2 Macpherson Street, Warriewood Water Quality Monitoring Plan

Meriton Group

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DOCUMENT TRACKING

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Template 2.8.1

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1. Introduction

1.1 Purpose and application

A Water Quality Monitoring Plan (WQMP) is to be prepared and commenced prior to the granting of a development application (DA) in accordance with *Section 4.2* and *Appendix C* of *"Pittwater Council 2001, Warriewood Valley Urban Land Release Water Management Specification*".

Eco Logical Australia Pty Ltd (ELA) has been commissioned by Meriton Group to prepare a WQMP for development of their Project Site at 2 Macpherson Street, Warriewood (DA No. N03981). This WQMP is applicable to all stages of development at the site, from pre-construction; during-construction activities and post-construction stage.

The purpose of this WQMP is to present how the extent and nature of potential impacts to surface water quality will be monitored during construction and operation of the proposed development and provide guidance on triggers that might initiate mitigation strategies (**Section 3**).

Critical to appreciation of any future impacts is assessment of pre-construction baseline conditions for the existing surface waters and this document presents results from one wet and two dry weather sampling events used to establish baseline conditions for the site prior to construction (**Section 4**).

This current version (v.4) of the WQMP (July 2019) supersedes all previous versions and includes results of sampling applicable to baseline assessment (to January 2019) undertaken during the pre-development phase of the development. These data provide *status quo* conditions relevant to assessment of future water and sediment quality conditions during construction and post-construction phases of the development.

This report will be up-dated to include data collected during the construction and post-construction phases of the DA as that data is collected. Future versions will also include interpretation and risk assessment against the baseline conditions provided in this version (version 4) of the WQMP.

1.2 Objective of the WQMP

The water quality requirements for the Project Site nominated in the "*Warriewood Valley Urban Land Release Water Management Specification"* (Pittwater Council 2001) are provided below:

"*Specific standards have been developed for in-sector monitoring applicable to wet or dry weather stormwater discharge concentrations. However, as a minimum, a 'no worsening' of existing runoff quality is required*".

The objective of the WQMP is to maintain the existing quality of local surface water through early identification of potential impacts to the health of the waterway via implementation of the WQMP, before and after construction to allow for appropriate response. It is designed to establish the water quality and ecological characteristics of the of the waterways within the vicinity of the development site.

As per Council's requirement (Pittwater Council, 2001) this WQMP relates to three key phases of the development:

- Pre-development phase (prior to approval of development application)
- Construction phase monitoring period (immediately after site works commence and up to Subdivision Certificate Issue) and
- Post-construction phase monitoring period (immediately after Subdivision Certificate Issue and up to Handover)

This version of the WQMP (version 4) has been updated following approval of the construction phase of the DA and reference is made to those criteria pertinent to that phase as described in **Section 3** with sampling protocols summarised in **Table 3-1** and **Table 3-2**.

A report is to be submitted to Council for baseline data collected for the pre-construction phase and then every three months for all types of monitoring conducted at the Project Site. Reporting criteria and frequency is described in **Section 3.7**.

1.3 Legislative guidelines

1.3.1 Warriewood Valley Urban Land Release Water Management Specification (2001)

The *Warriewood Valley Urban Land Release Water Management Specification* (Pittwater Council, 2001) was prepared to ensure that the development of the Warriewood Valley is carried out in an ecologically sustainable manner within the realm of the water environment. The document aims to achieve this by providing Applicants and Council with tools to guide the Applicants preparation of water-related documentation in the Rezoning, Development Application, Construction Certificate, Subdivision Certificate and Handover phases for the redevelopment (on a sector by sector basis) of the Valley.

This document provides specific requirements for the preparation by Applicants of Rezoning Applications, Development Applications, Construction Certificates, Subdivision Certificates and Handover documentation and outlines what levels of expertise will be required for certification to meet the requirements of the Warriewood Valley Development Control Plan (DCP No 20, 1998).

1.3.2 Australian & New Zealand Guidelines for Fresh & Marine Water Quality (2018)

The *Guidelines* provide the management framework for long-term strategies for consistent water quality management and planning; technical support for Australia's National Water Quality Management Strategy and tools to assess and manage ambient water quality. The focus is on water quality within the context of broader ecosystem health management. Water quality compliance targets are largely sourced from the precursor "*Australian and New Zealand Guidelines for Fresh and Marine Water Quality"* (ANZECC/ARMCANZ, 2000b) and the recently-revised Guidelines currently default to the earlier documentation for most targets and guideline values.

The objective of the 2018 Australian and New Zealand Guidelines for Fresh and Marine Water Quality is primarily to provide authoritative guidance on the management of water quality in Australia and New Zealand. This guidance includes setting water quality and sediment quality objectives designed to sustain current, or likely future, community values for natural and semi-natural water resources.

1.3.3 Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)

The Australian and New Zealand Environment and Conservation Council and the Agriculture and Resource Management Council of Australia and New Zealand developed the "*Australian and New Zealand Guidelines for Fresh and Marine Water Quality"* (ANZECC/ARMCANZ 2000b) as part of the Australian National Water Quality Management Strategy (*NWQMS*). The NWQMS aims to achieve the sustainable use of Australia's and New Zealand's water resources by protecting and enhancing their quality while maintaining any social development.

For each catchment in NSW, the State Government has endorsed the community's environmental values for water, known as Water Quality Objectives (WQOs). The NSW WQOs are the environmental values and long-term goals for consideration when assessing and managing the likely impact of activities on waterways (ANZECC/ARMCANZ, 2000a).

Environmental values are particular values or uses of the environment important to maintain a healthy ecosystem, to provide a public benefit, and improve or maintain safety or health from the effects of pollution, waste discharges and deposits. The environmental values expressed as WQOs provide goals that help in the selection of the most appropriate management options. The guiding principles are:

- *Where the environmental values are being achieved in a waterway they should be protected; and*
- *Where the environmental values are not being achieved in a waterway, all activities should work towards their achievement over time.*

A range of water quality indicators are used to help assess whether the current condition of a waterway supports these values. Each indicator has an associated "trigger" value which, if exceeded, could mean one or more of the water quality objectives might not be met. These key indicators are derived from ANZECC/ARMCANZ (2000a).

2. Project environment

2.1 Project Area

The Project Site is located in Warriewood Valley, approximately 23 km north-east of Sydney CBD. The Project Site is bounded by Narrabeen Creek to the north and east, Macpherson Street to the south and an undeveloped lot to the west (**Figure 2-1**). The site is located in Sector D of the "*Warriewood Valley Urban Land Release Water Management Specification"* (Pittwater Council, 2001).

The site is generally flat with a slightly higher elevation at the north section of the Project Site and then falls from north to south-east. Narrabeen Creek, a 2nd order watercourse and one of the three major creeks in Warriewood Valley, forms a border around the northern and eastern sides of the Project Site. A high-flow drainage channel separate to Narrabeen Creek exists along the western side of the Site eventually connecting to Warriewood Wetlands.

