EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 996951)</b>									
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	87.3	70	130	
<b>EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 988771)</b>									
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	106	87	115	
<b>EP005: Total Organic Carbon (TOC) (QCLot: 999174)</b>									
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	92.0	79	113	
				<1	100 mg/L	95.2	79	113	
<b>EP026SP: Chemical Oxygen Demand (Spectrophotometric) (QCLot: 998649)</b>									
EP026SP: Chemical Oxygen Demand	----	10	mg/L	<10	50 mg/L	102	82	112	
				<10	500 mg/L	100	83	113	
<b>EP030: Biochemical Oxygen Demand (BOD) (QCLot: 993352)</b>									
EP030: Biochemical Oxygen Demand	----	2	mg/L	<2	198 mg/L	103	78	117	
<b>EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 990521)</b>									
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	3486 µg/L	97.8	34	141	
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	9824 µg/L	99.7	38	127	
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	1476 µg/L	88.8	40	129	
<b>EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 990521)</b>									
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	6131 µg/L	98.5	36	129	
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	8365 µg/L	97.3	41	129	
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	470 µg/L	86.7	33	136	
<b>EP075(SIM)A: Phenolic Compounds (QCLot: 990519)</b>									
EP075(SIM): Phenol	108-95-2	1	µg/L	<1.0	10 µg/L	15.6	9	46	
EP075(SIM): 2-Chlorophenol	95-57-8	1	µg/L	<1.0	10 µg/L	37.2	34	97	
EP075(SIM): 2-Methylphenol	95-48-7	1	µg/L	<1.0	10 µg/L	33.3	25	93	
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	20 µg/L	27.9	22	83	
EP075(SIM): 2-Nitrophenol	88-75-5	1	µg/L	<1.0	10 µg/L	49.8	34	104	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
<b>EP075(SIM)A: Phenolic Compounds (QCLot: 990519) - continued</b>									
EP075(SIM): 2,4-Dimethylphenol	105-67-9	1	µg/L	<1.0	10 µg/L	38.0	34	102	
EP075(SIM): 2,4-Dichlorophenol	120-83-2	1	µg/L	<1.0	10 µg/L	50.5	34	104	
EP075(SIM): 2,6-Dichlorophenol	87-65-0	1	µg/L	<1.0	10 µg/L	43.1	38	102	
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	10 µg/L	35.8	30	106	
EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	1	µg/L	<1.0	10 µg/L	39.0	32	109	
EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	1	µg/L	<1.0	10 µg/L	40.4	34	110	
EP075(SIM): Pentachlorophenol	87-86-5	2	µg/L	<2.0	10 µg/L	85.3	14	104	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 990519)</b>									
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	10 µg/L	78.2	42	99	
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	10 µg/L	70.0	36	113	
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	10 µg/L	73.4	36	102	
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	10 µg/L	43.9	34	113	
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	10 µg/L	77.9	37	115	
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	10 µg/L	100	46	109	
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	10 µg/L	113	40	124	
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	10 µg/L	106	40	123	
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	10 µg/L	61.8	40	126	
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	10 µg/L	119	46	121	
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	1	µg/L	<1.0	10 µg/L	98.2	43	123	
	205-82-3								
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	10 µg/L	108	47	121	
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	10 µg/L	103	45	123	
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	10 µg/L	75.8	39	120	
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1	µg/L	<1.0	10 µg/L	70.1	39	119	
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	10 µg/L	97.1	40	123	
EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 990520)</b>									
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	59.2	35	95	
EP071: C15 - C28 Fraction	----	100	µg/L	<100	400 µg/L	89.4	34	111	
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	80.5	34	105	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 990557)</b>									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	108	74	113	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 990520)</b>									
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	400 µg/L	63.3	37	99	
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	600 µg/L	91.3	35	108	
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	200 µg/L	103	11	117	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 990557)</b>									
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	112	74	115	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
<b>EP080: BTEXN (QCLot: 990557)</b>									
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	111	84	114	
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	107	81	115	
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	108	84	113	
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	40 µg/L	112	84	114	
	106-42-3								
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	109	87	111	
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	110	77	118	
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 996761)</b>									
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	91.0	70	130	
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	82.4	70	130	
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	116	70	130	
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 996761)</b>									
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	86.6	70	130	
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	84.0	70	130	
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	80.0	70	130	
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	119	70	130	
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	110	70	130	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 996761)</b>									
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	104	70	130	
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	103	70	130	
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	122	70	130	
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	83.4	70	130	

