Premise

OBERON COUNCIL

Oberon Waste Facility

ANNUAL ENVIRONMENTAL MONITORING REPORT

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1. INTRODUCTION

1.1 Background

The Oberon Waste Facility (OWF) is located in the Oberon Local Government Area and is owned by Oberon Council. The 11 hectare property exists approximately 4 km north of the town of Oberon and comprises Lot 1 DP 350774, Lot 1 DP 598525, Lot 1 DP 844887 and Lot 36 DP 263034. The OWF is accessed via Lowes Mount Road.

The landfill site is approximately 620 metres north-south by 430 metres east-west, with the northern extent of the site narrower than the south (refer Drawing 05C_EV02).

The landfill is currently screened by rows of established native trees. The established trees provide visual screening on the northern, eastern and southern boundaries of the landfill. Rows of native trees are also being established on the western side of the site.

The land adjacent to the site is predominantly rural land used for grazing and some cropping, with timber processing also conducted approximately 2.5 km to the south-east.

Landfilling operations at the site are known to have commenced prior to the 1960s, and anecdotal evidence would suggest the site may have been established in the 1940s.

The OWF services the town of Oberon, which has a population of approximately 2,500 people. The landfill receives municipal kerbside waste, municipal delivered waste, commercial and industrial waste and building and demolition waste. It also has facilities for recycling drop off and green waste separation.

1.2 Licence Requirements

The OWF currently operates under Environment Protection Licence 20289 (EPL 20289), issued under Section 55 of the Protection of the Environment Operations Act 1997 (The Act). This licence governs the design, construction, operation, monitoring and rehabilitation of the facility in accordance with The Act.

Management and operation of the centre is also undertaken in accordance with the Landfill Environmental Management Plan (LEMP), 2013.

Section 5 of EPL 20289 provides instructions on environmental monitoring requirements. Specifically, Condition M2.1 describes the requirements to monitor the concentration of pollutants discharged to groundwater, surface water and accumulated building gas.

Annual reporting requirements that are outlined in Condition R1.1 state:

> *"R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:*
>
> *1. a Statement of Compliance,*
>
> *2. a Monitoring and Complaints Summary,*
>
> *3. a Statement of Compliance - Licence Conditions,*
>
> *4. a Statement of Compliance - Load based Fee,*
>
> *5. a Statement of Compliance - Requirement to Prepare Pollution Incident Response Management Plan,*

6. a Statement of Compliance - Requirement to Publish Pollution Monitoring Data; and

7. a Statement of Compliance - Environmental Management Systems and Practices."

The deadline for the Annual Return that is outlined in Condition R1.5 states:

"The Annual Return for the reporting period must be supplied to the EPA via eConnect EPA or by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date)."

Condition R1.8 'Monitoring Report' states:

"The licensee must supply, with the Annual Return, a report which provides:

a) an analysis and interpretation of monitoring results from samples collected at the premises over the reporting period;

b) actions to correct any identified adverse trends;

c) a summary of the results of landfill gas monitoring undertaken at the premises in accordance with condition M2.2.

d) a summary of pollution complaints resulting from activities undertaken at the premises during the reporting period.

e) a statement regarding the attainment of the achieved compaction rate of landfilled waste (excluding cover material) in accordance with condition O6.9.

f) a statement regarding the remaining disposal capacity (in cubic metres) of the landfill in accordance with condition M6.1."

This Annual Environmental Monitoring Report (AEMR) is a response to Condition R1.8. The reporting period for this AEMR is from 26 August 2018 to 25 August 2019. Collection of environmental data by Premise began at the OWF in November 2013.

EPL 20289 was not varied in the current reporting period.

1.3 Report Structure

Section 1 – presents a brief introduction and background to the report;

Section 2 – provides an overview of the environmental monitoring program undertaken at the facility during the reporting period;

Section 3 – presents the data and discussion of data collected during the reporting period;

Section 4 – presents all monitoring data that falls outside of the scope of environmental monitoring for the annual return year;

Section 5 – presents a summary of all monitoring undertaken as described in detail in Section 3 and Section 4; and

Section 6 – presents the conclusions and recommendations resulting from monitoring undertaken during the reporting period.

2. ENVIRONMENTAL MONITORING PROGRAM

2.1 Overview

Environmental monitoring undertaken at the OWF during the reporting period included that required for groundwater and surface water. The requirement for accumulated building gas was identified in August 2014 and subsequently commenced in September 2014. This section summarises all environmental monitoring undertaken during the reporting period (**Table 2.1**).

Table 2.1 – 2019 – 2020 Schedule of Environmental Monitoring

Date	Groundwater (Biannual)	Surface Water (Biannual)	Accumulated Building Gas (Biannual)
Sep 2019			✓
Oct 2019			✓
Nov 2019	✓		✓
Dec 2019			✓
Jan 2020			✓
Feb 2020			✓
Mar 2020			✓
Apr 2020			✓
May 2020		✓	✓
Jun 2020			✓
Jul 2020	✓	✓	✓
Aug 2020			✓

Sampling was conducted in general accordance with the Premise Australia document 'Standard Operating Procedure for Environmental Monitoring' (reviewed 2018), as attached at **Appendix A**.

2.2 Groundwater

The groundwater monitoring network was designed by CMJA (2012) and comprises six shallow (screened 3.5 – 5.0 m) and four deep (screened 24 – 30 m) monitoring wells. Drawing 05C_EV02 shows the configuration of the groundwater monitoring network. The four deep monitoring wells are installed as pairs to the correspondingly numbered shallow wells.

The groundwater monitoring points are identified as BH1S, BH1D, BH2, BH3S, BH3D, BH4S, BH4D, BH5, BH6S and BH6D, corresponding to EPL Points 2 through 11.

Groundwater level measurement and sampling are undertaken on a biannual basis in accordance with EPL 20289. Monitoring commenced in November 2013. The four deep piezometers are sampled annually and the six shallow piezometers are sampled biannually.

The November 2019 biannual monitoring round was able to collect samples from two (2) piezometers, whilst nine (9) samples were able to be collected from the July 2020 monitoring round.

Monitoring for the following analytes was able to be undertaken for samples collected throughout the reporting period:

Table 2.2 – Groundwater Sample Analytical Schedule

Alkalinity	Iron	Polycyclic Aromatic Hydrocarbons
Aluminium	Lead	Potassium
Arsenic	Magnesium	Sodium
Barium	Manganese	Standing Water Level
Benzene	Mercury	Sulfate
Cadmium	Nitrogen (Ammonia)	Toluene
Calcium	Nitrogen (Nitrate)	Total Dissolved Solids
Chloride	Nitrogen (Nitrite)	Total Organic Carbon
Chromium (total)	Organochlorine Pesticides	Total Petroleum Hydrocarbons
Cobalt	Organophosphorus Pesticides	Total Phenolics
Conductivity	pH	Xylene
Copper	Phosphorus (total)	Zinc
Ethylbenzene		
Fluoride		

2.3 Surface Water

Surface water monitoring is conducted at EPL Point 1, identified as SW1. The monitoring point is illustrated in **Drawing 05C_EV02**. In accordance with EPL 20289, this point is required to be sampled monthly during discharge. A rising stage sampler is installed to assist with event sample collection.

Table 2.3 identifies the list of surface water parameters and their analysis frequency during the reporting period.

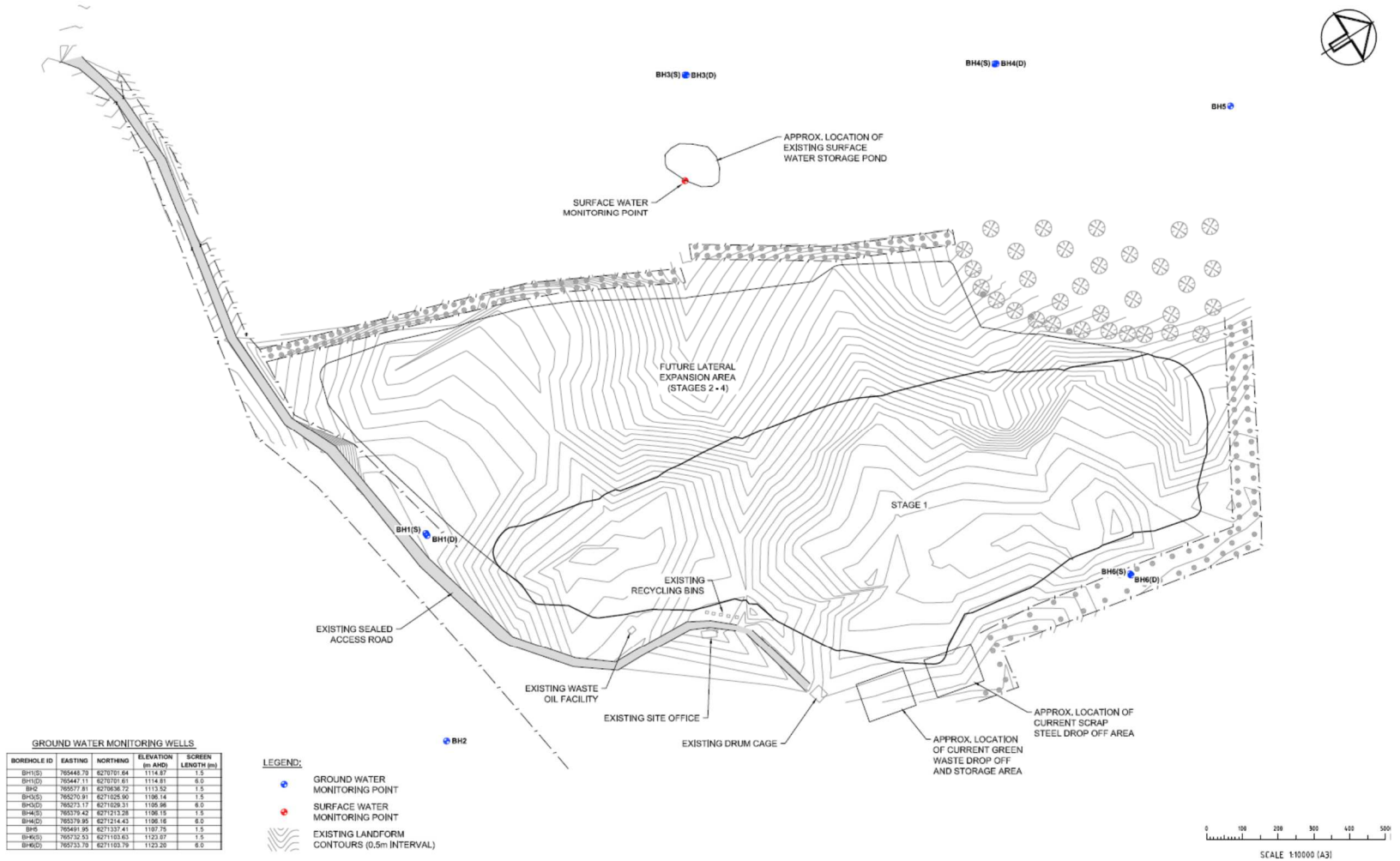
Table 2.3 – Surface Water Sample Analytical Schedule

Discharge Parameter	May 2020	July 2020
Conductivity	✓	✓
Oil & Grease	✓	✓
pH	✓	✓
Total Suspended Solids	✓	✓

2.4 Accumulated Building Gas

Accumulated building gas monitoring is conducted at EPL Point 12, identified as “all buildings within 250 m of waste filled areas”. In accordance with EPL 20289, this point is required to be monitored monthly for methane (percent by volume).

Figure 1 – Drawing 05C_EV02 – Oberon Waste Facility Monitoring – Groundwater, Surface Water and Accumulated Gas



3. ENVIRONMENTAL MONITORING RESULTS

3.1 Introduction

Monitoring results are presented in this section for all environmental monitoring undertaken during the reporting period. The laboratory data are presented, along with an interpretation of trends, variability and anomalies for groundwater and surface water. Any deficiencies in monitoring, environmental incidents and remedial actions undertaken to correct any problems or deficiencies are also discussed.

Monitoring data is summarised in the following figures and in the tables of **Appendix B**. All laboratory reports and chain-of-custody documentation are included in **Appendix C**.

3.2 Groundwater

Groundwater monitoring is to consist of biannual water level measurements at all 10 piezometers, with samples being collected twice annually from the shallow piezometers and once annually from the deep piezometers.

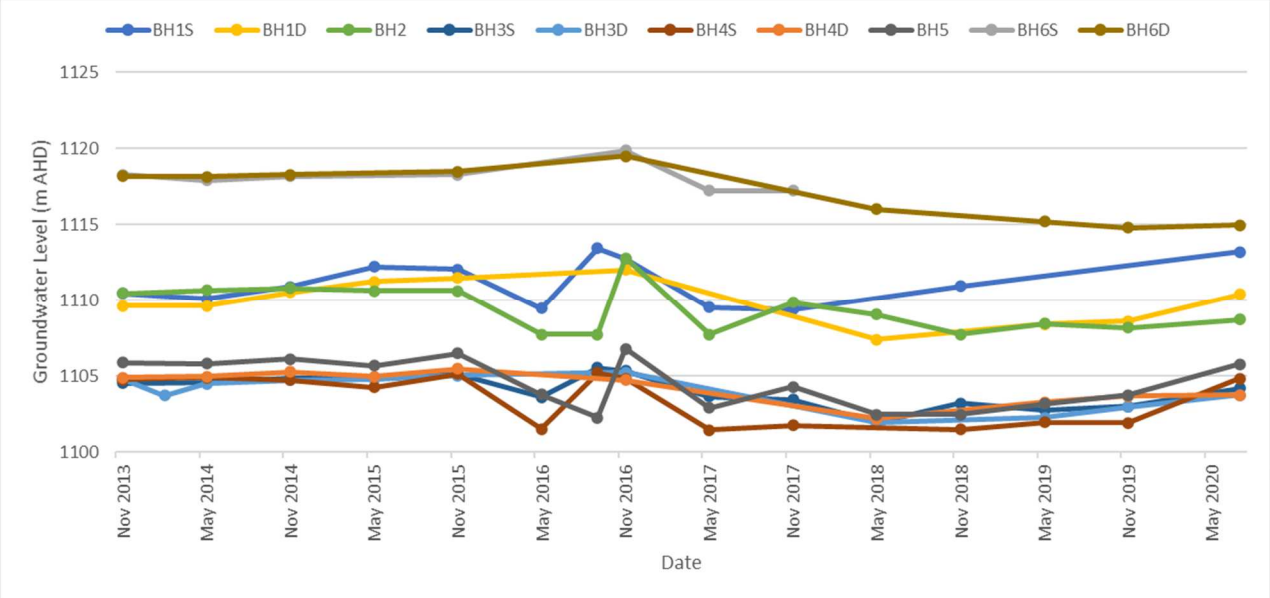
Groundwater is intermittently present in the monitoring wells at the facility, and sampling of groundwater cannot consistently be conducted.