2.2 Surface Water

Narrabeen Creek flows from west to east on the north west section of the site and from then flows south under Macpherson Street. There are existing culverts on the south eastern side of the Project Site on Macpherson Street and at the south-west corner of the Project Site.

A Riparian zone borders the Project Site alongside Narrabeen Creek at the north and east of the Site and adjacent to the high-flow drainage channel on the western side of the creek (**Figure 2-1**).

2.3 Existing aquatic environment

Prior to development of the WQMP, a preliminary reconnaissance survey was conducted at the Project Site on May 10th, 2018. Water was tested for salinity, pH and temperature within existing drainage channels (locations of the sampling sites are shown in **Figure 2-1**). All sites, except site 1, presented as stagnant pools and this is reflected in slightly elevated salinity at sites 2 and 3. The water was generally observed to be clear and slightly acidic with surface algae present in the channels located at the north, east and western sections of the Project Site (**Table 2-1**). These conditions are reflective of rainfall runoff with subsequent stagnation in isolated pools. Site 1 appears to be receiving fresh water from a drainage pipe from the eastern bank.

Table 2-1: Results from water quality monitoring undertaken during preliminary Project Site survey (May 10, 2018)

Location in Figure 2-1	Temperature (ºC)	pH	EC(µS/cm)	Present condition
1	15.8	6	142	Clear water
2	15.7	6	410	Algae present, clear water
3	-	-	221	Algae present, clear water
4	15.7	6	210	Algae present, clear water

Figure 2-1: Project Area with initial sampling locations

3. Water Quality Monitoring Plan

This section describes the specifications of sampling and analysis to be carried out under the Water Quality Monitoring Plan, including sampling requirements and frequency for each phase of development.

3.1 Monitoring Parameters

Three types of monitoring will be undertaken (Pittwater Council, 2001):

- Water Quality Monitoring (discrete sampling)
- Rapid Biological Assessment
- Sediment Toxicant Monitoring

Water quality samples will be collected and sent to a NATA-accredited laboratory with a comprehensive QA/QC process. The ALS laboratory in Smithfield, for example, is one such laboratory suitable to carry out these analyses.

The Rapid Biological Assessment provides a clear indicator of river health. Macroinvertebrates are to be sampled, sorted and identified by a person familiar with SE Australian waters, using accredited sampling and identification methods. Biological activity is to be reported using the SIGNAL Index (Chessman, 1995).

An assessment of sediment toxicant quality will be undertaken parallel with the Rapid Biological Assessment. ALS Environmental are an accredited NATA laboratory capable of carrying out these analyses.

3.2 Sampling Locations

Six (6) sampling locations have been selected following Council guidelines (Pittwater Council, 2001). These sampling locations are shown in **Figure 3-1** (and in **Appendix A**) and are described below:

- one site on Narrabeen Creek upstream of the proposed development (Site 1)
- one site on Narrabeen Creek at the downstream extent of the Site on the south eastern boundary upstream of the culverts on Macpherson Street (Site 2)
- three within-sector sites at proposed stormwater management structures along Narrabeen Creek (Site 3, Site 4 and Site 5) and
- one site at the downstream extent of the high flow channel adjacent to the west of the Site (Site 6)

Access to sampling sites will be engineered and maintained to facilitate safe and repeatable sampling of the creek without disruption to creek function and flow (e.g. cleared pathways).

Figure 3-1: Sampling locations for wet and dry weather monitoring

3.3 Monitoring Parameters for Water Quality Assessment

The parameters to be sampled as part of the Pittwater Council's Water Management Specifications (Pittwater Council, 2001) are summarised in **Table 3-1**. Different parameters and monitoring locations are required to be sampled depending on the weather and phase of the development.

Dry and Wet-weather sampling will be undertaken as per Council's requirements in the specified locations, as listed in detail in **Table 3-1** below.

3.4 Sampling Frequency

Dry-weather samplings are to be conducted on a regular three-monthly basis.

Wet-weather samples are to be undertaken for at least three (3) events spread evenly over the year at times where the rainfall is predicted to be greater than 20 mm over the catchment in a 24-hour period. Wet weather sampling will target the rising limb and/or the falling limb of the hydrograph, with at least one sample on the rising limb and one sample on the falling limb during each year.

Rapid Biological Assessment and Sediment sampling are to be carried out during the development application and annually thereafter, up to and including the handover stage of the Project. A minimum of one set of Biological Assessment and Sediment sampling should be carried out during the pre-

construction phase, with on-going annual assessments carried out for the construction phase and post-construction phase upon Development Application and Construction Certificate approvals, respectively.

3.5 Laboratory detection limits

The specified laboratory detection limits (LORs) for each analyte are listed in **Table 3-1.**

Table 3-1: Summary of monitoring parameters and site requirements

Media	State	Variable	LOR or precision as specified	Sampling locations Pre-development phase		Sampling locations Construction Phase		Sampling Locations Post-construction Phase	
				Wet weather	Dry weather	Wet weather	Dry Weather	Wet weather	Dry Weather
Water	Physical	Visual	-	1,2.4	1,2.4	1-6	1-6	1-6	1-6
		Salinity	10 µS/cm	1,2	1,2	1,2	1,2	1,2	1,2
		pH (Field)	0.01 pH Unit	1,2	1,2	1,2	1,2	1,2	1,2
		Temperature (Field)	-	1,2	1,2	1,2	1,2	1,2	1,2
		Dissolved Oxygen (Field)	0.1	1,2	1,2	1,2	1,2	1,2	1,2
		Turbidity (Field)	0.1 NTU	1,2	1,2	1,2	1,2	1,2	1,2
		Suspended Solids	5	1,2,4	1,2,4	1-6	1-6	1-6	1-6
		Volume Gross Pollutants Removed	n/a	n/a	n/a	n/a	SQID	n/a	SQID
	Chemical	Total Nitrogen	0.1	1,2.4	1,2.4	1-6	1-6	1-6	1-6
		Ammonia-Nitrogen	0.1	1,2.4	1,2.4	1-6	1-6	1-6	1-6
		Total Kjeldahl Nitrogen	0.1	1,2.4	1,2.4	1-6	1-6	1-6	1-6
		Nitrates and Nitrites	0.1	1,2.4	1,2.4	1-6	1-6	1-6	1-6
		Total Phosphorous	0.1	1,2.4	1,2.4	1-6	1-6	1-6	1-6
		Ortho-Phosphate	0.1	1,2.4	1,2.4	1-6	1-6	1-6	1-6
		Non-Filterable Phosphorous	0.1	1,2.4	1,2.4	1-6	1-6	1-6	1-6
		Hardness ($CaCO_3$)	1	n/a	1,2	n/a	1,2	n/a	1,2
		Chromium	0.01	n/a	1,2	n/a	1,2	n/a	1,2
		Lead	0.01	n/a	1,2	n/a	1,2	n/a	1,2
		Zinc	0.5	n/a	1,2	n/a	1,2	n/a	1,2
		Arsenic	0.005	n/a	1,2	n/a	1,2	n/a	1,2
		Mercury	0.001	n/a	1,2	n/a	1,2	n/a	1,2
		Copper	1	n/a	1,2	n/a	1,2	n/a	1,2
		Phenolic Compounds	0.1	n/a	1,2	n/a	1,2	n/a	1,2
		OC/OP Pesticides	0.1 µg/L	n/a	1,2	n/a	1,2	n/a	1,2