### Matrix Spike (MS) Report

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

Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report				
				Spike Concentration	Spike Recovery(%)		Recovery Limits (%)	
					MS	Low	High	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 988774)</b>								
EP1707303-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70	130	
<b>ED045G: Chloride by Discrete Analyser (QCLot: 988770)</b>								
EP1707297-007	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	99.6	70	130	
<b>EG020F: Dissolved Metals by ICP-MS (QCLot: 997063)</b>								
EP1707263-008	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	96.0	70	130	



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
<b>EG020F: Dissolved Metals by ICP-MS (QCLot: 997063) - continued</b>							
EP1707263-008	Anonymous	EG020A-F: Cadmium	7440-43-9	0.05 mg/L	95.6	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	98.0	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	94.1	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	96.9	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	96.4	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	96.5	70	130
<b>EG035F: Dissolved Mercury by FIMS (QCLot: 997064)</b>							
EP1707310-001	Q00186-01	EG035F: Mercury	7439-97-6	0.01 mg/L	100	70	130
<b>EK055G: Ammonia as N by Discrete Analyser (QCLot: 988776)</b>							
EP1707307-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	107	70	130
<b>EK057G: Nitrite as N by Discrete Analyser (QCLot: 988773)</b>							
EP1707303-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	84.5	70	130
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 988775)</b>							
EP1707286-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	112	70	130
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 996952)</b>							
EP1707332-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	125	70	130
<b>EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 996951)</b>							
EP1707332-001	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	96.3	70	130
<b>EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 988771)</b>							
EP1707297-007	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	116	70	130
<b>EP005: Total Organic Carbon (TOC) (QCLot: 999174)</b>							
EB1714415-004	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	94.7	70	130
<b>EP026SP: Chemical Oxygen Demand (Spectrophotometric) (QCLot: 998649)</b>							
EP1707310-001	Q00186-01	EP026SP: Chemical Oxygen Demand	----	47.6 mg/L	96.2	70	130
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 990520)</b>							
EP1707310-001	Q00186-01	EP071: C10 - C14 Fraction	----	400 µg/L	50.8	45	122
		EP071: C15 - C28 Fraction	----	400 µg/L	67.1	55	143
		EP071: C29 - C36 Fraction	----	400 µg/L	89.7	54	128
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 990557)</b>							
EP1707322-002	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	86.2	77	137
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 990520)</b>							
EP1707310-001	Q00186-01	EP071: >C10 - C16 Fraction	----	400 µg/L	50.5	45	122
		EP071: >C16 - C34 Fraction	----	600 µg/L	80.6	55	143
		EP071: >C34 - C40 Fraction	----	200 µg/L	111	54	128

Page : 13 of 13  
 Work Order : EP1707310  
 Client : GOLDER ASSOCIATES  
 Project : 1779954



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	Spike Recovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 990557)</b>							
EP1707322-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	79.0	77	137
<b>EP080: BTEXN (QCLot: 990557)</b>							
EP1707322-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	107	77	122
		EP080: Toluene	108-88-3	20 µg/L	82.8	74	126
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 996761)</b>							
EP1707263-007	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	90.6	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	84.2	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	106	50	130
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 996761)</b>							
EP1707263-007	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	81.5	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	80.8	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	72.4	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	125	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	113	50	130
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 996761)</b>							
EP1707263-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	106	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	104	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	112	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	73.8	50	130



## QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP1707310	Page	: 1 of 11
Client	: <b>GOLDER ASSOCIATES</b>	Laboratory	: Environmental Division Perth
Contact	: SARAH GARVEY	Telephone	: 08 9209 7631
Project	: 1779954	Date Samples Received	: 10-Jul-2017
Site	: ----	Issue Date	: 18-Jul-2017
Sampler	: ----	No. of samples received	: 2
Order number	: 1779954 [Q00186]	No. of samples analysed	: 2

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

### Summary of Outliers

#### Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

#### Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

#### Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



### Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
<b>Matrix Spike (MS) Recoveries</b>							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP1707303--001	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

### Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
<b>EA005P: pH by PC Titrator</b>						
Clear Plastic Bottle - Natural Q00186-01	----	----	----	11-Jul-2017	10-Jul-2017	1

### Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
<b>Matrix Spikes (MS)</b>					
PAH/Phenols (GC/MS - SIM)	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

### Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: \* = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
<b>EA005P: pH by PC Titrator</b>							
Clear Plastic Bottle - Natural (EA005-P) Q00186-01	10-Jul-2017	----	----	----	11-Jul-2017	10-Jul-2017	*
<b>EA010P: Conductivity by PC Titrator</b>							
Clear Plastic Bottle - Natural (EA010-P) Q00186-01	10-Jul-2017	----	----	----	11-Jul-2017	07-Aug-2017	✓



Matrix: **WATER** Evaluation: \* = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>							
Clear Plastic Bottle - Natural (EA015H) Q00186-01	10-Jul-2017	----	----	----	17-Jul-2017	17-Jul-2017	✓
<b>EA065: Total Hardness as CaCO3</b>							
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) Q00186-01	10-Jul-2017	----	----	----	14-Jul-2017	07-Aug-2017	✓
<b>ED037P: Alkalinity by PC Titrator</b>							
Clear Plastic Bottle - Natural (ED037-P) Q00186-01	10-Jul-2017	----	----	----	11-Jul-2017	24-Jul-2017	✓
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>							
Clear Plastic Bottle - Natural (ED041G) Q00186-01	10-Jul-2017	----	----	----	10-Jul-2017	07-Aug-2017	✓
<b>ED045G: Chloride by Discrete Analyser</b>							
Clear Plastic Bottle - Natural (ED045G) Q00186-01	10-Jul-2017	----	----	----	10-Jul-2017	07-Aug-2017	✓
<b>ED093F: Dissolved Major Cations</b>							
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) Q00186-01	10-Jul-2017	----	----	----	14-Jul-2017	07-Aug-2017	✓
<b>EG020F: Dissolved Metals by ICP-MS</b>							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) Q00186-01	10-Jul-2017	----	----	----	14-Jul-2017	06-Jan-2018	✓
<b>EG035F: Dissolved Mercury by FIMS</b>							
Clear Plastic Bottle - Filtered; Lab-acidified (EG035F) Q00186-01	10-Jul-2017	----	----	----	14-Jul-2017	07-Aug-2017	✓
<b>EK055G: Ammonia as N by Discrete Analyser</b>							
Clear Plastic Bottle - Sulfuric Acid (EK055G) Q00186-01	10-Jul-2017	----	----	----	10-Jul-2017	07-Aug-2017	✓
<b>EK057G: Nitrite as N by Discrete Analyser</b>							
Clear Plastic Bottle - Natural (EK057G) Q00186-01	10-Jul-2017	----	----	----	10-Jul-2017	12-Jul-2017	✓
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>							
Clear Plastic Bottle - Sulfuric Acid (EK059G) Q00186-01	10-Jul-2017	----	----	----	10-Jul-2017	07-Aug-2017	✓
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>							
Clear Plastic Bottle - Sulfuric Acid (EK061G) Q00186-01	10-Jul-2017	17-Jul-2017	07-Aug-2017	✓	17-Jul-2017	07-Aug-2017	✓
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>							
Clear Plastic Bottle - Sulfuric Acid (EK067G) Q00186-01	10-Jul-2017	17-Jul-2017	07-Aug-2017	✓	17-Jul-2017	07-Aug-2017	✓