The November 2019 biannual monitoring round was able to collect samples from Two (4) piezometers, and nine (9) samples were able to be collected from the July 2020 monitoring round.

3.2.1 GROUNDWATER LEVELS

Groundwater level measurements are presented for all monitoring stations in **Appendix A**, **Table A1** and are illustrated below in **Figure 3**.

Figure 2 – Groundwater Levels – OWF, 2013 – 2020



Comparative reduced groundwater levels indicated that piezometer BH6 is the most up-gradient monitoring point and the western piezometers at BH3 (pair), BH4 (pair) and BH5 are the most down-gradient. The range across the site in November 2019 was observed to be 12.88 m and the range across the site in July 2020 was observed to be 11.21 m. The largest variation recorded between the 2 monitoring rounds in the reporting period (i.e. from November 2019 to July 2020) was an increase of 2.9 m at BH4S, noting that no water was present in piezometer BH6S in July 2020.

It is noted that monitoring piezometer BH3D (EPL Point 6) was re-established in January 2014 following an inability to sample in November 2013. The piezometer has not been resurveyed following re-establishment and as such the reduced standing water level may be slightly inaccurate.

3.2.2 GROUNDWATER QUALITY

Analytical results for each groundwater monitoring station sampled in the reporting period are presented in **Appendix A**, **Table A2**.

Groundwater quality has been assessed by comparison to criteria (where available) adopted from Australian and New Zealand Environment and Conservation Council (ANZECC) Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 – Primary Industries: Water quality for irrigation and general water use.

Physical Parameters

Laboratory measured pH ranged from 6.1 pH units at BH2 (July 2020) to 7.8 pH units at BH5 (July 2020). The pH values of groundwater were within the guideline range considered suitable for pumping, irrigation and stock watering (6.0 to 8.5 pH units).

Electrical conductivity ranged from 100 µS/cm at BH1D (July 2020) to 930 µS/cm at BH4S (July 2020).

Total dissolved solids were found to range from 80 mg/L at BH1D (July 2020) to 550 mg/L at BH4S (July 2020), and within previously recorded ranges. All values were considered suitable for consumption by the most susceptible livestock category, poultry (<3000 mg/L).

Total alkalinity concentrations ranged from 26 mg$CaCO_3$/L at BH1D (July 2020) to 400 mg$CaCO_3$/L at BH4S (July 2020). All values were consistent with historical results, and were below the guideline hardness value for potential fouling of waters (350 mg/L), with the exception of BH4S.

Chemical Properties

Exchangeable Ions

Chloride concentrations ranged from 8.3 mg/L at BH6D (July 2020) to 97 mg/L at BH2 (July 2020). All concentrations were significantly lower than the guideline value for irrigation to moderately tolerant crops (700 mg/L).

Sulfate concentrations ranged from 3.3 mg/L at BH1S (July 2020), to 32 mg/L at BH5 (November 2019). All concentrations were significantly lower than the 1000 mg/L guideline value for livestock drinking water.

Fluoride concentrations ranged from below the laboratory limit of reporting (LOR) of 0.1 mg/L at BH1D (July 2020), BH1S (July 2020), BH2 (July 2020), BH3S (July 2020) and BH6D (July 2020), to 0.73 mg/L at BH4S (July 2020). These values are lower than the livestock drinking water guideline value (2.0 mg/L).

Calcium concentrations ranged from 2.7 mg/L at BH1D (July 2020) to 31 mg/L at BH3S (July 2020). All concentrations were significantly lower than the livestock drinking water guideline value of 1000 mg/L.

Magnesium concentrations ranged from 4.2 mg/L at BH1D (July 2020) to 44 mg/L at BH2 (July 2020).

Potassium concentrations ranged from 0.3 mg/L at BH3S (November 2019) to 9.8 mg/L at BH1S (July 2020).

Sodium concentrations were recorded to be highest at BH3S at 100 mg/L (November 2019 and July 2020), whilst BH1D recoded the lowest sodium concentration in groundwater at 8.8 mg/L (July 2020). These values are below the guideline for irrigation of moderately tolerant crops (460 mg/L), and the conservative aesthetic guideline for human drinking water (180 mg/L, NHMRC & NRMMC, 2011).

Nutrients

Ammonia was low across the facility, ranging from 0.01 mgN/L at BH6D (July 2020), to 0.07 mgN/L at BH1D (July 2020) and BH4S (July 2020). All values were below the conservative aesthetic guideline for ammonia in human drinking water (0.41 mgN/L, NHMRC & NRMMC, 2011).

Nitrite was recorded at below the laboratory LOR (<0.005 mgN/L) in all groundwater samples with the exception of BH2 (0.007 mg/L in July 2020). Results were significantly lower than the livestock drinking water guideline value of 9.12 mgN/L.

Nitrate in groundwater was lowest at BH5 at a concentration of 0.028 mgN/L (July 2020) and most elevated at BH2 at 16.0 mgN/L (July 2020). These results are lower than the livestock drinking water guideline value for nitrate (90.29 mg/L).

Total phosphorus was recorded to range from 0.06 mg/L at BH1D (July 2020) to 3.3 mg/L at BH2 (July 2020). All values exceeded the limit for long-term crop irrigation, and phosphorus concentrations in groundwater sampled from BH2 and BH3S (respectively 3.3 mg/L and 0.89 mg/L) were above the lower limit of the range considered unsuitable for short-term irrigation (0.8 to 12 mg/L).

Organics

Total organic carbon in groundwater was recorded to range from 0.7 mg/L at BH3D (July 2020), to 11.0 mg/L at BH5 (November 2019).

Total phenolics were detected in the groundwater samples collected from BH1D, BH2 and BH6D (July 2020) at a concentration of 0.01 mg/L. Samples from other monitoring points collected during the reporting period recorded concentrations of total phenolics at less than the laboratory LOR of 0.01 mg/L.

Organochlorine and organophosphorus pesticides were not detected in any annual sample (<0.0027 mg/L and <0.0034 mg/L respectively).

Polynuclear aromatic hydrocarbons (PAHs) were not detected in any annual sample (<0.001 mg/L).

Total petroleum (TPH) and total recoverable hydrocarbons (TRH) were not detected in any annual sample (<0.690 mg/L and <0.700 mg/L respectively).

Benzene, toluene, ethylbenzene, xylene and naphthalene (BTEXN) were not detected in any annual sample (BTEX <0.003 mg/L and naphthalene <0.005 mg/L).

Heavy Metals

Aluminium concentrations ranged from below the LOR of 0.005 mg/L at BH2 (July 2020), to 0.27 mg/L at BH3S (July 2020). No exceedances of the long-term crop irrigation or livestock drinking water guidelines (both 5 mg/L) were recorded for aluminium in groundwater.

Barium concentrations in groundwater ranged from 0.013 mg/L at BH6D (July 2020) to 0.44 mg/L at BH2 (July 2020). This was lower than the conservative health guideline for human drinking water (2000 µg/L, NHMRC & NRMMC, 2011).

Iron was observed to range from below the LOR of 0.005 mg/L at BH2 (July 2020) to 0.13 mg/L at BH3S (July 2020). All values were below the long-term irrigation guideline value of 0.2 mg/L.

Manganese concentrations ranged from below the laboratory LOR of 0.001 mg/L at BH6D (July 2020) to 3.2 mg/L at BH4S (July 2020). Samples collected from monitoring stations BH2 (July 2020) and BH4S (July 2020) exceeded the long-term (<100 years) crop irrigation guideline value of 0.2 mg/L. All concentrations were below the short-term (<20 years) guideline value of 10 mg/L.

Zinc concentrations in groundwater ranged from 0.019 mg/L at BH5 (July 2020), to 0.13 mg/L at BH2 (July 2020) and BH4D (July 2020). All recorded zinc concentrations in groundwater were below the conservative human health aesthetic guideline (3 mg/L, NHMRC & NRMMC, 2011) and the long-term crop irrigation and livestock drinking water guidelines (respectively 2 mg/L and 20 mg/L).

Concentrations of other heavy metals in groundwater, including arsenic (As), cadmium (Cd), chromium (Cr) cobalt (Co), copper (Cu), lead (Pb) and mercury (Hg), were recorded at concentrations in the order of the respective LORs, and below the long-term (up to 100 years) irrigation guideline concentrations, where applicable.

3.3 Surface Water

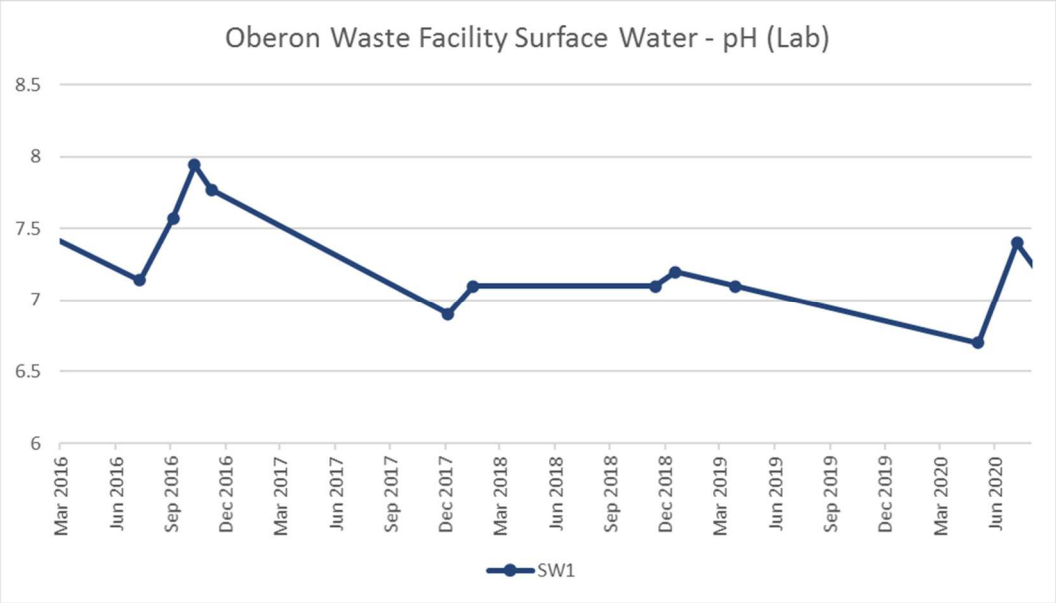
EPL 20289 requires surface water quality monitoring monthly during discharge from the surface water monitoring point SW1 (EPL point 1). Two (2) discharge events in the reporting period were recorded; in May 2020 and July 2020.

Samples are collected by Council contractors via rising stage samplers prior to overland flow and any off-site discharge, receiving further filtration through vegetation. All results are presented in **Appendix B**, **Table A3**.

3.3.1 QUALITY

Surface water pH concentrations are presented in **Figure 3**.

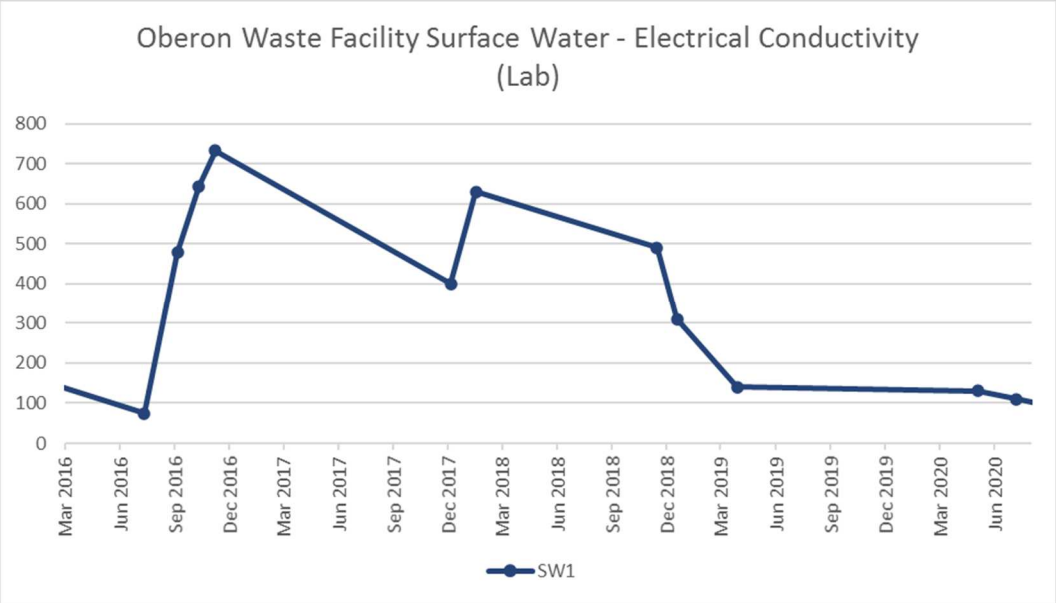
Figure 3 – Surface Water pH – OWF, 2016 – 2020



Surface water pH was near-neutral during the measurements recorded in the reporting period, with levels ranging from 6.7 to 7.4, and within the EPL 100 percentile discharge limit range of 6.5 – 8.5.

Surface water electrical conductivity levels are presented in **Figure 4**.