Media	State	Variable	LOR or precision as specified	Sampling locations Pre-development phase		Sampling locations Construction Phase		Sampling Locations Post-construction Phase	
				Wet weather	Dry weather	Wet weather	Dry Weather	Wet weather	Dry Weather
		Oil & Grease (H.E.M)	5	n/a	1,2	n/a	1,2	n/a	1,2
		PAH	1 µg/L	n/a	1,2	n/a	1,2	n/a	1,2
		Chlorophyll-a	1 mg/m^3	n/a	n/a	n/a	n/a	n/a	1,2
	Biological	Algal Identification and Count	10	n/a	1,2	n/a	1,2	n/a	1,2
		Faecal Coliform Count	1 cfu/100mL	1,2,4	1,2,4	1-6	1-6	1-6	1-6
		Biotic Index (SIGNAL)	-	n/a	1,2	n/a	1,2	n/a	1,2
Sediment	Chemical	Chromium	0.1	n/a	1,2	n/a	1,2	n/a	1,2
		Lead	0.1	n/a	1,2	n/a	1,2	n/a	1,2
		Zinc	0.1	n/a	1,2	n/a	1,2	n/a	1,2
		Arsenic	0.1	n/a	1,2	n/a	1,2	n/a	1,2
		Mercury	0.1	n/a	1,2	n/a	1,2	n/a	1,2
		Copper	0.1	n/a	1,2	n/a	1,2	n/a	1,2
		Phenolic Compounds	0.1	n/a	1,2	n/a	1,2	n/a	1,2
		Organochlorine Pesticides	0.5	n/a	1,2	n/a	1,2	n/a	1,2
		PAH	0.5 µg/L	n/a	1,2	n/a	1,2	n/a	1,2

3.6 Acceptance Criteria

The Acceptance Criteria will be assigned for each term (Short, Medium and Long-term) based on Council's guidelines (Pittwater Council, 2001). Thus, 'Short-term' relates to the period during and just after development (up to 'Handover'). 'Medium-term' is the period of one-year after completion of all water quality controls associated with the fully developed area. 'Long-term' relates to the period after control measures are introduced for all pollutant sources in the valley (if applicable).

In the short-term, existing conditions ('status quo') will be maintained (i.e. 90% compliance with the median values from pre-development (baseline) monitoring data)(*see* **Section 4**).

In the medium and long-term, a compliance rate of 90% against listed guidelines (**Table 3-2**) will to be targeted.

The Acceptance Criteria are summarised in **Table 3-2**.

Table 3-2: Acceptance Criteria

Media	State	Variable	Units	During Construction Site Discharges/In Sector	Post Construction Site Discharges	In-stream Short Term (Status Quo)	In-Stream Medium Term	In-Stream Long Term
Water	Physical	Visual	-	No litter	No litter	No litter	No litter	No litter
		Salinity (TDS)	mg/L			1000	1000	1000
		pH (Field)	-			6.6 - 8	6.6 - 8	6.6 - 8
		Temperature (Field)	℃			Status quo	Status quo	Status quo
		Dissolved Oxygen (Field)	%Sat			Status quo	90	90
		Turbidity (Field)	NTU			Status quo	50	20
		Suspended Solids	mg/L	100	50	Status quo	20	6
		Volume Gross	Tonne*	-	-	-	-	-
		Pollutants Removed						
	Chemical	Total Nitrogen	mg/L	1.6	1.6	Status quo	1.6	1.0
		Ammonia-Nitrogen	mg/L	See Notes	See Notes	See Notes	See Notes	See Notes
		Total Kjeldahl Nitrogen	mg/L	-	-	-	-	-
		Nitrates and Nitrites	mg/L	-	-	-	-	-
		Total Phosphorous	mg/L	0.1	0.05	Status quo	0.1	0.04
		Ortho-Phosphate	mg/L	-	-	-	-	-
		Non-Filterable Phosphorous	mg/L	-	-	-	-	-
		Hardness ($CaCO_3$)	mg/L			-	-	-
		Chromium	mg/L			Status quo	50% status quo	10
		Lead	mg/L			Status quo	50% status quo	1
		Zinc	mg/L			Status quo	50% status quo	50
		Arsenic	mg/L			Status quo	50% status quo	50
		Mercury	mg/L			Status quo	50% status quo	0.1
		Copper	mg/L			Status quo	50% status quo	2
		Phenolic Compounds	mg/L			Status quo	50% status quo	See Notes
		OC/OP Pesticides	mg/L			Status quo	50% status quo	See Notes
		Oil & Grease (H.E.M)	mg/L			50	20	5
		PAH	mg/L			Status quo	50% status quo	3
		Chlorophyll-a	mg/m^3			15	15	10
	Biological	Algal Identification and Count	-			Status quo	No algal bloom	No algal bloom
		Faecal Coliform Count	Cfu/100mL	150	150	1000	150	150
		Biotic Index	-			Status quo	> 5	> 6
Sediment	Chemical	Chromium	mg/kg			Status quo	50% status quo	80

Media	State	Variable	Units	During Construction Site Discharges/In Sector	Post Construction Site Discharges	In-stream Short Term (Status Quo)	In-Stream Medium Term	In-Stream Long Term
		Lead	mg/kg			Status quo	50% status quo	50
		Zinc	mg/kg			Status quo	50% status quo	200
		Arsenic	mg/kg			Status quo	50% status quo	20
		Mercury	mg/kg			Status quo	50% status quo	0.15
		Copper	mg/kg			Status quo	50% status quo	65
		Phenolic Compounds	mg/kg			Status quo	50% status quo	See Note
		Organochlorine Pesticides	mg/kg			Status quo	50% status quo	See Note
		Total PAH	mg/kg			Status quo	50% status quo	4000

* If gross pollutants are removed from site, this parameter should be included in **Table 3-1**

Notes for **Table 3-2**:

- 'Status Quo' means the median value is within the range of the 10th percentile and 90th percentile from the pre-development condition data
- 50% Status Quo means the median value is within the range of 50th percentile of the 10th percentile and 50th percentile of the 90th percentile from the pre-development condition data
- Sediment guidelines are dry weight from ANZECC/ARMCANZ, 2000
- General values have been adopted with consideration of ANZECC/ARMCANZ, 2000
- Water Hardness required to assist with interpretation of trigger guidelines for metal concentrations
- For the purposes of comparing the results with ANZECC/AMCANZ, 2000 guidelines, the creeks can generally be defined as 'lowland rivers'. If the existing level is lower than the medium or long-term guideline provided, the existing level is not to be exceeded.
- Note – ANZECC/ARMCANZ 2000 guidelines for each compound to be used
- For Ammonia: reported as equivalent total ammonia at a common pH value of 8, following the formalism of ANZECC/ARMCANZ, 2000.