Matrix: WATER

Evaluation: \* = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>							
Clear Plastic Bottle - Natural (EK071G) Q00186-01	10-Jul-2017	----	----	----	10-Jul-2017	12-Jul-2017	✓
<b>EP005: Total Organic Carbon (TOC)</b>							
Amber TOC Vial - Sulfuric Acid (EP005) Q00186-01	10-Jul-2017	----	----	----	17-Jul-2017	07-Aug-2017	✓
<b>EP026SP: Chemical Oxygen Demand (Spectrophotometric)</b>							
Clear Plastic Bottle - Sulfuric Acid (EP026SP) Q00186-01	10-Jul-2017	----	----	----	15-Jul-2017	07-Aug-2017	✓
<b>EP030: Biochemical Oxygen Demand (BOD)</b>							
Clear Plastic Bottle - Natural (EP030) Q00186-01	10-Jul-2017	----	----	----	12-Jul-2017	12-Jul-2017	✓
<b>EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup</b>							
Amber Glass Bottle - Unpreserved (EP071SG) Q00186-01	10-Jul-2017	13-Jul-2017	17-Jul-2017	✓	14-Jul-2017	22-Aug-2017	✓
<b>EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup</b>							
Amber Glass Bottle - Unpreserved (EP071SG) Q00186-01	10-Jul-2017	13-Jul-2017	17-Jul-2017	✓	14-Jul-2017	22-Aug-2017	✓
<b>EP075(SIM)A: Phenolic Compounds</b>							
Amber Glass Bottle - Unpreserved (EP075(SIM)) Q00186-01	10-Jul-2017	13-Jul-2017	17-Jul-2017	✓	14-Jul-2017	22-Aug-2017	✓
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>							
Amber Glass Bottle - Unpreserved (EP075(SIM)) Q00186-01	10-Jul-2017	13-Jul-2017	17-Jul-2017	✓	14-Jul-2017	22-Aug-2017	✓
<b>EP080/071: Total Petroleum Hydrocarbons</b>							
Amber Glass Bottle - Unpreserved (EP071) Q00186-01	10-Jul-2017	13-Jul-2017	17-Jul-2017	✓	14-Jul-2017	22-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) Q00186-01, Q00186-02	10-Jul-2017	12-Jul-2017	24-Jul-2017	✓	12-Jul-2017	24-Jul-2017	✓
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>							
Amber Glass Bottle - Unpreserved (EP071) Q00186-01	10-Jul-2017	13-Jul-2017	17-Jul-2017	✓	14-Jul-2017	22-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) Q00186-01, Q00186-02	10-Jul-2017	12-Jul-2017	24-Jul-2017	✓	12-Jul-2017	24-Jul-2017	✓
<b>EP080: BTEXN</b>							
Amber VOC Vial - Sulfuric Acid (EP080) Q00186-01, Q00186-02	10-Jul-2017	12-Jul-2017	24-Jul-2017	✓	12-Jul-2017	24-Jul-2017	✓
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>							
HDPE (no PTFE) (EP231X) Q00186-01	10-Jul-2017	----	----	----	17-Jul-2017	06-Jan-2018	✓

Page : 5 of 11  
 Work Order : EP1707310  
 Client : GOLDER ASSOCIATES  
 Project : 1779954



Matrix: **WATER**

Evaluation: \* = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>							
HDPE (no PTFE) (EP231X) Q00186-01	10-Jul-2017	----	----	----	17-Jul-2017	06-Jan-2018	✓
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>							
HDPE (no PTFE) (EP231X) Q00186-01	10-Jul-2017	----	----	----	17-Jul-2017	06-Jan-2018	✓
<b>EP231P: PFAS Sums</b>							
HDPE (no PTFE) (EP231X) Q00186-01	10-Jul-2017	----	----	----	17-Jul-2017	06-Jan-2018	✓





## Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER** Evaluation: \* = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
<b>Analytical Methods</b>							
<b>Laboratory Duplicates (DUP)</b>							
Alkalinity by PC Titrator	ED037-P	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	9	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	9	22.22	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	1	100.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	3	33.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	1	1	100.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Laboratory Control Samples (LCS)</b>							
Alkalinity by PC Titrator	ED037-P	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER** Evaluation: \* = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reular	Actual	Expected	Evaluation	
<b>Analytical Methods</b>							
<b>Laboratory Control Samples (LCS) - Continued</b>							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	3	66.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Method Blanks (MB)</b>							
Alkalinity by PC Titrator	ED037-P	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Matrix Spikes (MS)</b>							
Ammonia as N by Discrete analyser	EK055G	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER** Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
<b>Analytical Methods</b>							
<b>Matrix Spikes (MS) - Continued</b>							
Nitrite and Nitrate as N (NO <sub>x</sub> ) by Discrete Analyser	EK059G	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	9	11.11	5.00	✔	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	1	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	14	7.14	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO <sub>4</sub> 2- by Discrete Analyser	ED041G	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	3	33.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	1	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3)  Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3)  Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)