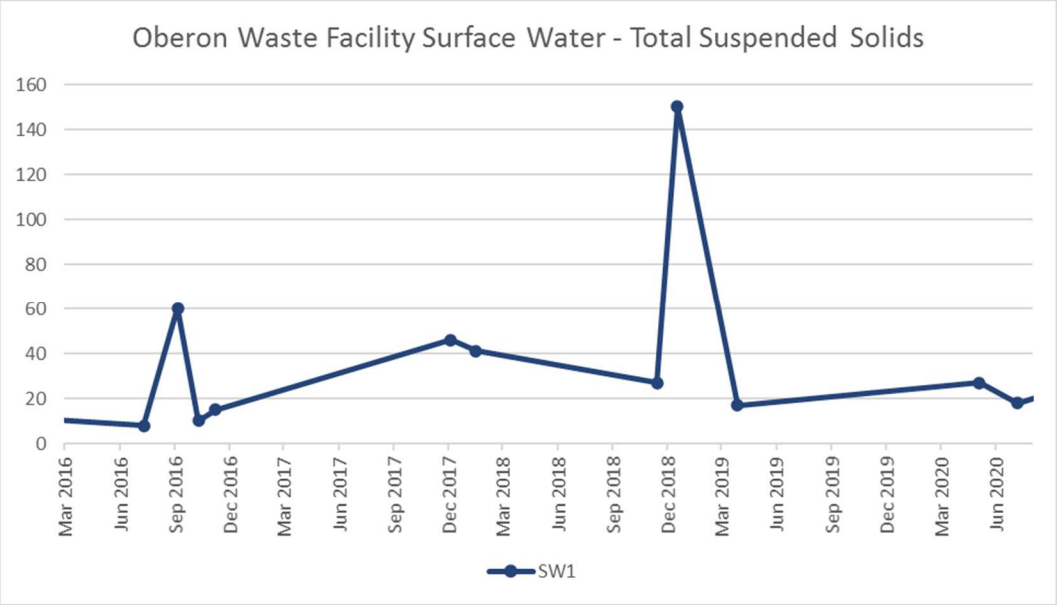
Figure 4 – Surface Water EC – OWF, 2016 – 2020



The recorded EC levels of surface water in the reporting period ranged from 110 µS/cm to 130 µS/cm. The corresponding TDS concentrations ranged from 74 mg/L to 87 mg/L, and considered suitable for consumption by the most susceptible livestock category, poultry (<3000 mg/L).

Surface water total suspended solid (TSS) concentrations are presented in **Figure 5**.

Figure 5 – Surface Water TSS – OWF, 2016 – 2020



The total suspended solid (TSS) concentrations in surface water were recorded to range from 18 mg/L to 27 mg/L. The EPL 100 percentile limit of 50 mg/L was not exceeded in the reporting period.

Surface water oil and grease levels are presented in **Figure 6**.

Figure 6 – Surface Water Oil & Grease – OWF, 2016 – 2020

The oil and grease concentration in surface water was not recorded at a concentration above the laboratory LOR of 5 mg/L. The EPL 100 percentile limit of 10 mg/L was not exceeded in the reporting period.

3.4 Accumulated Landfill Gas

Methane concentrations in buildings / sheds were all below the detection threshold concentration of 0.005% (v/v) during the monthly monitoring rounds.

4. OTHER MONITORING DATA

4.1 Public Concerns and Complaints

There were no environmental, operational or pollution complaints received for the Oberon Waste Facility during the annual reporting period.

4.2 Effective Compaction

The licence for Oberon Waste Facility requires a minimum waste compaction of 0.65 t/m^3 (EPL Condition O6.9). Calculation of the rate of compaction requires the waste volume to be considered against the tonnage received, however volume data was not available.

Previous estimates of filling density based on volume data (August 2016 to August 2018) have provided an estimated rate of compaction of approximately 0.76 tonnes/m^3.

All exposed landfilled waste is generally covered daily to a minimum depth of 150 mm and compacted at the end of each day prior to ceasing operations. Compaction is achieved using a 28 tonne bulldozer and/or a 25 tonne excavator. Operational procedures have not significantly varied since the 2016-2018 period, and the compaction rate is inferred to be greater than the minimum requirement of the EPL.

5. SUMMARY

5.1 Monitoring

This section provides a summary of the monitoring results presented in **Section 3** and **Section 4**.

5.1.1 GROUNDWATER

Comparative reduced groundwater levels indicated that piezometer BH6 is the most up-gradient monitoring point and the western piezometers at BH3 (pair), BH4 (pair) and BH5 are the most down-gradient. The range across the site in November 2019 was observed to be 12.88 m and the range across the site in July 2020 was observed to be 11.21 m. The largest variation recorded between the 2 monitoring rounds in the reporting period (i.e. from November 2019 to July 2020) was an increase of 2.9 m at BH4S, noting that no water was present in piezometer BH6S in July 2020.

It is noted that monitoring piezometer BH3D (EPL Point 6) was re-established in January 2014 following an inability to sample in November 2013. The piezometer has not been resurveyed following re-establishment and as such the reduced standing water level may be slightly inaccurate..

Organic contaminants, including pesticides, PAHs and petroleum hydrocarbons, were not detected in any groundwater sample. No significant changes were observed between the monitoring rounds. Concentrations of other monitored parameters generally did not exhibit significant variance from previous monitoring rounds, and were within historic ranges.

5.1.2 SURFACE WATER

Discharge samples from SW1 as required by to be collected by EPL 20289, occurred in May 2020 and July 2020.

No exceedances of the EPL discharge limits (licence condition L2.4) were recorded for pH, oil & grease or total suspended solids (TSS). No EPL discharge limits are in force for EC.

5.1.3 LANDFILL GAS

Monitoring of accumulated building gas was conducted monthly throughout the reporting period. No gas in buildings was detected in in any monitoring event.

5.1.4 COMPLAINTS

There were no environmental, operational or pollution complaints received for the Oberon Waste Facility during the annual reporting period.

5.2 Waste Compaction

The average waste compaction for the landfill in the reporting period has not been calculated.

All exposed landfilled waste is generally covered daily to a minimum depth of 150 mm and compacted at the end of each day prior to ceasing operations. Compaction is achieved using a 28 tonne bulldozer and/or a 25 tonne excavator. Operational procedures have not significantly varied since the 2016-2018 period, which recorded a compaction rate of approximately 0.76 tonnes/m^3.

The compaction rate is inferred to be greater than the minimum requirement of the EPL.

6. CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The results of the groundwater sampling indicated relatively consistent groundwater conditions at the Oberon Waste Facility, indicating minimal evidence of adverse impact arising from the landfill.

Surface water sampling did not indicate any exceedances of the EPL discharge limits.

The average compaction rate was inferred to be greater than the minimum requirement of the EPL.

6.2 Recommendations

It is recommended that environmental monitoring be continued at the Oberon Waste Facility in accordance with existing monitoring requirements of EPL 20289 and the Oberon Waste Facility LEMP.

A volumetric survey should be completed within the 2020-2021 monitoring period to calculate the rate of compaction, for comparison against the minimum requirement of the EPL.

REFERENCES

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

National Health and Medical Research Council and the Natural Resource Management Ministerial Council (NHMRC & NRMMC) 2011, National Water Quality Management Strategy: Australian Drinking Water Guidelines. Updated 2017

Oberon Shire Council 2013, Landfill Environmental Management Plan – Oberon Waste Facility, Australia.

APPENDIX A

STANDARD OPERATING PROCEDURE – ENVIRONMENTAL MONITORING

Premise	Standard Operating Procedure
	Environmental Monitoring
	File No: **SOP 19**

Revision Status:

Change History

Date	Details of Change	Version No.
12/12/2013	Document created	Draft
31/03/2014	Reviewed	Version 1
17/08/2015	Reviewed	Version 2
05/09/2016	Reviewed	Version 3
14/02/2018	Reviewed	Version 4

Premise

PURPOSE

To ensure consistent and correct methods are used for all environmental monitoring, as per the requirements of the Environment Protection Licence(s) as applicable. Environmental monitoring in this SOP includes groundwater, surface water, leachate, surface gas, accumulated gas and sub-surface gas monitoring.

The following procedures are to be followed.

WORK PROCEDURE

1. GROUNDWATER LEVEL MEASUREMENT

The monitoring frequency will be in accordance with EPL requirements.

Water level measurement will be undertaken using an electronic water level interface probe. The following procedure will be used:

1. Before starting, prepare field notebook and check that the water level meter is working.
2. Decontaminate the interface probe by rinsing with tap water followed by distilled water.
3. Visually check the borehole for damage and record any observed damage in the field sheets.
4. Remove cap(s), measure depth to water below top of 50mm PVC casing for the piezometer.
5. Replace caps, record piezometer number, date, time and depth to water in field sheets.

Conversion of Groundwater Level to Metres AHD

Recorded depths to groundwater should be converted to an elevation in metres AHD.

groundwater	=	elevation top	-	depth to
elevation (m AHD)		PVC pipe (m AHD)		groundwater (m)

2. GROUNDWATER SAMPLING

The monitoring frequency will be in accordance with EPL requirements.

The following procedure will be used to obtain water samples.

1. Measure water level as described above.
2. Prepare sample containers, cross-check sampling requirements with laboratory sample container guide for correct bottle type, preservative and required quantity, note any specific holding times.
3. Label laboratory prepared bottles with project number, monitoring point identification, sampler initials, date and time using water proof ink (xylene free) on self adhesive labels.
4. Purge the borehole: calculate purge volume (V) using the following formula:

for 50 mm borehole V (litres) = 3x [(depth of bore - depth to water) x 2.26]

Sampling should be conducted after the monitoring point has recovered from purging (sampling should not take place more than one day after purging) or alternatively, water can continue to be extracted until field measured parameters stabilise, indicating sample is representative of recharge.

5. Field measure temperature, pH and electrical conductivity; record results in field sheets.
6. Note on field sheets any visual observations relating to volume/flow present, colour, sediment, particulate matter, oil on surface etc as well as any apparent odour.
7. Lower a new plastic unpreserved bottle gently below surface of the water sample, filling bottle to top. Decant into sample bottles containing preservatives directly without rinsing, with zero headspace. Samples for volatile analysis should be obtained first. Samples for metals analysis should be field filtered using 11µm filter paper or equivalent. Replace lids tightly.
8. Place sample bottles into pre-chilled esky with several frozen ice-packs immediately after sample is decanted.

Methods of Purging

Bailing

Rinse the line in distilled water. Remove a new polyethylene bailer (factory decontaminated) from its protective wrapping. Attach the line to the bailer. Lower bailer gently to mid-point of screen, withdraw, decant into distilled water rinsed bucket. Repeat until purge volume and sufficient recharge is achieved or until field measured parameters stabilise, indicating sample is representative of recharge.

Submersible Pump

Ensure pump has been running to tank or waste for at least 100 L. Run discharge into bucket and measure field parameters to ensure stabilisation. Obtain sample as described above.

3. SURFACE WATER AND LEACHATE SAMPLING

The monitoring frequency will be in accordance with EPL requirements.

The following procedure will be used to obtain surface water and leachate samples.

1. Prepare sample containers, cross-check sampling requirements with laboratory sample container guide for correct bottle type, preservative and required quantity, note any specific holding times.
2. Label laboratory prepared bottles with project number, monitoring point identification, sampler initials, date and time using water proof ink (xylene free) on self adhesive labels.
3. Collect from as close as practicable to point of discharge and upwind if possible to avoid collecting any concentration of surface contaminants. Obtain sample from below surface, being careful not to disturb any bottom sediment.
4. Field measure temperature, pH and electrical conductivity; record results in field sheets.
5. Note on field sheets any visual observations relating to volume/flow present, colour, sediment, particulate matter, oil on surface etc as well as any apparent odour.
6. Lower a new plastic unpreserved bottle gently below surface of the water, filling bottle to top. Decant into sample bottles containing preservatives directly without rinsing, with zero headspace. Samples for volatile analysis should be obtained first. Replace lids tightly.
7. Place sample bottles into pre-chilled esky with several frozen ice-packs immediately after sample is decanted.

4. TRANSPORT TO LABORATORY

1. Complete chain-of-custody (COC) form for samples, ensuring that details on COC and sample bottle label are identical.
2. On returning to base, repack esky with fresh ice packs. Seal copy of COC in plastic sleeve and place inside esky. Seal esky with packaging tape, security seal and care stickers.
3. Dispatch esky to laboratory by courier on the same day that samples are taken. Retain copy of courier consignment notice. Do not dispatch samples on Fridays unless arranged prior with laboratory.

5. GAS MONITORING

5.1 ACCUMULATED GAS MONITORING

Accumulated (building) gas methane monitoring will be conducted using a zeroed and calibrated methane, carbon dioxide and oxygen gas detector, currently the Ventis MX4 Multi Gas Meter. The threshold level for closer investigation and potential action is 12,500 parts per million (1.25 % v/v) of methane in any building on the facility or within 250 m of landfilled areas. If methane is detected above this limit, daily testing is recommended until ventilation or other measures have controlled the methane concentration. The monitoring frequency will be in accordance with EPL requirements.

The following procedure will be used to monitor accumulated landfill gas:

1. Before starting, prepare field notebook and check that gas analyser is working.

2. All enclosed buildings within 200 m of active or capped areas of landfill shall be monitored. All rooms shall be investigated, with the gas meter allowed to detect for a period of approximately one minute in each. Ensure larger spaces also have perimeter walks conducted as well as investigation of alcoves and pits.

5.2 SURFACE GAS EMISSION MONITORING

Surface gas methane monitoring will be conducted using a zeroed and calibrated methane, carbon dioxide and oxygen gas detector, currently the Ventis MX4 Multi Gas Meter. If methane is detected above the detection limit of the meter, additional investigation may be warranted. The monitoring frequency will be in accordance with EPL requirements.

The following procedure will be used to monitor surface gas emissions:

1. Before starting, prepare field notebook and check that gas analyser is working.

2. Walk the surface of filled and currently filling areas and record methane concentration every 10 m.

5.3 SUB-SURFACE GAS MONITORING

Sub-surface gas methane monitoring will be conducted using a zeroed and calibrated methane, carbon dioxide and oxygen gas detector, currently the Ventis MX4 Multi Gas Meter. The threshold level for closer investigation and potential action is 12,500 parts per million (1.25 % v/v) of methane at any subsurface monitoring point. The monitoring frequency will be in accordance with EPL requirements.

The following procedure will be used to monitor surface gas emissions:

1. Before starting, prepare field notebook and check that gas analyser is working.

2. All sub-surface landfill gas monitoring points shall be monitored at a depth of approximately 2 m below surface using rigid HDPE tubing. The top of the well casing is to be sealed around the tubing, and the gas meter allowed to detect for a period of approximately one minute in each well.