3.7 Reporting

A report is to be submitted to Council for baseline data collected for the pre-construction phase and then every three months for all types of monitoring conducted at the Project Site. This report will include:

- objectives of the monitoring program;
- limitations of the program;
- map indicating the location of the monitoring sites;
- description of the monitoring site's catchment, including catchment area, land use, and estimated impervious fraction;
- description of the rainfall patterns during the monitoring period (including the daily rainfall and monitoring dates)
- summary of the sampling techniques;
- summary of the analytical techniques, including detection limits;
- QA/QC procedures;
- any factors which may have affected the results;
- the laboratory test certificates (will be included in an Appendix).
- a discussion (including graphs) on the influence of season and flow conditions on the monitoring results;
- a comparison between the observed pollutant concentrations and the long-term water quality objectives for ecosystem protection (as described in Appendix C, Pittwater Council, 2001).

The minimum requirement for the development application is the inclusion of results of initial water quality sampling for wet and dry weather. Subsequent monitoring results will be included in the Construction Certificate and Handover reports.

Following an event sampling, the report will include the following additional information (using data acquired by Council at the Narrabeen Creek, Macpherson Road data collection sites):

- a table containing the event date, approximate runoff volume (or depth) based on spot or continuous gaugings, Event Mean Concentration (EMC) and load.

- event rainfall depth, peak flow and peak concentration rate.

Once development consent is granted by Council, the original laboratory analysis reports and details of site locations, and the date and time of sampling will be forwarded to Council three weeks after a dry or wet weather sampling event where data has been collected and analysed. A summary report of the event will then be prepared to be included in the three-monthly reports described above.

4. Baseline assessment – Pre-construction phase conditions

The sampling program for this WQMP requires both wet weather and dry weather sampling of the local water features prior to any construction. This section presents the outcomes of two pre-construction sampling events conducted in late 2018 at the Project Site.

A wet weather sampling event was conducted on September 27, 2018 following approximately 20 mm of rain in the previous 24-hours at Warriewood. A dry weather sampling was conducted on October 26, 2018 with <2 mm rainfall in the previous 24 hours. These two sampling events satisfy the requirements for baseline data for the pre-development phase of the project.

Samples were collected for water quality assessment for wet weather and sediment toxicant assessment and rapid biological assessment in addition to water quality assessment for dry weather as per the '*Warriewood Valley Urban Land Release Water Management Specification'* (Pittwater Council 2001, ELA 2018).

4.1 Existing environment

As per the reporting specifications of Pittwater Council's Water Management Specifications (Pittwater Council, 2001), a description of the catchment and rainfall pattern is provided below:

The Narrabeen Creek catchment

The Narrabeen Creek catchment has become increasingly developed over the past decade. The headwaters of Narrabeen Creek are located to the east of Mona Vale Road, where there is still remnant bushland. As it flows downstream, Narrabeen Creek flows through the newly developed areas of Warriewood before reaching 2 Macpherson Street. The catchment area upstream of the subject site is approximately 1.4 km^2. Land use in the Narrabeen Creek catchment is mainly residential, with a few industrial complexes towards the upstream extent of the catchment.

Whilst the creek runs through a preserved 20-50 m wide riparian strip, the remaining area of the catchment presents predominantly as impervious roof-tops and roads, with only the initial 30-40 m of the upper catchment under native bush.

Rainfall patterns

Prior to the wet weather sampling event, rainfall recorded in Warriewood had been low, with the area having experienced a relatively dry winter. Between 1 July 2018 and 27 September 2018, 71.5 mm of rain was recorded at Warriewood. As mentioned previously, 20 mm of rain was recorded at Boondah Reserve in Warriewood in the 24 hours to 6am 27 September 2018. Less than 2 mm rainfall fell in the previous 24-hours prior to the dry weather sampling (Figure 4-1).

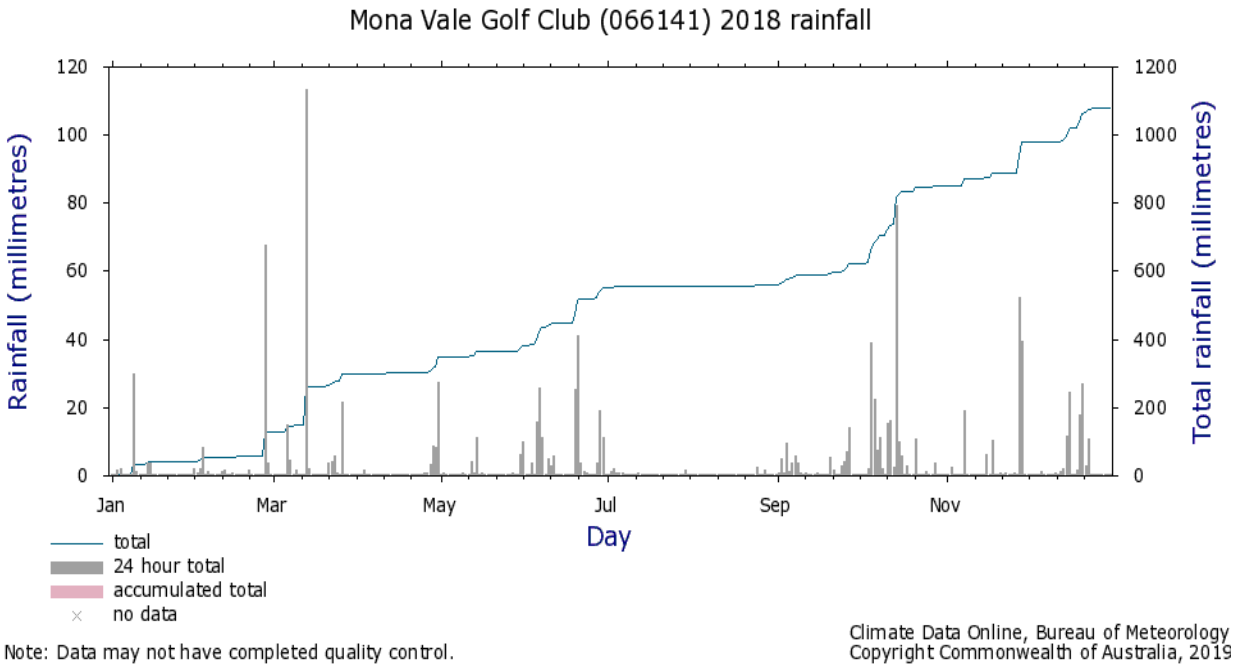

Figure 4-1: Cumulative rainfall data for Warriewood (Mona Vale Golf Club Station) in 2018. (Source http://www.bom.gov.au)

4.2 Location of monitoring sites

For the baseline assessment, three sites along Narrabeen Creek were sampled for the wet/dry weather monitoring (Table 4-1). These three locations were chosen based on: safe access to Narrabeen Creek; requirements of *Warriewood Valley Urban Land Release Water Management Specification'* (Pittwater Council, 2001) and ease of repeat sampling at the chosen location.