Analytical Methods	Method	Matrix	Method Descriptions
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (2013) Schedule B(3)
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	WATER	In house: Referenced to APHA 5220 D. Samples are digested with a known excess of an acidic potassium dichromate solution using silver sulfate as a catalyst. The chromium is reduced from the Cr (VI) oxidation state to the Cr (III) state by the oxygen present in the organic material. Both of these chromium species are coloured and absorb in the visible region of (400nm & 600nm) the spectrum. The oxidisable organic matter can be calculated in terms of oxygen equivalents.
Biochemical Oxygen Demand (BOD)	EP030	WATER	In house: Referenced to APHA 5210 B. The 5-Day BOD test provides an empirical measure of the oxygen consumption capacity of a given water. A portion of the sample is diluted into oxygenated, nutrient rich water, and a seed added to begin biological decay. The initial dissolved oxygen content is measured, then the bottle is sealed and incubated for five days. The remaining dissolved oxygen is measured, and from the difference, the demand for oxygen, by biological decay, is determined. This method is compliant with NEPM (2013) Schedule B(3)





Analytical Methods	Method	Matrix	Method Descriptions
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers.

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.



1 Havelock Street  
West Perth, WA 6005 Australia  
Telephone +61 8 9213 7600 Fax +61 8 9213 7611

**CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST**

Q 00186

page 1 of 1

Project Number: 1779954		Laboratory Name: ACS	
Golder Contact: S Garvey		Address: 10 Hobd Way	
Golder Email Address: @golder.com.au	Telephone/Fax:	Contact: Shake	

Address where reports should be sent to

PO Box 1914  
West Perth, WA 6872  
Telephone (61 8) 9213 7600  
Fax (61 8) 9213 7611

Other: @mhalla  
Email: \_\_\_\_\_  
Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Sample Control Number (SCN)	Sample Matrix (over)	Date Sampled (D/M/Y)	Number of Containers	Analyses Required										Remarks (over)					
				1	2	3	4	5	6	7	8	9	10		11	12			
1000186-01	W	10/7	11	(See Attached 11/15)															
-02	W	10/7	1	(for suite)															
<del>-03</del>				(Tr. Blank)															
-04				Stex (6-C110)															
-05																			
-06																			
-07																			
-08																			
-09																			
-10																			
-11																			
-12																			

Environmental Division  
Perth  
Work Order Reference  
**EP1707310**



Telephone : + 61-8-9209 7656

Relinquisher's Signature: <i>[Signature]</i>	Relinquished by: Signature <i>[Signature]</i>	Company: <i>[Signature]</i>	Date: 10/7	Time: 17:00	Received by: Signature <i>[Signature]</i>	Company: ACS
Refrigeration Storage (°C):	Relinquished by: Signature <i>[Signature]</i>	Company:	Date: 10/7	Time:	Received by: Signature	Company:
Notes:	Method of Shipment:	Waybill No:	Received for Lab by:		Date:	Time:
	Shipped by:	Shipment Condition: Seal intact:	Temp (°C):	Cooler opened by:	Date:	Time:

WHITE: Golder Copy YELLOW: Lab Copy PINK: Lab Returns with Final Report

### ATTACHMENT 3

#### Groundwater Sample Analysis Parameters

Parameter
pH
Electrical conductivity
Total nitrogen as N
Total kjeldahl nitrogen as N
Ammonia (NH <sub>3</sub> )
Nitrate (NO <sub>3</sub> )
Nitrite (NO <sub>2</sub> )
Nitrate + Nitrite as N
Total phosphorus
Reactive phosphorus
Total dissolved solids
hardness
Total organic carbon
Biochemical oxygen demand
Chemical oxygen demand
Alkalinity
Major cations / anions
Arsenic (dissolved)
Cadmium (dissolved)
Chromium (dissolved)
Copper (dissolved)
Lead (dissolved)
Nickel (dissolved)
Zinc (dissolved)
Mercury (dissolved)
Iron (dissolved)
Aluminium (dissolved)
Calcium (dissolved)
Total recoverable hydrocarbons (NEPM fractions)
Total recoverable hydrocarbons (silica gel cleanup)
Benzene
Toluene
Ethylbenzene
Xylenes
Phenols
Polycyclic aromatic hydrocarbons
PFAS <sup>1</sup>

<sup>1</sup> As per the minimum requirements set out in Table 3 (page 10) of *Interim Guideline on the Assessment and Management of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)* (DER, 2017)



# **APPENDIX G**

## **Important Information**



## IMPORTANT INFORMATION RELATING TO THIS REPORT

The document (“Report”) to which this page is attached and which this page forms a part of, has been issued by Golder Associates Pty Ltd (“Golder”) subject to the important limitations and other qualifications set out below.