APPENDIX B

MONITORING DATA

TABLE A1 - EPL 20289 OBERON WASTE FACILITY- GROUNDWATER GAUGING RESULTS

Ground Water Levels: 11-Nov-19

Piezometer Details:

	Ground Elev (mAHD)	Stickup (m)	Elevation Top PVC (mAHD)	Date	Measured (m)	GWL (mAHD)	Well Depth (m)	Well Base (mAHD)	Water Column (m)
BH1S	-	-	1114.87	11/11/2019	WLNM	-	5.50	1109.37	N/A
BH1D	-	-	1114.81	11/11/2019	6.20	1108.61	26.50	1088.31	20.30
BH2	-	-	1113.52	11/11/2019	5.35	1108.17	5.80	1107.72	0.45
BH3S	-	-	1106.14	11/11/2019	3.16	1102.98	5.00	1101.14	1.84
BH3D	-	-	1105.96	11/11/2019	3.02	1102.94	26.60	1079.36	23.58
BH4S	-	-	1106.15	11/11/2019	4.24	1101.91	4.80	1101.35	0.56
BH4D	-	-	1106.16	11/11/2019	2.51	1103.65	50.50	1055.66	47.99
BH5	-	-	1107.75	11/11/2019	4.02	1103.73	5.50	1102.25	1.48
BH6S	-	-	1123.07	11/11/2019	WLNM	-	5.87	1117.20	N/A
BH6D	-	-	1123.20	11/11/2019	8.41	1114.79	27.00	1096.20	18.59

Definitions:

Stickup:	Height of piezometer pipe above ground surface.
Ground Elev:	Actual elevation of ground at the piezometer relative to an arbitrary datum. All ground elevations are measured to the same datum, hence Piezo GWLs are relative to each other.
GWL:	Actual elevation of groundwater at the piezometer relative to an arbitrary datum.
Measured:	Depth of groundwater measured from the top of the piezometer pipe.
-	Gauging not required under EPL
WLNM:	*Water Level Not Measured* (Dry)

Ground Water Levels: 07-Jul-20

Piezometer Details:

	Ground Elev (mAHD)	Stickup (m)	Elevation Top PVC (mAHD)	Date	Measured (m)	GWL (mAHD)	Well Depth (m)	Well Base (mAHD)	Water Column (m)
BH1S	-	-	1114.87	07/07/2020	1.68	1113.19	5.50	1109.37	3.82
BH1D	-	-	1114.81	07/07/2020	4.44	1110.37	26.50	1088.31	22.06
BH2	-	-	1113.52	07/07/2020	4.82	1108.70	5.80	1107.72	0.98
BH3S	-	-	1106.14	07/07/2020	1.97	1104.17	5.00	1101.14	3.03
BH3D	-	-	1105.96	07/07/2020	2.22	1103.74	26.60	1079.36	24.38
BH4S	-	-	1106.15	07/07/2020	1.34	1104.81	4.80	1101.35	3.46
BH4D	-	-	1106.16	07/07/2020	2.44	1103.72	50.50	1055.66	48.06
BH5	-	-	1107.75	07/07/2020	1.98	1105.77	5.50	1102.25	3.52
BH6S	-	-	1123.07	07/07/2020	WLNM	-	5.87	1117.20	N/A
BH6D	-	-	1123.20	07/07/2020	8.27	1114.93	27.00	1096.20	18.73

	BH1S		BH1D		BH2		BH3S		BH3D		BH4S		BH4D		BH5		BH6S		BH6D	
Date	Measured	GWL (mAHD)	Measured	GWL (mAHD)	Measured	GWL (mAHD)	Measured	GWL (mAHD)	Measured	GWL (mAHD)	Measured	GWL (mAHD)	Measured	GWL (mAHD)	Measured	GWL (mAHD)	Measured	GWL (mAHD)	Measured	
19-Nov-13	4.41	1110.46	5.20	1109.61	3.06	1110.46	1.63	1104.51	1.18	1104.78	1.40	1104.75	1.27	1104.89	1.89	1105.86	4.83	1118.24	5.06	1118.14
25-Feb-14	-		-		-		-		2.28	1103.68	-		-		-					
12-May-14	4.80	1110.07	5.20	1109.61	2.85	1110.67	1.58	1104.56	1.48	1104.48	1.26	1104.89	1.23	1104.93	1.97	1105.78	5.20	1117.87	5.07	1118.13
05-Nov-14	3.99	1110.88	4.28	1110.53	2.72	1110.80	1.31	1104.83	1.24	1104.72	1.43	1104.72	0.92	1105.24	1.66	1106.09	4.90	1118.17	4.94	1118.26
06-May-15	2.67	1112.20	3.58	1111.23	2.90	1110.62	1.27	1104.87	1.18	1104.78	1.91	1104.24	1.21	1104.95	2.11	1105.64	5.87		WLNM	
23-Nov-15	2.82	1112.05	3.33	1111.48	2.90	1110.62	1.04	1105.10	0.94	1105.02	1.05	1105.10	0.70	1105.46	1.30	1106.45	4.83	1118.24	4.73	1118.47
19-May-16	5.42	1109.45	-		5.80	1107.72	2.55	1103.59	-		4.65	1101.50	-		3.97	1103.78	5.87		-	
05-Sep-16	1.46	1113.41	-		5.80	1107.72	0.61	1105.53	-		0.97	1105.18	-		5.50	1102.25	5.87		-	
07-Nov-16	2.14	1112.73	2.80	1112.01	0.74	1112.78	0.82	1105.32	0.76	1105.20	1.35	1104.80	1.45	1104.71	0.99	1106.76	3.22	1119.85	3.72	1119.48
17-May-17	5.37	1109.50	-		5.80	1107.72	2.51	1103.63	-		4.73	1101.42	-		4.87	1102.88	5.87	1117.20	-	
13-Nov-17	5.50	1109.37	-		3.68	1109.84	2.71	1103.43	-		4.43	1101.72	-		3.47	1104.28	5.87	1117.20	-	
28-May-18	WLNM		7.42	1107.39	4.50	1109.02	4.22	1101.92	4.01	1101.95	WLNM		4.00	1102.16	5.29	1102.46	WLNM		7.22	1115.98
15-Nov-18	3.94	1110.93	-		5.80	1107.72	2.94	1103.20	-		4.68	1101.47	-		5.30	1102.45	WLNM		-	
01-May-19	WLNM		6.41	1108.40	5.10	1108.42	3.40	1102.74	3.70	1102.26	4.20	1101.95	2.90	1103.26	4.61	1103.14	WLNM		8.01	1115.19
11-Nov-19	WLNM		6.20	1108.61	5.35	1108.17	3.16	1102.98	3.02	1102.94	4.24	1101.91	2.51	1103.65	4.02	1103.73	WLNM		8.41	1114.79
07-Jul-20	1.68	1113.19	4.44	1110.37	4.82	1108.70	1.97	1104.17	2.22	1103.74	1.34	1104.81	2.44	1103.72	1.98	1105.77	WLNM		8.27	1114.93

TABLE A2: OBERON WASTE FACILITY - RESULTS OF LABORATORY ANALYSIS
NOVEMBER 2019 - JULY 2020 GROUNDWATER

				Sample ID	BH1D	BH1S	BH2	BH3D	BH3S	BH3S	BH4D	BH4S	BH6D	BH5	BH5
				Sample Date	07/07/2020	07/07/2020	07/07/2020	07/07/2020	11/11/2019	07/07/2020	07/07/2020	07/07/2020	07/07/2020	11/11/2019	07/07/2020
Group	**Analyte**	**LOR**	**Units**	**Criteria**	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS
Physical Parameters	pH (Lab)	0	No unit	6.0 - 9.0	**6.2**	**6.2**	**6.1**	**6.9**	**6.7**	**6.5**	**7.2**	**7.4**	**7.4**	**7.3**	**7.8**
	Electrical Conductivity (Lab)	2	µS/cm	-	**100**	**170**	**560**	**220**	**550**	**370**	**290**	**930**	**230**	**400**	**360**
	Total Dissolved Solids	10	mg/L	3000	**80**	**95**	**390**	**150**	**380**	**240**	**180**	**550**	**150**	**260**	**230**
	Total Suspended Solids	5	mg/L	50	-	-	-	-	-	-	-	-	-	-	-
	Oil & Grease	5	mg/L	10	-	-	-	-	-	-	-	-	-	-	-
Alkalinity	Total Alkalinity as CaCO3	5	mg/L	350	**26**	**27**	**70**	**88**	**230**	**140**	**110**	**400**	**110**	**150**	**160**
Anions	Chloride	1	mg/L	350	**14**	**33**	**97**	**18**	**40**	**21**	**24**	**80**	**8.3**	**22**	**14**
	Fluoride	0.1	mg/L	1	< 0.1	< 0.1	< 0.1	**0.16**	-	< 0.1	**0.22**	**0.73**	< 0.1	-	**0.24**
	Sulfate (SO4)	1	mg/L	-	**9.8**	**3.3**	**3.8**	**7.3**	**9.4**	**14**	**9.7**	**6.5**	**5.5**	**32**	**23**
Cations	Calcium (Ca)	0.1	mg/L	1000	**2.7**	**7.4**	**3.3**	**5.7**	**8.8**	**31**	**13**	**7.7**	**5.1**	**12**	**24**
	Magnesium (Mg)	0.1	mg/L	-	**4.2**	**4.8**	**44**	**13**	**14**	**9**	**15**	**43**	**18**	**22**	**19**
	Potassium (K)	0.2	mg/L	-	**3**	**9.8**	**0.5**	**1.6**	**0.3**	**0.9**	**2.1**	**0.6**	**2.4**	**0.8**	**1.5**
	Sodium (Na)	0.1	mg/L	230	**9.5**	**6.9**	**22**	**19**	**96**	**31**	**20**	**88**	**12**	**44**	**21**
Forms of Carbon	Total Organic Carbon	0.2	mg/L	-	**0.9**	**2.9**	**1.4**	**0.7**	**2.6**	**3.3**	**1.8**	**9.9**	**1.1**	**11**	**8.1**
Nutrients	Ammonia (NH3) as N	0.01	mg/L	-	**0.07**	**0.06**	**0.03**	**0.03**	**0.035**	**0.04**	**0.05**	**0.07**	**0.01**	**0.033**	**0.04**
	Nitrate (NO3) as N	0.005	mg/L	-	**0.45**	**0.039**	**16**	**0.057**	**0.35**	**3**	**0.18**	**0.06**	**0.22**	**0.43**	**0.028**
	Nitrite (NO2) as N	0.005	mg/L	-	< 0.005	< 0.005	**0.007**	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	Total Phosphorus	0.02	mg/L	0.05	**0.06**	**0.09**	**3.3**	**0.1**	**0.89**	**0.31**	**0.16**	**0.19**	**0.21**	**0.37**	**0.16**
Trace Metals	Aluminium (Al)	0.005	mg/L	5	**0.009**	**0.034**	< 0.005	**0.012**	-	**0.27**	**0.009**	**0.006**	**0.012**	-	**0.063**
	Arsenic (As)	0.001	mg/L	0.1	< 0.001	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.001	**0.001**	-	**0.002**
	Barium (Ba)	0.001	mg/L	-	**0.14**	**0.099**	**0.44**	**0.061**	-	**0.13**	**0.02**	**0.13**	**0.013**	-	**0.072**
	Cadmium (Cd)	0.0001	mg/L	0.01	**0.0002**	< 0.0001	**0.0003**	< 0.0001	-	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	< 0.0001
	Chromium (Cr)	0.001	mg/L	0.1	< 0.001	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.001	< 0.001	-	< 0.001
	Cobalt (Co)	0.001	mg/L	0.05	< 0.001	**0.001**	**0.012**	< 0.001	-	**0.001**	< 0.001	**0.017**	< 0.001	-	< 0.001
	Copper (Cu)	0.001	mg/L	0.2	**0.005**	**0.004**	< 0.001	**0.001**	-	**0.002**	**0.003**	< 0.001	**0.001**	-	**0.005**
	Iron (Fe)	0.005	mg/L	0.2	**0.008**	**0.045**	< 0.005	**0.011**	-	**0.13**	**0.011**	**0.009**	**0.012**	-	**0.11**
	Lead (Pb)	0.001	mg/L	2	< 0.001	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.001	< 0.001	-	< 0.001
	Manganese (Mn)	0.001	mg/L	0.2	**0.016**	**0.052**	**0.28**	**0.005**	-	**0.14**	**0.1**	**3.2**	< 0.001	-	**0.053**
	Mercury (Hg)	0.0001	mg/L	0.002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	< 0.0001
	Zinc (Zn)	0.005	mg/L	2	**0.078**	**0.061**	**0.13**	**0.088**	-	**0.058**	**0.13**	**0.023**	**0.076**	-	**0.019**