Table 4-1: Location of each water quality sampling site within 2 Macpherson Street, Warriewood

Site Code	Location (Figure 3-1)	GPS Coordinates	Description of sampling location
US01	1	33° 41' 10", 151° 18' 0"	Located at upstream extent of site. No litter or oily residue was observed at the time of sampling
MS01	4	33° 41' 20", 151° 17' 57"	Located approximately halfway along Narrabeen Creek within the site, beneath large fig tree on right bank. No litter or oily residue was observed at the time of sampling
DS01	2	33° 41' 23", 151° 17' 58"	Located at downstream extent of site, approximately 15 m upstream of culverts under Macpherson Street. No litter or oily residue was observed at the time of sampling

4.3 Sampling techniques

At each of the sampling locations within the Project Site, the following sampling techniques were used to collect data for the required parameters (summarised in **Table 4-2**).

4.3.1 Field data

A hand-held water quality meter (calibrated immediately prior to the sampling event) was used to collect field measurements shown in **Table 4-2**. The meter was left in the water until the dissolved oxygen levels, temperature and pH had stabilised before a measurement of each of the parameters was recorded.

4.3.2 Water sampling

Water samples at each of the sampling locations were collected by hand (without the need for a sampling pole) as access to the creek line facilitated easy access to the water. Unless the sample bottles had been pre-treated (such as with sodium thiosulphate for the faecal coliform test), each sample bottle was rinsed with creek water three times before being filled with enough water for the appropriate sample. Water was collected from approximately 10 cm below the water's surface. Care was taken to not disturb the sediment on the bed of the creek while collecting water samples or measurements using the hand-held water quality meter, as this could skew the results.

4.3.3 Sediment and Biotic SIGNAL sampling

As per the WQMP, sampling for sediment and Biotic Index SIGNAL was conducted for two sites: the upstream (US01) and the downstream (DS01) site. Collected water samples and sediment samples were stored on ice in a sealed esky before they were taken to the ALS laboratory in Smithfield for analysis. Aseptic techniques were followed to ensure integrity of all collected samples.

Macroinvertebrates were sampled, sorted and identified using AUSRIVAS sampling and identification protocols. For each sampling site, edge sampling for macroinvertebrates was conducted by 2 ecologists using a 250 µm-mesh sweep net over a total length of 10 m with a focus on getting a representative sample from each habitat. Net contents were emptied into a white sorting tray and scanned for a period of 40 minutes. Each invertebrate taxon was removed and preserved in small specimen jars containing 85% un-denatured ethanol. No additional taxa were identified after 40 minutes of scanning.

Macroinvertebrates were identified to the family taxonomic level and counted. Identified taxa were given a relative SIGNAL score indicating the taxon's tolerance to pollution.

As per Council's Water Management Specifications (Pittwater Council, 2001), the SIGNAL indices are presented in Table 4-5. Each site was classified as per the categories below:

less than 4 = severely impaired, very poor water quality
4-5 = moderately impaired, poor water quality
5-6 = mildly impaired, fair water quality
6 -7 = unimpaired, good water quality
>7 = unimpaired and rich in sensitive taxa, excellent water quality.

No sediment samples nor macroinvertebrates were collected for the wet weather sampling event, as per the Council's Water Management Specifications (Pittwater Council, 2001).

Table 4-2: Summary of sampling techniques

Sampling technique	Media	Parameter measured	Location of measurement	
			Wet weather	Dry weather
Hand-held water quality meter	Water	Salinity	US01/DS01	US01/DS01
		pH	US01/DS01	US01/DS01
		Temperature	US01/DS01	US01/DS01
		Dissolved Oxygen	US01/DS01	US01/DS01
		Turbidity	US01/DS01	US01/DS01
Water sample collected and sent to ALS laboratory		Suspended solids	US01/MS01/DS01	US01/MS01/DS01
		Total Nitrogen	US01/MS01/DS01	US01/MS01/DS01
		Ammonia-Nitrogen	US01/MS01/DS01	US01/MS01/DS01
		Total Kjeldahl Nitrogen	US01/MS01/DS01	US01/MS01/DS01
		Nitrates and Nitrites	US01/MS01/DS01	US01/MS01/DS01
		Total Phosphorus	US01/MS01/DS01	US01/MS01/DS01
		Ortho-Phosphate	US01/MS01/DS01	US01/MS01/DS01
		Non-filterable Phosphorus	US01/MS01/DS01	US01/MS01/DS01
		Hardness ($CaCO_3$)	n/a	US01/DS01
		Chromium	n/a	US01/DS01
		Lead	n/a	US01/DS01
		Zinc	n/a	US01/DS01
		Arsenic	n/a	US01/DS01
		Mercury	n/a	US01/DS01
		Copper	n/a	US01/DS01
		Phenolic Compounds	n/a	US01/DS01
		OC/OP Pesticides	n/a	US01/DS01
		Oil & Grease (H.E.M)	n/a	US01/DS01
		PAH	n/a	US01/DS01
		Algal Identification and Count	n/a	US01/DS01
		Faecal coliform	US01/MS01/DS01	US01/MS01/DS01
	Sediment	Chromium	n/a	US01/DS01
		Lead	n/a	US01/DS01
		Zinc	n/a	US01/DS01
		Arsenic	n/a	US01/DS01
		Mercury	n/a	US01/DS01
		Copper	n/a	US01/DS01
		Phenolic Compounds	n/a	US01/DS01
		Organochlorine Pesticides	n/a	US01/DS01
		PAH	n/a	US01/DS01

n/a = not requires as per Pittwater Council's Water Management Specifications (Pittwater Council, 2001)

4.4 Analytical techniques

The water samples were analysed by the NATA-accredited ALS laboratory at Smithfield**.** The details of the analyses undertaken by ALS are included in **Appendix B**. Detection limits or limits of reporting (LOR) for each of the parameters tested for are included in Table 4-4, below**.**

4.5 QA/QC procedures

To ensure the accuracy of the water quality results, the water quality meter was calibrated in the office before being used in the field by using calibration liquids. The meter was rinsed with creek water between each sampling location and each water sample bottle that hadn't been pre-treated was rinsed three times before being filled with the final sample.