This Report constitutes or is part of services (“Services”) provided by Golder to its client (“Client”) under and subject to a contract between Golder and its Client (“Contract”). The contents of this page are not intended to and do not alter Golder’s obligations (including any limits on those obligations) to its Client under the Contract.

This Report is provided for use solely by Golder’s Client and persons acting on the Client’s behalf, such as its professional advisers. Golder is responsible only to its Client for this Report. Golder has no responsibility to any other person who relies or makes decisions based upon this Report or who makes any other use of this Report. Golder accepts no responsibility for any loss or damage suffered by any person other than its Client as a result of any reliance upon any part of this Report, decisions made based upon this Report or any other use of it.

This Report has been prepared in the context of the circumstances and purposes referred to in, or derived from, the Contract and Golder accepts no responsibility for use of the Report, in whole or in part, in any other context or circumstance or for any other purpose.

The scope of Golder’s Services and the period of time they relate to are determined by the Contract and are subject to restrictions and limitations set out in the Contract. If a service or other work is not expressly referred to in this Report, do not assume that it has been provided or performed. If a matter is not addressed in this Report, do not assume that any determination has been made by Golder in regards to it.

At any location relevant to the Services conditions may exist which were not detected by Golder, in particular due to the specific scope of the investigation Golder has been engaged to undertake. Conditions can only be verified at the exact location of any tests undertaken. Variations in conditions may occur between tested locations and there may be conditions which have not been revealed by the investigation and which have not therefore been taken into account in this Report.

Golder accepts no responsibility for and makes no representation as to the accuracy or completeness of the information provided to it by or on behalf of the Client or sourced from any third party. Golder has assumed that such information is correct unless otherwise stated and no responsibility is accepted by Golder for incomplete or inaccurate data supplied by its Client or any other person for whom Golder is not responsible. Golder has not taken account of matters that may have existed when the Report was prepared but which were only later disclosed to Golder.

Having regard to the matters referred to in the previous paragraphs on this page in particular, carrying out the Services has allowed Golder to form no more than an opinion as to the actual conditions at any relevant location. That opinion is necessarily constrained by the extent of the information collected by Golder or otherwise made available to Golder. Further, the passage of time may affect the accuracy, applicability or usefulness of the opinions, assessments or other information in this Report. This Report is based upon the information and other circumstances that existed and were known to Golder when the Services were performed and this Report was prepared. Golder has not considered the effect of any possible future developments including physical changes to any relevant location or changes to any laws or regulations relevant to such location.

Where permitted by the Contract, Golder may have retained subconsultants affiliated with Golder to provide some or all of the Services. However, it is Golder which remains solely responsible for the Services and there is no legal recourse against any of Golder’s affiliated companies or the employees, officers or directors of any of them.

By date, or revision, the Report supersedes any prior report or other document issued by Golder dealing with any matter that is addressed in the Report.

**Any uncertainty as to the extent to which this Report can be used or relied upon in any respect should be referred to Golder for clarification.**



As a global, employee-owned organisation with over 50 years of experience, Golder Associates is driven by our purpose to engineer earth's development while preserving earth's integrity. We deliver solutions that help our clients achieve their sustainable development goals by providing a wide range of independent consulting, design and construction services in our specialist areas of earth, environment and energy.

For more information, visit [golder.com](http://golder.com)

Africa	+ 27 11 254 4800
Asia	+ 86 21 6258 5522
Australasia	+ 61 3 8862 3500
Europe	+ 44 1628 851851
North America	+ 1 800 275 3281
South America	+ 56 2 2616 2000

[solutions@golder.com](mailto:solutions@golder.com)  
[www.golder.com](http://www.golder.com)

**Golder Associates Pty Ltd**  
**Level 3, 1 Havelock Street**  
**West Perth, Western Australia 6005**  
**Australia**  
**T: +61 8 9213 7600**