TABLE A2: OBERON WASTE FACILITY - RESULTS OF LABORATORY ANALYSIS
NOVEMBER 2019 - JULY 2020 GROUNDWATER

				Sample ID	BH1D	BH1S	BH2	BH3D	BH3S	BH3S	BH4D	BH4S	BH6D	BH5	BH5
				Sample Date	07/07/2020	07/07/2020	07/07/2020	07/07/2020	11/11/2019	07/07/2020	07/07/2020	07/07/2020	07/07/2020	11/11/2019	07/07/2020
Group	**Analyte**	**LOR**	**Units**	**Criteria**	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS
OC Pesticides	Aldrin	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Alpha BHC	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Alpha Chlordane	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Alpha Endosulfan	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Beta BHC	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Beta Endosulfan	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Delta BHC	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Dieldrin	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Endosulfan sulphate	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Endrin	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Endrin aldehyde	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Endrin ketone	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Heptachlor	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Heptachlor epoxide	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Hexachlorobenzene (HCB)	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Lindane (gamma BHC)	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Methoxychlor	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	p,p'-DDD	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	p,p'-DDE	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	p,p'-DDT	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	o,p'-DDE	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Gamma Chlordane	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	trans-Nonachlor	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	o,p'-DDD	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	o,p'-DDT	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Isodrin	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Mirex	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
OP Pesticides	Dichlorvos	0.5	µg/L	-	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5
	Dimethoate	0.5	µg/L	-	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5
	Ethion	0.2	µg/L	-	< 0.2	< 0.2	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	< 0.2	-	< 0.2
	Malathion	0.2	µg/L	-	< 0.2	< 0.2	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	< 0.2	-	< 0.2
	Diazinon (Dimpylate)	0.5	µg/L	-	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5
	Chlorpyrifos (Chlorpyrifos Ethyl)	0.2	µg/L	-	< 0.2	< 0.2	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	< 0.2	-	< 0.2
	Parathion-ethyl (Parathion)	0.2	µg/L	-	< 0.2	< 0.2	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	< 0.2	-	< 0.2
	Bromophos Ethyl	0.2	µg/L	-	< 0.2	< 0.2	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	< 0.2	-	< 0.2
	Azinphos-methyl	0.2	µg/L	-	< 0.2	< 0.2	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	< 0.2	-	< 0.2
	Fenitrothion	0.2	µg/L	-	< 0.2	< 0.2	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	< 0.2	-	< 0.2
	Methidathion	0.5	µg/L	-	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5
Phenolics	Total Phenols	0.01	mg/L	-	**0.01**	< 0.01	**0.01**	< 0.01	-	< 0.01	< 0.01	< 0.01	**0.01**	-	< 0.01
BTEXN Analytes	Benzene (F0)	0.5	µg/L	-	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5
	Toluene	0.5	µg/L	-	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5
	Ethylbenzene	0.5	µg/L	-	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5
	meta- & para-Xylene	1	µg/L	-	< 1	< 1	< 1	< 1	-	< 1	< 1	< 1	< 1	-	< 1
	ortho-Xylene	0.5	µg/L	-	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5
	Total Xylenes	1.5	µg/L	-	< 1.5	< 1.5	< 1.5	< 1.5	-	< 1.5	< 1.5	< 1.5	< 1.5	-	< 1.5
	Sum of BTEX	3	µg/L	-	< 3	< 3	< 3	< 3	-	< 3	< 3	< 3	< 3	-	< 3
	Naphthalene	0.1	µg/L	-	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5

TABLE A2: OBERON WASTE FACILITY - RESULTS OF LABORATORY ANALYSIS
NOVEMBER 2019 - JULY 2020 GROUNDWATER

				Sample ID	BH1D	BH1S	BH2	BH3D	BH3S	BH3S	BH4D	BH4S	BH6D	BH5	BH5
				Sample Date	07/07/2020	07/07/2020	07/07/2020	07/07/2020	11/11/2019	07/07/2020	07/07/2020	07/07/2020	07/07/2020	11/11/2019	07/07/2020
Group	**Analyte**	**LOR**	**Units**	**Criteria**	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS
Total Petroleum Hydrocarbons	TRH C6-C9	40	µg/L	-	< 40	< 40	< 40	< 40	-	< 40	< 40	< 40	< 40	-	< 40
	TRH C10-C14	50	µg/L	-	< 50	< 50	< 50	< 50	-	< 50	< 50	< 50	< 50	-	< 50
	TRH C15-C28	200	µg/L	-	< 200	< 200	< 200	< 200	-	< 200	< 200	< 200	< 200	-	< 200
	TRH C29-C36	200	µg/L	-	< 200	< 200	< 200	< 200	-	< 200	< 200	< 200	< 200	-	< 200
	TRH C37-C40	200	µg/L	-	< 200	< 200	< 200	< 200	-	< 200	< 200	< 200	< 200	-	< 200
Total Recoverable Hydrocarbons	Benzene (F0)	0.5	µg/L	-	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5
	TRH C6-C10	50	µg/L	-	< 50	< 50	< 50	< 50	-	< 50	< 50	< 50	< 50	-	< 50
	TRH C6-C10 less BTEX (F1)	50	µg/L	-	< 50	< 50	< 50	< 50	-	< 50	< 50	< 50	< 50	-	< 50
	TRH >C10-C16 (F2)	60	µg/L	-	< 60	< 60	< 60	< 60	-	< 60	< 60	< 60	< 60	-	< 60
	TRH >C10-C16 less Naphthalene (F2)	60	µg/L	-	< 60	< 60	< 60	< 60	-	< 60	< 60	< 60	< 60	-	< 60
	TRH >C16-C34 (F3)	500	µg/L	-	< 500	< 500	< 500	< 500	-	< 500	< 500	< 500	< 500	-	< 500
	TRH >C34-C40 (F4)	500	µg/L	-	< 500	< 500	< 500	< 500	-	< 500	< 500	< 500	< 500	-	< 500
	TRH C10-C40	320	µg/L	-	< 320	< 320	< 320	< 320	-	< 320	< 320	< 320	< 320	-	< 320
Polynuclear Aromatic Hydrocarbons	Acenaphthene	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Acenaphthylene	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Anthracene	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Benzo(a)anthracene	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Benzo(a)pyrene	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Benzo(b&j)fluoranthene	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Benzo(ghi)perylene	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Benzo(k)fluoranthene	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Chrysene	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Dibenzo(ah)anthracene	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Fluoranthene	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Fluorene	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Indeno(1,2,3-cd)pyrene	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Naphthalene	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Phenanthrene	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Pyrene	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	2-methylnaphthalene	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	1-methylnaphthalene	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Total PAHs	1	µg/L	-	< 1	< 1	< 1	< 1	-	< 1	< 1	< 1	< 1	-	< 1

mg/L	milligrams per litre
µg/L	micrograms per litre
µS/cm	microsiemens per centimetre
LOR	limit of reporting
PS	primary sample
Criteria	Criteria adopted from *Australian and New Zealand Environment and Conservation Council (ANZECC) Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) Australian and New Zealand Guidelines for Fresh and Marine Water Quality* - 'Primary Industries: Water quality for irrigation and general water use', 2000
	within criteria
	criteria exceeded

TABLE A3: OBERON WASTE FACILITY - RESULTS OF LABORATORY ANALYSIS
MAY 2020 - JULY 2020 SURFACE WATER

				Sample ID	SW1	SW1
				Sample Date	07/07/2020	04/05/2020
Group	**Analyte**	**LOR**	**Units**	**Criteria**	PS	PS
Physical Parameters	pH (Lab)	0	No unit	6.0 - 9.0	**7.4**	**6.7**
	Electrical Conductivity (Lab)	2	µS/cm	-	**110**	**130**
	Total Suspended Solids	5	mg/L	50	**18**	**27**
	Oil & Grease	5	mg/L	10	< 5	< 5

mg/L	milligrams per litre
µS/cm	microsiemens per centimetre
LOR	limit of reporting
PS	primary sample
Criteria	Criteria adopted from *NSW EPA Environment Protection Licence 20289* 'Limit Conditions - L2.4 Water and/or Land Concentration Limits', 2019
	within criteria
	criteria exceeded

APPENDIX C

MONITORING REPORTS AND LABORATORY RESULTS

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Brendan Stuart
Client	PREMISE
Address	LEVEL 1 100 BRUNSWICK STREET FORTITUDE VALLEY QLD 4006
Telephone	61 2 6939 5000
Facsimile	(Not specified)
Email	Brendan.stuart@premise.com.au
Project	**217505 - Oberon WF**
Order Number	(Not specified)
Samples	2

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE199908 R0**
Date Received	13 Nov 2019
Date Reported	18 Nov 2019

COMMENTS

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

SIGNATORIES

Dong LIANG
Metals/Inorganics Team Leader

Shane MCDERMOTT
Inorganic/Metals Chemist

Parameter	Units	LOR	Sample Number: SE199908.001 Sample Matrix: Water Sample Date: 11 Nov 2019 Sample Name: BH3 (S)	Sample Number: SE199908.002 Sample Matrix: Water Sample Date: 11 Nov 2019 Sample Name: BH5
Anions by Ion Chromatography in Water Method: AN245 Tested: 14/11/2019				
Chloride	mg/L	1	**40**	**22**
Nitrate Nitrogen, NO3-N	mg/L	0.005	**0.35**	**0.43**
Sulfate, SO4	mg/L	1	**9.4**	**32**
Nitrite in Water Method: AN277 Tested: 14/11/2019				
Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005
Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 14/11/2019				
Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	**0.89**	**0.37**
Ammonia Nitrogen by Discrete Analyser (Aquakem) Method: AN291 Tested: 14/11/2019				
Ammonia Nitrogen, NH_3 as N	mg/L	0.005	**0.035**	**0.033**
Alkalinity Method: AN135 Tested: 18/11/2019				
Total Alkalinity as CaCO3	mg/L	5	**230**	**150**
Forms of Carbon Method: AN190 Tested: 14/11/2019				
Total Organic Carbon as NPOC	mg/L	0.2	**2.6**	**11**

Parameter	Units	LOR	Sample Number: SE199908.001 Sample Matrix: Water Sample Date: 11 Nov 2019 Sample Name: BH3 (S)	Sample Number: SE199908.002 Sample Matrix: Water Sample Date: 11 Nov 2019 Sample Name: BH5
Total Dissolved Solids (TDS) in water Method: AN113 Tested: 15/11/2019				
Total Dissolved Solids Dried at 175-185°C	mg/L	10	**380**	**260**
pH in water Method: AN101 Tested: 14/11/2019				
pH**	No unit	-	**6.7**	**7.3**
Conductivity and TDS by Calculation - Water Method: AN106 Tested: 14/11/2019				
Conductivity @ 25 C	µS/cm	2	**550**	**400**
Metals in Water (Dissolved) by ICPOES Method: AN320 Tested: 14/11/2019				
Calcium, Ca	mg/L	0.1	**8.8**	**12**
Magnesium, Mg	mg/L	0.1	**14**	**22**
Potassium, K	mg/L	0.2	**0.3**	**0.8**
Sodium, Na	mg/L	0.1	**96**	**44**

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Alkalinity Method: ME-(AU)-[ENV]AN135

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Alkalinity as CaCO3	LB187868	mg/L	5	<5	1%	95%

Ammonia Nitrogen by Discrete Analyser (Aquakem) Method: ME-(AU)-[ENV]AN291

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Ammonia Nitrogen, NH_3 as N	LB187614	mg/L	0.005	0.006	0 - 6%	100%	89%

Anions by Ion Chromatography in Water Method: ME-(AU)-[ENV]AN245

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Chloride	LB187618	mg/L	1	<1.0	93%
Nitrate Nitrogen, NO3-N	LB187618	mg/L	0.005	<0.005	96%
Sulfate, SO4	LB187618	mg/L	1	<1.0	91%

Conductivity and TDS by Calculation - Water Method: ME-(AU)-[ENV]AN106

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Conductivity @ 25 C	LB187653	µS/cm	2	<2	1%	NA

Forms of Carbon Method: ME-(AU)-[ENV]AN190

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Organic Carbon as NPOC	LB187608	mg/L	0.2	<0.2	1%	93%	96%

Metals in Water (Dissolved) by ICPOES Method: ME-(AU)-[ENV]AN320

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Calcium, Ca	LB187600	mg/L	0.1	<0.1	1%	98%	91 - 93%
Magnesium, Mg	LB187600	mg/L	0.1	<0.1	0 - 1%	96%	84 - 103%
Potassium, K	LB187600	mg/L	0.2	<0.2	0 - 6%	92%	102%
Sodium, Na	LB187600	mg/L	0.1	<0.1	0 - 6%	97%	86 - 96%

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Nitrite in Water **Method: ME-(AU)-[ENV]AN277**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Nitrite Nitrogen, NO2 as N	LB187614	mg/L	0.005	<0.005	0%	107%	101%

pH in water **Method: ME-(AU)-[ENV]AN101**

Parameter	QC Reference	Units	LOR	LCS %Recovery
pH**	LB187653	No unit	-	100%

Total Dissolved Solids (TDS) in water **Method: ME-(AU)-[ENV]AN113**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Dissolved Solids Dried at 175-185°C	LB187735	mg/L	10	<10	4%	98%

Total Phosphorus by Kjeldahl Digestion DA in Water **Method: ME-(AU)-[ENV]AN279/AN293(Sydney only)**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Phosphorus (Kjeldahl Digestion) as P	LB187611	mg/L	0.02	<0.02	12 - 21%	107%	106%

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN020	Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode (glass plus reference electrode) and is calibrated against 3 buffers purchased commercially. For soils, an extract with water is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos/cm or µS/cm @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Total Dissolved Salts can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. SGS use 0.6. Reference APHA 2510 B.
AN106	Salinity may be calculated in terms of NaCl from the sample conductivity. This assumes all soluble salts present, measured by the conductivity, are present as NaCl.
AN113	Total Dissolved Solids: A well-mixed filtered sample of known volume is evaporated to dryness at 180°C and the residue weighed. Approximate methods for correlating chemical analysis with dissolved solids are available. Reference APHA 2540 C.
AN113	The Total Dissolved Solids residue may also be ignited at 550 C and volatile TDS (Organic TDS) and non-volatile TDS (Inorganic) can be determined.
AN135	Alkalinity (and forms of) by Titration: The sample is titrated with standard acid to pH 8.3 (P titre) and pH 4.5 (T titre) and permanent and/or total alkalinity calculated. The results are expressed as equivalents of calcium carbonate or recalculated as bicarbonate, carbonate and hydroxide. Reference APHA 2320. Internal Reference AN135
AN190	TOC and DOC in Water: A homogenised micro portion of sample is injected into a heated reaction chamber packed with an oxidative catalyst that converts organic carbon to carbon dioxide. The CO2 is measured using a non-dispersive infrared detector. The process is fully automated in a commercially available analyser. If required a sugar value can be calculated from the TOC result. Reference APHA 5310 B.
AN190	Chemical oxygen demand can be calculated/estimated based on the O2/C relation as 2.67*NPOC (TOC). This is an estimate only and the factor will vary with sample matrix so results should be interpreted with caution.
AN245	Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
AN277/WC250.312	Nitrite ions, when reacted with a reagent containing sulphanilamide and N-(1-naphthyl)-ethylenediamine dihydrochloride produce a highly coloured azo dye that is measured photometrically at 540nm.
AN279/AN293(Sydney)	The sample is digested with Sulphuric acid, K2SO4 and CuSO4. All forms of phosphorus are converted into orthophosphate. The digest is cooled and placed on the discrete analyser for colorimetric analysis.
AN291	Ammonia in solution reacts with hypochlorite ions from Sodium Dichloroisocyanuate, and salicylate in the presence of Sodium Nitroprusside to form indophenol blue and measured at 670 nm by Discrete Analyser.
AN320	Metals by ICP-OES: Samples are preserved with 10% nitric acid for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components.