Nitrile gloves were worn by the samplers to ensure that the samples and the water quality meter weren't inadvertently contaminated during the sampling process and each set of gloves was discarded between each sampling location.

ALS laboratory QA/QC compliance assessments for the samples collected are included in **Appendix C** and **Appendix F**.

Note that ALS is not a NATA-accredited laboratory for the non-filterable phosphorus test (**Appendix E**).

4.6 Baseline (Pre-construction) Results and *status quo* Conditions

Analytical results for the wet weather sampling and two dry weather sampling events (and a representative rainwater sample from Central Coast about 30 km northeast of the site) are presented below.

4.6.1 Wet weather sampling

The samples for the wet weather monitoring were collected following 20 mm of rain over the previous 24 hours to 9 am, September 27, 2018.

A stormwater outlet from adjacent properties discharges into Narrabeen Creek approximately 50 m upstream from sampling location DS01. Without the water quality results from these properties collected during the same period, it is not possible to tell if these results are affected by discharge from neighbouring, upstream, properties.

Field measurements

A number of physical and chemical properties were collected in the field (**Table 4-3**). In summary:

- pH at all locations fell within guidelines for slightly disturbed aquatic ecosystems, except for at US01 at the upstream extent of the site.
- Dissolved oxygen concentration was outside (below) guidelines for aquatic ecosystems at all sites. At DS01, there was significant vegetation growing within the waterway and a lot of green filamentous algae in the water, which could have affected the concentration of dissolved oxygen at this location. Oxygen potential decreased across the site.
- Turbidity was very low at all locations (i.e. good water clarity) and below trigger values.
- Conductivity (measure of salinity) was low at all locations and below trigger values for aquatic ecosystems.

4.6.1.1.1 Analytes

- All analysed analytes reported within or below recommended ANZECC guidelines, with the exception of some nutrients and pathogens (*see below*).

Nutrients

- Total phosphorus, nitrogen and ammonia levels were all above the trigger values for slightly disturbed freshwater ecosystems at all three sampling locations. There was no longitudinal pattern to these results (i.e. the upstream and downstream values are similar) to suggest that the elevated nutrients are derived from a point-source, such as the subject site. It may be due to broader catchment influences. Elevated levels of algae were observed at the downstream site which may be promoted by the elevated nutrient levels.

Biological

- Faecal coliforms are an indicator of bacteria from animal faeces and were detected at elevated levels at all sampling locations. Levels are relatively high and exceed recommended levels for primary contact (150 CFU/100mL) but are below levels for secondary contact (1000 CFU/100mL). Concentrations reduce across the site by 30%, suggesting a primary source upstream of the site.

- Comparison between the preliminary reconnaissance survey and the wet weather event suggests that conditions in the main channel have not appreciably changed between the two sampling dates, with waters exhibiting similar salinities on both dates. The former, however, did not constitute a full sampling event and further dry weather, pre-construction samples should be collected for baseline comparison.

4.6.2 Dry weather sampling

The results from the two dry weather samplings may be summarised as follows:

Field measurements

- pH at all locations fell within guidelines for slightly disturbed aquatic ecosystems.
- Dissolved oxygen concentration was outside (below) guidelines for aquatic ecosystems at all sites and was lower than values observed during the wet weather sampling on September. The lowest DO was observed at the DS01 site (7.5%). Significant vegetation growing within the waterway and a lot of green filamentous algae in the water at this site could have affected the concentration of dissolved oxygen at this location. Oxygen potential decreased across the site.
- Turbidity was very low at all locations (i.e. good water clarity) and below trigger values.
- Conductivity (measure of salinity) was low at all locations and below trigger values for aquatic ecosystems during the wet weather sampling, however, it exceeded the trigger limit at all sites during the dry weather sampling. The highest conductivity (and salinity) was observed at the DS01 site.
- Total suspended solid was higher at DS01 site during dry weather sampling compared to the wet weather sampling and was higher again at US01 during the January 2019 sampling.

4.6.2.1.1 Water Analytes

- All analysed analytes reported within or below recommended ANZECC guidelines, with the exception of some nutrients and pathogens (*see below*) and zinc and copper metals. These latter likely represent collection of zinc dust from neighbourhood construction and the use of zincalume roofing.

Nutrients

- Total phosphorus, nitrogen and ammonia levels were all above the trigger values for slightly disturbed freshwater ecosystems at all three sampling locations. No longitudinal pattern was observed in the results (i.e. the upstream and downstream values are similar) to suggest that the elevated nutrients are derived from a point-source, such as the subject site. It may be due to broader catchment influences. Elevated levels of algae were observed at the downstream site which may be promoted by the elevated nutrient levels.
- Ortho-Phosphate and non-filterable phosphorous were not analysed during the first dry weather sampling but these values are likely to be similar if not lower to the values obtained during the wet weather sampling conducted on September (Ortho-Phosphate = <0.01 mg/L, non-filterable phosphorous = 0.01 mg/L). Ortho-Phosphate was 0.03 at DS01 during the January 2019 sampling. Non-filtered Phosphorus was also higher at the MS01 and DS01 sites (0.03 and 0.1 mg/L respectively) during the January 2019 sampling.

Biological

- Faecal coliforms are an indicator of bacteria from animal faeces and were detected at elevated levels at all sampling locations, however, was found to be lower than the wet weather sampling at all sites. Levels are relatively high and exceeded recommended levels for primary contact (150 CFU/100mL) but are below levels for secondary contact (1000 CFU/100mL). No longitudinal pattern was observed in the results.

Sediment results

- All analytes remained within the recommended range except for zinc, which was slightly over the range at US01 and below the range at DS01. High levels likely reflect runoff from corrugated metal roofs in the area.

Macroinvertebrates

- Macroinvertebrates from a total of 12 families were collected from the three sampling locations during dry weather sampling on 26th October 2018. Table 4-5 presents the macroinvertebrates (identified to family level) and their SIGNAL scores.
- The calculated SIGNAL score for each site are presented in Table 4-5**.** Both sites can be classified as “severely impaired” with a SIGNAL score <4 based on Council’s guidelines (Pittwater Council, 2001) - indicating “very poor” water quality.
- Slightly higher family richness was recorded at the DS01.