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN320	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements. Reference APHA 3120 B.
Calculation	Free and Total Carbon Dioxide may be calculated using alkalinity forms only when the samples TDS is <500mg/L. If TDS is >500mg/L free or total carbon dioxide cannot be reported. APHA4500CO2 D.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
		QFL	QC result is below the lower tolerance
**	Indicative data, theoretical holding time exceeded.	-	The sample was not analysed for this analyte
		NVL	Not Validated

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

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

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

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

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

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

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

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au.pv.sgsvr/en-gb/environment.

CHAIN OF CUSTODY & ANALYSIS REQUEST

SGS Environmental Services
Unit 16, 33 Maddox Street
Alexandria NSW 2015
Telephone No: (02) 85940400
Facsimile No: (02) 85940499
Email: au.samplereceipt.sydney@sgs.com

Company Name:	Premise	Project Name/No:	217505 – Oberon WF
Address:	154 Peisley St	Purchase Order No:	
	Orange NSW 2800	Results Required By:	(STD)
		Telephone:	02 6393 5000
Contact Name:	Brendan Stuart	Facsimile:	02 6393 5050
		Email Results:	brendan.stuart@premise.com.au

Client Sample ID	Date Sampled	Lab Sample ID	WATER	SOIL	PRESERVATIVE	NO OF CONTAINERS	See Below	SB199908
~~BH1S~~								
~~BH2~~								
BH3(S)	11/11/19	1	X		X			
~~BH4(S)~~								
BH5	11/11/19	2	X		X			
~~BH6(S)~~								
BH1(D)	11/11/19		X		X			HOLD
BH3(D)	11/11/19		X		X			HOLD
BH4(D)	11/11/19		X		X			HOLD
BH6(D)	11/11/19		X		X			HOLD

Alkalinity (as calcium carbonate) **Ammonia** **Calcium**
Chloride **Conductivity** **Magnesium** **Nitrate**
Nitrite **pH** **Phosphorus (total)** **Potassium**
Sodium **Sulfate** **Total dissolved solids**
Total organic carbon

Relinquished By: Premise	Date/Time: 12/11/18	Received By:	Date/Time 13/11/19 @ 9:35
Relinquished By:	Date/Time:	Received By:	Date/Time
Samples Intact: (Yes)/ No	Temperature: Ambient / (Chilled)	Sample Cooler Sealed: Yes/ No	Laboratory Quotation No: FJ1542
	Comments:		

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS		LABORATORY DETAILS	
Contact	Brendan Stuart	Manager	Huong Crawford
Client	PREMISE	Laboratory	SGS Alexandria Environmental
Address	LEVEL 1 100 BRUNSWICK STREET FORTITUDE VALLEY QLD 4006	Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	61 2 6939 5000	Telephone	+61 2 8594 0400
Facsimile	(Not specified)	Facsimile	+61 2 8594 0499
Email	Brendan.stuart@premise.com.au	Email	au.environmental.sydney@sgs.com
Project	**217505-Obeson WF**	SGS Reference	**SE205881 R0**
Order Number	(Not specified)	Date Received	06 May 2020
Samples	1	Date Reported	13 May 2020

COMMENTS

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

SIGNATORIES

Dong LIANG
Metals/Inorganics Team Leader

Shane MCDERMOTT
Inorganic/Metals Chemist

Parameter	Units	LOR	Sample Number: SE205881.001 Sample Matrix: Water Sample Date: 04 May 2020 Sample Name: SW1
pH in water Method: AN101 Tested: 13/5/2020			
pH**	No unit	-	**6.7**
Conductivity and TDS by Calculation - Water Method: AN106 Tested: 13/5/2020			
Conductivity @ 25 C	µS/cm	2	**130**
Oil and Grease in Water Method: AN185 Tested: 8/5/2020			
Oil and Grease	mg/L	5	<5
Total and Volatile Suspended Solids (TSS / VSS) Method: AN114 Tested: 11/5/2020			
Total Suspended Solids Dried at 103-105°C	mg/L	5	**27**

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Conductivity and TDS by Calculation - Water **Method: ME-(AU)-[ENV]AN106**

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Conductivity @ 25 C	LB199367	µS/cm	2	<2	102%

Oil and Grease in Water **Method: ME-(AU)-[ENV]AN185**

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Oil and Grease	LB199075	mg/L	5	<5	73%

pH in water **Method: ME-(AU)-[ENV]AN101**

Parameter	QC Reference	Units	LOR	LCS %Recovery
pH**	LB199367	No unit	-	100%

Total and Volatile Suspended Solids (TSS / VSS) **Method: ME-(AU)-[ENV]AN114**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Suspended Solids Dried at 103-105°C	LB199194	mg/L	5	<5	19%	96%

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode (glass plus reference electrode) and is calibrated against 3 buffers purchased commercially. For soils, an extract with water is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos/cm or µS/cm @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Total Dissolved Salts can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. SGS use 0.6. Reference APHA 2510 B.
AN106	Salinity may be calculated in terms of NaCl from the sample conductivity. This assumes all soluble salts present, measured by the conductivity, are present as NaCl.
AN114	Total Suspended and Volatile Suspended Solids: The sample is homogenised by shaking and a known volume is filtered through a pre-weighed GF/C filter paper and washed well with deionised water. The filter paper is dried and reweighed. The TSS is the residue retained by the filter per unit volume of sample. Reference APHA 2540 D. Internal Reference AN114
AN185	Gravimetric Oil & Grease and Hydrocarbons: A known volume of sample is extracted using an organic solvent and the solvent layer with dissolved oils and greases is transferred to a pre-weighed beaker. The solvent is evaporated over low heating and the beaker reweighed. The concentration of oil and grease is determined by the increase in mass of the collection beaker per volume of sample extracted. O&G is suitable for lubricating oils and other high boiling point products but is not suitable for volatiles. Reference to APHA 5520 B and USEPA 1664 Revision B.. Internal Reference AN185

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
		QFL	QC result is below the lower tolerance
**	Indicative data, theoretical holding time exceeded.	-	The sample was not analysed for this analyte
		NVL	Not Validated

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

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

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

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

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

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

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

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au/en-gb/environment-health-and-safety.

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CHAIN OF CUSTODY & ANALYSIS REQUEST

Page 1 of 1

SGS Environmental Services
Unit 16, 33 Maddox Street
Alexandria NSW 2015
Telephone No: (02) 85940400
Facsimile No: (02) 85940499
Email: au.samplereceipt.sydney@sgs.com

Company Name:	Geolyse	Project Name/No:	217505 – Oberon WF
Address:	154 Peisley St	Purchase Order No:	
	Orange NSW 2800	Results Required By:	(STD)
		Telephone:	02 6393 5000
Contact Name:	Brendan Stuart	Facsimile:	02 6393 5050
		Email Results:	brendan.stuart@premise.com.au

Client Sample ID	Date Sampled	Lab Sample ID	WATER	SOIL	PRESERVATIVE	NO OF CONTAINERS	See Below												
SW1	4/05/20	1	X		X		**Conductivity**	**Oil & Grease**											
							pH	**Total suspended solids**											

SB 205881

Relinquished By: Premise	Date/Time:	Received By:	Date/Time 06/05/20 @10.-
Relinquished By:	Date/Time:	Received By:	Date/Time
Samples Intact: Yes/ No	Temperature: Ambient / Chilled	Sample Cooler Sealed: Yes/ No	Laboratory Quotation No: FJ1542
	Comments:		

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS		LABORATORY DETAILS	
Contact	Brendan Stuart	Manager	Huong Crawford
Client	PREMISE	Laboratory	SGS Alexandria Environmental
Address	LEVEL 1 100 BRUNSWICK STREET FORTITUDE VALLEY QLD 4006	Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	61 2 6939 5000	Telephone	+61 2 8594 0400
Facsimile	(Not specified)	Facsimile	+61 2 8594 0499
Email	Brendan.stuart@premise.com.au	Email	au.environmental.sydney@sgs.com
Project	**217505 - Oberon WF - Additional**	SGS Reference	**SE208484A R0**
Order Number	(Not specified)	Date Received	09 Jul 2020
Samples	10	Date Reported	17 Jul 2020

COMMENTS

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

SIGNATORIES

Dong LIANG
Metals/Inorganics Team Leader

Kamrul AHSAN
Senior Chemist

Ly Kim HA
Organic Section Head

Shane MCDERMOTT
Inorganic/Metals Chemist

Parameter	Units	LOR	Sample Number: SE208484A.001 Sample Matrix: Water Sample Date: 07 Jul 2020 Sample Name: BH1(S)	SE208484A.002 Water 07 Jul 2020 BH1(D)	SE208484A.003 Water 07 Jul 2020 BH2	SE208484A.004 Water 07 Jul 2020 BH3(S)
VOCs in Water Method: AN433 Tested: 16/7/2020						
Monocyclic Aromatic Hydrocarbons						
Benzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
Toluene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
m/p-xylene	µg/L	1	<1	<1	<1	<1
o-xylene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
Polycyclic VOCs						
Naphthalene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
Surrogates						
d4-1,2-dichloroethane (Surrogate)	%	-	**112**	**111**	**113**	**110**
d8-toluene (Surrogate)	%	-	**96**	**97**	**97**	**96**
Bromofluorobenzene (Surrogate)	%	-	**98**	**98**	**98**	**99**
Totals						
Total Xylenes	µg/L	1.5	<1.5	<1.5	<1.5	<1.5
Total BTEX	µg/L	3	<3	<3	<3	<3
Volatile Petroleum Hydrocarbons in Water Method: AN433 Tested: 16/7/2020						
TRH C6-C10	µg/L	50	<50	<50	<50	<50
TRH C6-C9	µg/L	40	<40	<40	<40	<40
Surrogates						
d4-1,2-dichloroethane (Surrogate)	%	-	**112**	**111**	**113**	**110**
d8-toluene (Surrogate)	%	-	**96**	**97**	**97**	**96**
Bromofluorobenzene (Surrogate)	%	-	**98**	**98**	**98**	**99**
VPH F Bands						
Benzene (F0)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50	<50	<50

Parameter	Units	LOR	Sample Number: SE208484A.001 Sample Matrix: Water Sample Date: 07 Jul 2020 Sample Name: BH1(S)	SE208484A.002 Water 07 Jul 2020 BH1(D)	SE208484A.003 Water 07 Jul 2020 BH2	SE208484A.004 Water 07 Jul 2020 BH3(S)
TRH (Total Recoverable Hydrocarbons) in Water Method: AN403 Tested: 16/7/2020						
TRH C10-C14	µg/L	50	<50	<50	<50	<50
TRH C15-C28	µg/L	200	<200	<200	<200	<200
TRH C29-C36	µg/L	200	<200	<200	<200	<200
TRH C37-C40	µg/L	200	<200	<200	<200	<200
TRH C10-C40	µg/L	320	<320	<320	<320	<320
TRH F Bands						
TRH >C10-C16	µg/L	60	<60	<60	<60	<60
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60	<60	<60	<60
TRH >C16-C34 (F3)	µg/L	500	<500	<500	<500	<500
TRH >C34-C40 (F4)	µg/L	500	<500	<500	<500	<500
PAH (Polynuclear Aromatic Hydrocarbons) in Water Method: AN420 Tested: 16/7/2020						
Naphthalene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Total PAH (18)	µg/L	1	<1	<1	<1	<1
Surrogates						
d5-nitrobenzene (Surrogate)	%	-	**60**	**58**	**50**	**56**
2-fluorobiphenyl (Surrogate)	%	-	**62**	**62**	**54**	**58**
d14-p-terphenyl (Surrogate)	%	-	**104**	**102**	**94**	**100**
OC Pesticides in Water Method: AN420 Tested: 16/7/2020						
Hexachlorobenzene (HCB)	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Alpha BHC	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Lindane (gamma BHC)	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Gamma Chlordane	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Endrin	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDD	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDD	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	µg/L	0.1	<0.1	<0.1	<0.1	<0.1

Parameter	Units	LOR	Sample Number: SE208484A.001 Sample Matrix: Water Sample Date: 07 Jul 2020 Sample Name: BH1(S)	SE208484A.002 Water 07 Jul 2020 BH1(D)	SE208484A.003 Water 07 Jul 2020 BH2	SE208484A.004 Water 07 Jul 2020 BH3(S)
OC Pesticides in Water Method: AN420 Tested: 16/7/2020 (continued)						
Endosulfan sulphate	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Endrin aldehyde	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Endrin ketone	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Mirex	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Surrogates						
Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	**55**	**64**	**76**	**63**
OP Pesticides in Water Method: AN420 Tested: 16/7/2020						
Dichlorvos	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Malathion	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
Ethion	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Surrogates						
2-fluorobiphenyl (Surrogate)	%	-	**62**	**62**	**54**	**58**
d14-p-terphenyl (Surrogate)	%	-	**104**	**102**	**94**	**100**
Total Phenolics in Water Method: AN289 Tested: 16/7/2020						
Total Phenols	mg/L	0.01	<0.01	**0.01**	**0.01**	<0.01
Anions by Ion Chromatography in Water Method: AN245 Tested: 16/7/2020						
Fluoride	mg/L	0.1	<0.10	<0.10	<0.10	<0.10

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name SE208484A.001 Water 07 Jul 2020 BH1(S)	SE208484A.002 Water 07 Jul 2020 BH1(D)	SE208484A.003 Water 07 Jul 2020 BH2	SE208484A.004 Water 07 Jul 2020 BH3(S)
Trace Metals (Dissolved) in Water by ICPMS Method: AN318 Tested: 15/7/2020						
Aluminium, Al	µg/L	5	**34**	**9**	<5	**270**
Arsenic, As	µg/L	1	<1	<1	<1	<1
Barium, Ba	µg/L	1	**99**	**140**	**440**	**130**
Cadmium, Cd	µg/L	0.1	<0.1	**0.2**	**0.3**	<0.1
Chromium, Cr	µg/L	1	<1	<1	<1	<1
Cobalt, Co	µg/L	1	**1**	<1	**12**	**1**
Copper, Cu	µg/L	1	**4**	**5**	<1	**2**
Iron, Fe	µg/L	5	**45**	**8**	<5	**130**
Lead, Pb	µg/L	1	<1	<1	<1	<1
Manganese, Mn	µg/L	1	**52**	**16**	**280**	**140**
Zinc, Zn	µg/L	5	**61**	**78**	**130**	**58**
Mercury (dissolved) in Water Method: AN311(Perth)/AN312 Tested: 16/7/2020						
Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Parameter	Units	LOR	Sample Number: SE208484A.005 Sample Matrix: Water Sample Date: 07 Jul 2020 Sample Name: BH3(D)	SE208484A.006 Water 07 Jul 2020 BH4(S)	SE208484A.007 Water 07 Jul 2020 BH4(D)	SE208484A.008 Water 07 Jul 2020 BH5
VOCs in Water Method: AN433 Tested: 16/7/2020						
Monocyclic Aromatic Hydrocarbons						
Benzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
Toluene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
m/p-xylene	µg/L	1	<1	<1	<1	<1
o-xylene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
Polycyclic VOCs						
Naphthalene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
Surrogates						
d4-1,2-dichloroethane (Surrogate)	%	-	**111**	**116**	**113**	**115**
d8-toluene (Surrogate)	%	-	**98**	**96**	**96**	**98**
Bromofluorobenzene (Surrogate)	%	-	**98**	**99**	**98**	**98**
Totals						
Total Xylenes	µg/L	1.5	<1.5	<1.5	<1.5	<1.5
Total BTEX	µg/L	3	<3	<3	<3	<3
Volatile Petroleum Hydrocarbons in Water Method: AN433 Tested: 16/7/2020						
TRH C6-C10	µg/L	50	<50	<50	<50	<50
TRH C6-C9	µg/L	40	<40	<40	<40	<40
Surrogates						
d4-1,2-dichloroethane (Surrogate)	%	-	**111**	**116**	**113**	**115**
d8-toluene (Surrogate)	%	-	**98**	**96**	**96**	**98**
Bromofluorobenzene (Surrogate)	%	-	**98**	**99**	**98**	**98**
VPH F Bands						
Benzene (F0)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50	<50	<50

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name SE208484A.005 Water 07 Jul 2020 BH3(D)	SE208484A.006 Water 07 Jul 2020 BH4(S)	SE208484A.007 Water 07 Jul 2020 BH4(D)	SE208484A.008 Water 07 Jul 2020 BH5
TRH (Total Recoverable Hydrocarbons) in Water Method: AN403 Tested: 16/7/2020						
TRH C10-C14	µg/L	50	<50	<50	<50	<50
TRH C15-C28	µg/L	200	<200	<200	<200	<200
TRH C29-C36	µg/L	200	<200	<200	<200	<200
TRH C37-C40	µg/L	200	<200	<200	<200	<200
TRH C10-C40	µg/L	320	<320	<320	<320	<320
TRH F Bands						
TRH >C10-C16	µg/L	60	<60	<60	<60	<60
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60	<60	<60	<60
TRH >C16-C34 (F3)	µg/L	500	<500	<500	<500	<500
TRH >C34-C40 (F4)	µg/L	500	<500	<500	<500	<500
PAH (Polynuclear Aromatic Hydrocarbons) in Water Method: AN420 Tested: 16/7/2020						
Naphthalene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Total PAH (18)	µg/L	1	<1	<1	<1	<1
Surrogates						
d5-nitrobenzene (Surrogate)	%	-	**62**	**52**	**64**	**50**
2-fluorobiphenyl (Surrogate)	%	-	**74**	**54**	**74**	**58**
d14-p-terphenyl (Surrogate)	%	-	**98**	**94**	**92**	**82**
OC Pesticides in Water Method: AN420 Tested: 16/7/2020						
Hexachlorobenzene (HCB)	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Alpha BHC	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Lindane (gamma BHC)	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Gamma Chlordane	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Endrin	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDD	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDD	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	µg/L	0.1	<0.1	<0.1	<0.1	<0.1

Parameter	Units	LOR	Sample Number: SE208484A.005 Sample Matrix: Water Sample Date: 07 Jul 2020 Sample Name: BH3(D)	SE208484A.006 Water 07 Jul 2020 BH4(S)	SE208484A.007 Water 07 Jul 2020 BH4(D)	SE208484A.008 Water 07 Jul 2020 BH5
OC Pesticides in Water Method: AN420 Tested: 16/7/2020 (continued)						
Endosulfan sulphate	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Endrin aldehyde	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Endrin ketone	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Mirex	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Surrogates						
Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	**80**	**62**	**71**	**120**
OP Pesticides in Water Method: AN420 Tested: 16/7/2020						
Dichlorvos	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Malathion	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
Ethion	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Surrogates						
2-fluorobiphenyl (Surrogate)	%	-	**74**	**54**	**74**	**58**
d14-p-terphenyl (Surrogate)	%	-	**98**	**94**	**92**	**82**
Total Phenolics in Water Method: AN289 Tested: 16/7/2020						
Total Phenols	mg/L	0.01	<0.01	<0.01	<0.01	<0.01
Anions by Ion Chromatography in Water Method: AN245 Tested: 16/7/2020						
Fluoride	mg/L	0.1	**0.16**	**0.73**	**0.22**	**0.24**

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name	SE208484A.005 Water 07 Jul 2020 BH3(D)	SE208484A.006 Water 07 Jul 2020 BH4(S)	SE208484A.007 Water 07 Jul 2020 BH4(D)	SE208484A.008 Water 07 Jul 2020 BH5
Trace Metals (Dissolved) in Water by ICPMS Method: AN318 Tested: 15/7/2020							
Aluminium, Al	µg/L	5		**12**	**6**	**9**	**63**
Arsenic, As	µg/L	1		<1	<1	<1	**2**
Barium, Ba	µg/L	1		**61**	**130**	**20**	**72**
Cadmium, Cd	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
Chromium, Cr	µg/L	1		<1	<1	<1	<1
Cobalt, Co	µg/L	1		<1	**17**	<1	<1
Copper, Cu	µg/L	1		**1**	<1	**3**	**5**
Iron, Fe	µg/L	5		**11**	**9**	**11**	**110**
Lead, Pb	µg/L	1		<1	<1	<1	<1
Manganese, Mn	µg/L	1		**5**	**3200**	**100**	**53**
Zinc, Zn	µg/L	5		**88**	**23**	**130**	**19**
Mercury (dissolved) in Water Method: AN311(Perth)/AN312 Tested: 16/7/2020							
Mercury	mg/L	0.0001		<0.0001	<0.0001	<0.0001	<0.0001

Parameter	Units	LOR	Sample Number: SE208484A.009 Sample Matrix: Water Sample Date: 07 Jul 2020 Sample Name: BH6(D)	Sample Number: SE208484A.010 Sample Matrix: Water Sample Date: 07 Jul 2020 Sample Name: SW1
VOCs in Water Method: AN433 Tested: 16/7/2020				
Monocyclic Aromatic Hydrocarbons				
Benzene	µg/L	0.5	<0.5	-
Toluene	µg/L	0.5	<0.5	-
Ethylbenzene	µg/L	0.5	<0.5	-
m/p-xylene	µg/L	1	<1	-
o-xylene	µg/L	0.5	<0.5	-
Polycyclic VOCs				
Naphthalene	µg/L	0.5	<0.5	-
Surrogates				
d4-1,2-dichloroethane (Surrogate)	%	-	**111**	-
d8-toluene (Surrogate)	%	-	**97**	-
Bromofluorobenzene (Surrogate)	%	-	**99**	-
Totals				
Total Xylenes	µg/L	1.5	<1.5	-
Total BTEX	µg/L	3	<3	-
Volatile Petroleum Hydrocarbons in Water Method: AN433 Tested: 16/7/2020				
TRH C6-C10	µg/L	50	<50	-
TRH C6-C9	µg/L	40	<40	-
Surrogates				
d4-1,2-dichloroethane (Surrogate)	%	-	**111**	-
d8-toluene (Surrogate)	%	-	**97**	-
Bromofluorobenzene (Surrogate)	%	-	**99**	-
VPH F Bands				
Benzene (F0)	µg/L	0.5	<0.5	-
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	-

Parameter	Units	LOR	Sample Number: SE208484A.009 Sample Matrix: Water Sample Date: 07 Jul 2020 Sample Name: BH6(D)	Sample Number: SE208484A.010 Sample Matrix: Water Sample Date: 07 Jul 2020 Sample Name: SW1
TRH (Total Recoverable Hydrocarbons) in Water Method: AN403 Tested: 16/7/2020				
TRH C10-C14	µg/L	50	<50	-
TRH C15-C28	µg/L	200	<200	-
TRH C29-C36	µg/L	200	<200	-
TRH C37-C40	µg/L	200	<200	-
TRH C10-C40	µg/L	320	<320	-
TRH F Bands				
TRH >C10-C16	µg/L	60	<60	-
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60	-
TRH >C16-C34 (F3)	µg/L	500	<500	-
TRH >C34-C40 (F4)	µg/L	500	<500	-
PAH (Polynuclear Aromatic Hydrocarbons) in Water Method: AN420 Tested: 16/7/2020				
Naphthalene	µg/L	0.1	<0.1	-
2-methylnaphthalene	µg/L	0.1	<0.1	-
1-methylnaphthalene	µg/L	0.1	<0.1	-
Acenaphthylene	µg/L	0.1	<0.1	-
Acenaphthene	µg/L	0.1	<0.1	-
Fluorene	µg/L	0.1	<0.1	-
Phenanthrene	µg/L	0.1	<0.1	-
Anthracene	µg/L	0.1	<0.1	-
Fluoranthene	µg/L	0.1	<0.1	-
Pyrene	µg/L	0.1	<0.1	-
Benzo(a)anthracene	µg/L	0.1	<0.1	-
Chrysene	µg/L	0.1	<0.1	-
Benzo(b&j)fluoranthene	µg/L	0.1	<0.1	-
Benzo(k)fluoranthene	µg/L	0.1	<0.1	-
Benzo(a)pyrene	µg/L	0.1	<0.1	-
Indeno(1,2,3-cd)pyrene	µg/L	0.1	<0.1	-
Dibenzo(ah)anthracene	µg/L	0.1	<0.1	-
Benzo(ghi)perylene	µg/L	0.1	<0.1	-
Total PAH (18)	µg/L	1	<1	-
Surrogates				
d5-nitrobenzene (Surrogate)	%	-	**46**	-
2-fluorobiphenyl (Surrogate)	%	-	**48**	-
d14-p-terphenyl (Surrogate)	%	-	**76**	-
OC Pesticides in Water Method: AN420 Tested: 16/7/2020				
Hexachlorobenzene (HCB)	µg/L	0.1	<0.1	-
Alpha BHC	µg/L	0.1	<0.1	-
Lindane (gamma BHC)	µg/L	0.1	<0.1	-
Heptachlor	µg/L	0.1	<0.1	-
Aldrin	µg/L	0.1	<0.1	-
Beta BHC	µg/L	0.1	<0.1	-
Delta BHC	µg/L	0.1	<0.1	-
Heptachlor epoxide	µg/L	0.1	<0.1	-
o,p'-DDE	µg/L	0.1	<0.1	-
Alpha Endosulfan	µg/L	0.1	<0.1	-
Gamma Chlordane	µg/L	0.1	<0.1	-
Alpha Chlordane	µg/L	0.1	<0.1	-
trans-Nonachlor	µg/L	0.1	<0.1	-
p,p'-DDE	µg/L	0.1	<0.1	-
Dieldrin	µg/L	0.1	<0.1	-
Endrin	µg/L	0.1	<0.1	-
o,p'-DDD	µg/L	0.1	<0.1	-
o,p'-DDT	µg/L	0.1	<0.1	-
Beta Endosulfan	µg/L	0.1	<0.1	-

Parameter	Units	LOR	Sample Number: SE208484A.009 Sample Matrix: Water Sample Date: 07 Jul 2020 Sample Name: BH6(D)	Sample Number: SE208484A.010 Sample Matrix: Water Sample Date: 07 Jul 2020 Sample Name: SW1
OC Pesticides in Water Method: AN420 Tested: 17/7/2020 (continued)				
p,p'-DDD	µg/L	0.1	<0.1	-
p,p'-DDT	µg/L	0.1	<0.1	-
Endosulfan sulphate	µg/L	0.1	<0.1	-
Endrin aldehyde	µg/L	0.1	<0.1	-
Methoxychlor	µg/L	0.1	<0.1	-
Endrin ketone	µg/L	0.1	<0.1	-
Isodrin	µg/L	0.1	<0.1	-
Mirex	µg/L	0.1	<0.1	-
Surrogates				
Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	**52**	-
OP Pesticides in Water Method: AN420 Tested: 16/7/2020				
Dichlorvos	µg/L	0.5	<0.5	-
Dimethoate	µg/L	0.5	<0.5	-
Diazinon (Dimpylate)	µg/L	0.5	<0.5	-
Fenitrothion	µg/L	0.2	<0.2	-
Malathion	µg/L	0.2	<0.2	-
Chlorpyrifos (Chlorpyrifos Ethyl)	µg/L	0.2	<0.2	-
Parathion-ethyl (Parathion)	µg/L	0.2	<0.2	-
Bromophos Ethyl	µg/L	0.2	<0.2	-
Methidathion	µg/L	0.5	<0.5	-
Ethion	µg/L	0.2	<0.2	-
Azinphos-methyl	µg/L	0.2	<0.2	-
Surrogates				
2-fluorobiphenyl (Surrogate)	%	-	**48**	-
d14-p-terphenyl (Surrogate)	%	-	**76**	-

Parameter	Units	LOR	Sample Number: SE208484A.009 Sample Matrix: Water Sample Date: 07 Jul 2020 Sample Name: BH6(D)	Sample Number: SE208484A.010 Sample Matrix: Water Sample Date: 07 Jul 2020 Sample Name: SW1
Total Phenolics in Water Method: AN289 Tested: 16/7/2020				
Total Phenols	mg/L	0.01	**0.01**	-
Anions by Ion Chromatography in Water Method: AN245 Tested: 16/7/2020				
Fluoride	mg/L	0.1	<0.10	-
Trace Metals (Dissolved) in Water by ICPMS Method: AN318 Tested: 15/7/2020				
Aluminium, Al	µg/L	5	**12**	-
Arsenic, As	µg/L	1	**1**	-
Barium, Ba	µg/L	1	**13**	-
Cadmium, Cd	µg/L	0.1	<0.1	-
Chromium, Cr	µg/L	1	<1	-
Cobalt, Co	µg/L	1	<1	-
Copper, Cu	µg/L	1	**1**	-
Iron, Fe	µg/L	5	**12**	-
Lead, Pb	µg/L	1	<1	-
Manganese, Mn	µg/L	1	<1	-
Zinc, Zn	µg/L	5	**76**	-
Mercury (dissolved) in Water Method: AN311(Perth)/AN312 Tested: 16/7/2020				
Mercury	mg/L	0.0001	<0.0001	-