Table 4-3: Field water quality data from the sampling events (ANZECC exceedances highlighted)

Analyte	Media	Guidelines ANZECC (1, 2)	Units	LOR	Wet weather sampling (September 27, 2018)			Dry weather sampling (October 26, 2018)			Dry weather sampling (January 18, 2019)		
					US01	MS01	DS01	US01	MS01	DS01	US01	MS01	DS01
					27/9/18 9:40am	27/9/18 10:40am	27/9/18 11:20am	26/10/18 12:45 pm	26/10/18 12:15 pm	26/10/18 11:00 am	18/01/19 8:20 am	18/01/19 09:15 am	18/01/19 09:55 am
Temperature	Water (3)		°C		13.75	14	13.95	18.8	17.9	17.5	20.19	20.12	20.36
pH		6.5 - 8	pH units		6.39	6.62	6.53	6.97	6.93	6.80	6.92	6.84	6.73
Dissolved Oxygen		85-110	%		65.2	58	49	2.1	26.8	25.8	12	9.9	7.5
Turbidity		50	NTU		7.2	7.3	8.4	4.2	3.9	12.6	6.7	12.6	11.2
Conductivity		0.300	mS/cm		0.195	0.209	0.203	0.481	0.518	0.534	0.459	0.513	0.535
Salinity†		180	mg/L		117	125	122	289	311	320	275	308	321

† = calculated assuming salinity as 0.6 x conductivity

Table 4-4: Laboratory water quality data from the sampling events (ANZECC exceedances highlighted)

Analyte	Media	Guidelines ANZECC (1, 2)	Units	LOR	Wet weather sampling (September 27, 2018)			Dry weather sampling (October 26, 2018)			Dry weather sampling (January 18, 2019)			Representative Rainwater sample (Central coast)
					US01	MS01	DS01	US01	MS01	DS01	US01	MS01	DS01	
					27/9/18 9:40 am	27/9/18 10:40 am	27/9/18 11:20 am	26/10/18 12:45 pm	26/10/18 12:15 pm	26/10/18 11:00 am	18/01/19 8:20 am	18/01/19 09:15 am	18/01/19 09:55 am	
Hardness ($CaCO_3$)			mg/L	5				96	110	110	106	113	110	17

Analyte	Media	Guidelines ANZECC (1, 2)	Units	LOR	Wet weather sampling (September 27, 2018)			Dry weather sampling (October 26, 2018)			Dry weather sampling (January 18, 2019)			Representative Rainwater sample (Central coast)
					US01	MS01	DS01	US01	MS01	DS01	US01	MS01	DS01	
					27/9/18 9:40 am	27/9/18 10:40 am	27/9/18 11:20 am	26/10/18 12:45 pm	26/10/18 12:15 pm	26/10/18 11:00 am	18/01/19 8:20 am	18/01/19 09:15 am	18/01/19 09:55 am	
Chromium	Water (3)	0.003	mg/L	0.001				<0.001	-	<0.001	0.001	-	<0.001	<0.001
Lead		0.0034	mg/L	0.001				<0.001	-	<0.001	<0.001	-	<0.001	<0.001
Zinc		0.008	mg/L	0.005				0.016	-	0.018	0.006		<0.005	0.007
Arsenic		0.024	mg/L	0.001				<0.001	-	0.002	0.002	-	0.001	<0.001
Mercury		0.0006	mg/L	0.0001				<0.0001	-	<0.0001	<0.0001	-	<0.0001	<0.0001
Copper		0.0014	mg/L	0.001				0.002	-	0.002	0.002	-	<0.001	<0.001
Phenolic compounds (total Phenol)		0.32	mg/L	0.5				<0.05	-	<0.05	<0.005	-	<0.005	-
OC/OP pesticides**			µg/L	0.5				<0.5	-	<0.5	<0.5	-	<0.5	-
Oil & Grease (H.E.M)			mg/L	0.5				<0.5	-	<05	8	-	<0.05	
PAH								N/A	N/A	N/A	<1	-	<1	
Ammonia as N		0.9	mg/L	0.01	0.06	0.04	0.04	0.04	0.05	0.06	0.09	0.12	0.03	0.02
Nitrite + Nitrate as N (NOx)		0.04	mg/L	0.01	0.32	0.30	0.34	0.07	0.04	0.17	<0.01	<0.01	0.01	0.3
Total Kjeldahl Nitrogen as N (TKN)			mg/L	0.1	0.3	0.3	0.3	0.3	0.4	0.4	0.2	1.2	0.9	<0.01
Total Nitrogen as N (TKN + NOx)		0.5	mg/L	0.1	0.6	0.6	0.6	0.4	0.4	0.5	0.2	1.2	0.9	0.3
Total Phosphorus as P		0.05	mg/L	0.01	0.04	0.04	0.04	0.03	0.04	0.06	0.08	0.24	0.13	0.01
Ortho-Phosphate			mg/L	0.01	<0.01	<0.01	<0.01	N/A	N/A	N/A	0.02	0.01	0.03	<0.01
Non-filterable phosphorous			mg/L	0.01	0.01	0.01	0.01	N/A	N/A	N/A	<0.01	0.03	0.1	<0.01
Faecal Coliforms		1000	CFU/100 mL	1	430	390	290	~56	110	160	160	140	~400	<1
Total Suspended Solids			mg/L	5	<5	<5	<5	<5	<5	12	5	14	<5	<5

Analyte	Media	Guidelines ANZECC (1, 2)	Units	LOR	Wet weather sampling (September 27, 2018)			Dry weather sampling (October 26, 2018)			Dry weather sampling (January 18, 2019)			Representative Rainwater sample (Central coast)
					US01	MS01	DS01	US01	MS01	DS01	US01	MS01	DS01	
					27/9/18 9:40 am	27/9/18 10:40 am	27/9/18 11:20 am	26/10/18 12:45 pm	26/10/18 12:15 pm	26/10/18 11:00 am	18/01/19 8:20 am	18/01/19 09:15 am	18/01/19 09:55 am	
Chromium	Sediment (4)	80-370	mg/kg	2				38	-	9	0.01			
Lead		50-220	mg/kg	5				93	-	15				
Zinc		200-410	mg/kg	5				451	-	88				
Arsenic		20-70	mg/kg	5				15	-	5				
Mercury		0.15-1	mg/kg	0.1				0.1	-	<0.1				
Copper		65-270	mg/kg	5				62	-	18				
Phenolic compounds (total Phenol)			mg/kg	1				<1	-	<1				
OC pesticides**			mg/kg	0.05				<0.05	-	<0.05				
PAH**			mg/kg	0.5				<0.8	-	<0.5				

Notes:

(1) 95% level of protection for freshwater species (ANZECC & ARMCANZ 2000)

(2) Default trigger values for slightly disturbed ecosystems and lowland rivers in south-east Australia (NSW &Vic east flowing coastal rivers) (ANZECC & ARMCANZ 2000)

(3) Guideline values indicate 95% protection levels for slightly-moderately disturbed ecosystems (ANZECC 2000)

(4) Guideline range indicates ISQC – Low (Trigger value) and ISQC High values

N/A = Not analysed for dry-weather sampling

* = Non-filterable phosphorus is not covered by ALS's NATA accreditation

** = see Appendix B for individual analyte values

Table 4-5: Macroinvertebrate data from dry weather sampling event on 26th October 2018.