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Anions by Ion Chromatography in Water **Method: ME-(AU)-[ENV]AN245**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Fluoride	LB204424	mg/L	0.1	<0.10	0%	96%	96%

Mercury (dissolved) in Water **Method: ME-(AU)-[ENV]AN311(Perth)/AN312**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Mercury	LB204434	mg/L	0.0001	<0.0001	0 - 195%	93%

OC Pesticides in Water **Method: ME-(AU)-[ENV]AN420**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Hexachlorobenzene (HCB)	LB204426	µg/L	0.1	<0.1	0%	NA
Alpha BHC	LB204426	µg/L	0.1	<0.1	0%	NA
Lindane (gamma BHC)	LB204426	µg/L	0.1	<0.1	0%	NA
Heptachlor	LB204426	µg/L	0.1	<0.1	0%	103%
Aldrin	LB204426	µg/L	0.1	<0.1	0%	120%
Beta BHC	LB204426	µg/L	0.1	<0.1	0%	NA
Delta BHC	LB204426	µg/L	0.1	<0.1	0%	113%
Heptachlor epoxide	LB204426	µg/L	0.1	<0.1	0%	NA
o,p'-DDE	LB204426	µg/L	0.1	<0.1	0%	NA
Alpha Endosulfan	LB204426	µg/L	0.1	<0.1	0%	NA
Gamma Chlordane	LB204426	µg/L	0.1	<0.1	0%	NA
Alpha Chlordane	LB204426	µg/L	0.1	<0.1	0%	NA
trans-Nonachlor	LB204426	µg/L	0.1	<0.1	0%	NA
p,p'-DDE	LB204426	µg/L	0.1	<0.1	0%	NA
Dieldrin	LB204426	µg/L	0.1	<0.1	0%	120%
Endrin	LB204426	µg/L	0.1	<0.1	0%	105%
o,p'-DDD	LB204426	µg/L	0.1	<0.1	0%	NA
o,p'-DDT	LB204426	µg/L	0.1	<0.1	0%	NA
Beta Endosulfan	LB204426	µg/L	0.1	<0.1	0%	NA
p,p'-DDD	LB204426	µg/L	0.1	<0.1	0%	NA
p,p'-DDT	LB204426	µg/L	0.1	<0.1	0%	72%
Endosulfan sulphate	LB204426	µg/L	0.1	<0.1	0%	NA
Endrin aldehyde	LB204426	µg/L	0.1	<0.1	0%	NA
Methoxychlor	LB204426	µg/L	0.1	<0.1	0%	NA
Endrin ketone	LB204426	µg/L	0.1	<0.1	0%	NA
Isodrin	LB204426	µg/L	0.1	<0.1	0%	NA
Mirex	LB204426	µg/L	0.1	<0.1	0%	NA

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Tetrachloro-m-xylene (TCMX) (Surrogate)	LB204426	%	-	97%	16%	99%

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

OP Pesticides in Water **Method: ME-(AU)-[ENV]AN420**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Dichlorvos	LB204426	µg/L	0.5	<0.5	0%	96%
Dimethoate	LB204426	µg/L	0.5	<0.5	0%	NA
Diazinon (Dimpylate)	LB204426	µg/L	0.5	<0.5	0%	100%
Fenitrothion	LB204426	µg/L	0.2	<0.2	0%	NA
Malathion	LB204426	µg/L	0.2	<0.2	0%	NA
Chlorpyrifos (Chlorpyrifos Ethyl)	LB204426	µg/L	0.2	<0.2	0%	82%
Parathion-ethyl (Parathion)	LB204426	µg/L	0.2	<0.2	0%	NA
Bromophos Ethyl	LB204426	µg/L	0.2	<0.2	0%	NA
Methidathion	LB204426	µg/L	0.5	<0.5	0%	NA
Ethion	LB204426	µg/L	0.2	<0.2	0%	84%
Azinphos-methyl	LB204426	µg/L	0.2	<0.2	0%	NA

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
2-fluorobiphenyl (Surrogate)	LB204426	%	-	66%	0%	66%
d14-p-terphenyl (Surrogate)	LB204426	%	-	78%	4%	78%

PAH (Polynuclear Aromatic Hydrocarbons) in Water **Method: ME-(AU)-[ENV]AN420**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Naphthalene	LB204426	µg/L	0.1	<0.1	0%	64%
2-methylnaphthalene	LB204426	µg/L	0.1	<0.1	0%	NA
1-methylnaphthalene	LB204426	µg/L	0.1	<0.1	0%	NA
Acenaphthylene	LB204426	µg/L	0.1	<0.1	0%	84%
Acenaphthene	LB204426	µg/L	0.1	<0.1	0%	76%
Fluorene	LB204426	µg/L	0.1	<0.1	0%	NA
Phenanthrene	LB204426	µg/L	0.1	<0.1	0%	89%
Anthracene	LB204426	µg/L	0.1	<0.1	0%	87%
Fluoranthene	LB204426	µg/L	0.1	<0.1	0%	91%
Pyrene	LB204426	µg/L	0.1	<0.1	0%	95%
Benzo(a)anthracene	LB204426	µg/L	0.1	<0.1	0%	NA
Chrysene	LB204426	µg/L	0.1	<0.1	0%	NA
Benzo(b&j)fluoranthene	LB204426	µg/L	0.1	<0.1	0%	NA
Benzo(k)fluoranthene	LB204426	µg/L	0.1	<0.1	0%	NA
Benzo(a)pyrene	LB204426	µg/L	0.1	<0.1	0%	95%
Indeno(1,2,3-cd)pyrene	LB204426	µg/L	0.1	<0.1	0%	NA
Dibenzo(ah)anthracene	LB204426	µg/L	0.1	<0.1	0%	NA
Benzo(ghi)perylene	LB204426	µg/L	0.1	<0.1	0%	NA
Total PAH (18)	LB204426	µg/L	1	<1		

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
d5-nitrobenzene (Surrogate)	LB204426	%	-	58%	3%	62%
2-fluorobiphenyl (Surrogate)	LB204426	%	-	66%	0%	66%
d14-p-terphenyl (Surrogate)	LB204426	%	-	78%	4%	78%

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Total Phenolics in Water **Method: ME-(AU)-[ENV]AN289**

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery	MS %Recovery
Total Phenols	LB204448	mg/L	0.01	<0.01	90%	103%

Trace Metals (Dissolved) in Water by ICPMS **Method: ME-(AU)-[ENV]AN318**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Aluminium, Al	LB204402	µg/L	5	<5	0%	101%	105%
Arsenic, As	LB204402	µg/L	1	<1	0%	94%	104%
Barium, Ba	LB204402	µg/L	1	<1		105%	93%
Cadmium, Cd	LB204402	µg/L	0.1	<0.1	0%	103%	106%
Chromium, Cr	LB204402	µg/L	1	<1		108%	110%
Cobalt, Co	LB204402	µg/L	1	<1		106%	105%
Copper, Cu	LB204402	µg/L	1	<1	0%	110%	110%
Iron, Fe	LB204402	µg/L	5	<5	0%	110%	108%
Lead, Pb	LB204402	µg/L	1	<1	0%	101%	105%
Manganese, Mn	LB204402	µg/L	1	<1	3%	104%	98%
Zinc, Zn	LB204402	µg/L	5	<5	0%	109%	102%

TRH (Total Recoverable Hydrocarbons) in Water **Method: ME-(AU)-[ENV]AN403**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
TRH C10-C14	LB204426	µg/L	50	<50	0%	74%
TRH C15-C28	LB204426	µg/L	200	<200	0%	95%
TRH C29-C36	LB204426	µg/L	200	<200	0%	107%
TRH C37-C40	LB204426	µg/L	200	<200	0%	NA
TRH C10-C40	LB204426	µg/L	320	<320	0%	NA

TRH F Bands

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
TRH >C10-C16	LB204426	µg/L	60	<60	0%	83%
TRH >C10-C16 - Naphthalene (F2)	LB204426	µg/L	60	<60	0%	NA
TRH >C16-C34 (F3)	LB204426	µg/L	500	<500	0%	113%
TRH >C34-C40 (F4)	LB204426	µg/L	500	<500	0%	101%

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

VOCs in Water Method: ME-(AU)-[ENV]AN433

Monocyclic Aromatic Hydrocarbons

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Benzene	LB204439	µg/L	0.5	<0.5	0%	100%	106%
Toluene	LB204439	µg/L	0.5	<0.5	0%	104%	103%
Ethylbenzene	LB204439	µg/L	0.5	<0.5	0%	103%	104%
m/p-xylene	LB204439	µg/L	1	<1	0%	103%	105%
o-xylene	LB204439	µg/L	0.5	<0.5	0%	107%	103%

Polycyclic VOCs

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Naphthalene	LB204439	µg/L	0.5	<0.5	0%	NA	NA

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
d4-1,2-dichloroethane (Surrogate)	LB204439	%	-	109%	17%	95%	105%
d8-toluene (Surrogate)	LB204439	%	-	95%	2%	99%	103%
Bromofluorobenzene (Surrogate)	LB204439	%	-	95%	1%	100%	99%

Totals

Parameter	QC Reference	Units	LOR	MB
Total Xylenes	LB204439	µg/L	1.5	<1.5
Total BTEX	LB204439	µg/L	3	<3

Volatile Petroleum Hydrocarbons in Water Method: ME-(AU)-[ENV]AN433

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
TRH C6-C10	LB204439	µg/L	50	<50	0%	98%	98%
TRH C6-C9	LB204439	µg/L	40	<40	0%	102%	98%

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
d4-1,2-dichloroethane (Surrogate)	LB204439	%	-	109%	12 - 17%	95%	105%
d8-toluene (Surrogate)	LB204439	%	-	95%	0 - 2%	99%	103%
Bromofluorobenzene (Surrogate)	LB204439	%	-	95%	1%	100%	99%

VPH F Bands

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Benzene (F0)	LB204439	µg/L	0.5	<0.5	0%	NA	NA
TRH C6-C10 minus BTEX (F1)	LB204439	µg/L	50	<50	0%	100%	101%

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN020	Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.
AN245	Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
AN289	Analysis of Total Phenols in Soil Sediment and Water: Steam distillable phenols react with 4-aminoantipyrine at pH 7.9±0.1 in the presence of potassium ferricyanide to form a coloured antipyrine dye analysed by Discrete Analyser. Reference APHA 5530 B/D.
AN311(Perth)/AN312	Mercury by Cold Vapour AAS in Waters: Mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500.
AN318	Determination of elements at trace level in waters by ICP-MS technique,, referenced to USEPA 6020B and USEPA 200.8 (5.4).
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). Where F2 is corrected for Naphthalene, the VOC data for Naphthalene is used.
AN403	Additionally, the volatile C6-C9/C6-C10 fractions may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Recoveerable Hydrocarbons - Silica (TRH-Silica) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents.
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN420	(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN420	SVOC Compounds: Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
		QFL	QC result is below the lower tolerance
**	Indicative data, theoretical holding time exceeded.	-	The sample was not analysed for this analyte
		NVL	Not Validated

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

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

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

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

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

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

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

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au/en-gb/environment-health-and-safety.

SGS

CHAIN OF CUSTODY & ANALYSIS REQUEST

Page 1 of 1

SGS Environmental Services
Unit 16, 33 Maddox Street
Alexandria NSW 2015
Telephone No: (02) 85940400
Facsimile No: (02) 85940499
Email: au.samplereceipt.sydney@sgs.com

Company Name:	Premise	Project Name/No:	217505 – Oberon WF
Address:	154 Peisley St	Purchase Order No:	
	Orange NSW 2800	Results Required By:	(STD)
		Telephone:	02 6393 5000
Contact Name:	Brendan Stuart	Facsimile:	02 6393 5050
		Email Results:	brendan.stuart@premise.com.au

SGS EHS Alexandria Laboratory

SE208484A COC

Received: 09 – Jul – 2020

Client Sample ID	Date Sampled	Lab Sample ID	WATER	SOIL	PRESERVATIVE	NO OF CONTAINERS
BH1(S)	7/7/20	1	X		X	
BH1(D)	7/7/20	2	X		X	
BH2	7/7/20	3	X		X	
BH3(S)	7/7/20	4	X		X	
BH3 (D)	7/7/20	5	X		X	
BH4(S)	7/7/20	6	X		X	
BH4(D)	7/7/20	7	X		X	
BH5	7/7/20	8	X		X	
BH6(D)	7/7/20	9	X		X	
SW1	7/7/20	10	X		X	

See Below

Alkalinity (as calcium carbonate) **Aluminium** **Ammonia**
Arsenic **Barium** **Benzene** **Cadmium**
Calcium **Chloride** **Chromium (total)** **Cobalt**
Conductivity **Copper** **Ethyl benzene** **Fluoride**
Iron **Lead** **Magnesium** **Manganese**
Mercury **Nitrate** **Nitrite**
Organochlorine pesticides **Organophosphate pesticides**
pH **Phosphorus (total)**
Potassium **Sodium** **Sulfate** **Toluene**
Total dissolved solids **Total organic carbon**
Total petroleum hydrocarbons **Total Phenolics**
Xylene **Zinc** **Polycyclic aromatic hydrocarbons**

Conductivity **Oil & Grease**
pH **Total suspended solids**

Relinquished By: Premise	Date/Time: 8/7/20	Received By:	Date/Time 9/7/2020 11.10am
Relinquished By: Dean Lavers	Date/Time:	Received By:	Date/Time
Samples Intact: Yes/ No	Temperature: Ambient / Chilled	Sample Cooler Sealed: Yes/ No	Laboratory Quotation No: FJ1542
	Comments:		