Site	Order	Family	Count	SIGNAL
US01 Edge sampling (12:45 pm)	Diptera	Chironomidae/Chironominae	19	3
	Diptera	Chironomidae/ Tanypodinae	2	3
	Misc. Class: Oligochaeta		2	2
	Hemiptera	Gelastocoridae	1	5
	Acarina	Hydracarina	8	6
	Diptera	Culicidae	1	1
	Misc. (no head)		1	N/A
	Coleoptera	Hydraenidae	1	3
	Microcrustacean	Ostracoda	3	4
	Total families	**8**	**Total SIGNAL**	**3.37**
DS01 Edge sampling (11:00 am)	Diptera	Chironomidae/Chironomiae	29	3
	Diptera	Chironomidae/ Tanypodinae	5	3
	Mollusca and Gastropoda	Lymnacidae	13	1
	Mollusca and Gastropoda	Planorbidae	5	2
	Diptera	Simuliidae	7	5
	Odonata - Zygospora	Coenagrionidae	3	2
	Diptera	Culicidae	9	1
	Acarina	Hydracarina	3	6
	Microcrustacean	Ostracoda	11	N/A
	Microcrustacean	Copapoda	12	N/A
	Odonata	Corduliid	1	5
	Rhynchobdellida	Glossiphoniidae	1	1
	Total families	**10**	**Total SIGNAL**	**2.9**

5. Construction phase assessment

Development Application (DA No. 0398/17) was approved on 31st May, 2019 for the civil works, including cut and fill to create a suitable building platform for future development, private road, drainage works and environmental management works.

Subsequent versions of this report will provide data against this phase as collected and reported following the guidelines described in **Section 3.7**.

6. References

ANZECC, 2000. *Australian Guidelines for Water Quality Monitoring and Reporting, Australian and New Zealand Environment and Conservation Council,* 2000.

ANZECC/ARMCANZ, 2000a. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality Volume 1, Australian and New Zealand Environment and Conservation Council*, 2000.

ANZECC/ARMCANZ, 2000b. Australian and New Zealand Guidelines for Fresh and Marine Water Quality Volume 2, Australian and New Zealand Environment and Conservation Council, 2000Pitwater Council, 2001. *Warriewood Valley Urban Land Release Water Management Specification (revised version)*, February 2001.

ANZG, 2018. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at: www.waterquality.gov.au/anz-guidelines

Chessman, B.C., 1995. *Rapid Assessment of Rivers using macroinvertebrates: A procedure based on habitat-specific sampling, family level identification and a biotic index*. Aus. J. of Ecology, **10**(1).

Pittwater Council, 2001. *Warriewood Valley Urban Land Release Water Management Specification* (revised version), February 2001.

Appendix A: Sampling Site Photos

Site 1: Upstream of the proposed development at the confluence of Narrabeen Creek and drainage from western culvert

Site 2: Downstream of the proposed development at culvert on Macpherson Street.

Site 4: An in-sector site at mid-point of the development area

Site 6: Downstream extent of the high flow channel adjacent to the west of the Site

Appendix B: Certificate of Analysis

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1901722**	Page	: 1 of 8
Client	: **ECO LOGICAL AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR Ian Dixon	Contact	: Customer Services ES
Address	: PO BOX 12 SUTHERLAND NSW 1499	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 4201 2208	Telephone	: +61-2-8784 8555
Project	: 11527 Macpherson St, Warrie Wood	Date Samples Received	: 18-Jan-2019 16:00
Order number	:	Date Analysis Commenced	: 19-Jan-2019
C-O-C number	: ----	Issue Date	: 25-Jan-2019 11:33
Sampler	: Claire Wheeler/Rizwaua Kumman		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Sarah Griffiths	Microbiologist	Sydney Microbiology, Smithfield, NSW
Sunitha Kannampilli	Phycologist	Sydney Phycology, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW

General Comments

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

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

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

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

- Results apply to sample(s) as submitted.
- MF = membrane filtration
- CFU = colony forming unit
- KEY: PTP=Potential Toxin Producers
; ND=Not Detected; NS=Not Specified
; cf. = comparable from
- Samples were preserved with Lugols Iodine solution.
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- Under microscopic observation, debris present in sample #01 and #03
- Under microscopic observation, 'No Algae' detected in sample #04
- MW006 is ALS's internal code and is equivalent to AS4276.7.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	US01	MS01	DS01	RC	----
				Client sampling date / time	18-Jan-2019 08:20	18-Jan-2019 09:15	18-Jan-2019 09:55	15-Jan-2019 13:21	----
Compound	CAS Number	LOR	Unit		ES1901722-001	ES1901722-002	ES1901722-003	ES1901722-004	--------
					Result	Result	Result	Result	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		**5**	**14**	<5	<5	----
ED093F: SAR and Hardness Calculations									
Total Hardness as CaCO3	----	1	mg/L		**106**	**113**	**110**	**17**	----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		**0.002**	----	**0.001**	<0.001	----
Chromium	7440-47-3	0.001	mg/L		**0.001**	----	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L		**0.002**	----	<0.001	**0.001**	----
Lead	7439-92-1	0.001	mg/L		<0.001	----	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L		**0.006**	----	<0.005	**0.007**	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	----	<0.0001	<0.0001	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.09**	**0.12**	**0.03**	**0.02**	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	**0.01**	**0.30**	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	**0.01**	**0.30**	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.2**	**1.2**	**0.9**	<0.1	----
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser									
Filtered Total Phosphorus as P	----	0.01	mg/L		**0.08**	**0.21**	**0.03**	**0.01**	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.08**	**0.24**	**0.13**	**0.01**	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.02**	**0.01**	**0.03**	<0.01	----
EP020: Oil and Grease (O&G)									
Oil & Grease	----	5	mg/L		**8**	----	<5	----	----
EP035G: Total Phenol by Discrete Analyser									
Phenols (Total)	----	0.05	mg/L		<0.05	<0.05	<0.05	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	----	<0.5	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	US01	MS01	DS01	RC	----
				Client sampling date / time	18-Jan-2019 08:20	18-Jan-2019 09:15	18-Jan-2019 09:55	15-Jan-2019 13:21	----
Compound	CAS Number	LOR	Unit		ES1901722-001	ES1901722-002	ES1901722-003	ES1901722-004	--------
					Result	Result	Result	Result	----
EP068A: Organochlorine Pesticides (OC) - Continued									
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	----	<0.5	----	----
beta-BHC	319-85-7	0.5	µg/L		<0.5	----	<0.5	----	----
gamma-BHC	58-89-9	0.5	µg/L		<0.5	----	<0.5	----	----
delta-BHC	319-86-8	0.5	µg/L		<0.5	----	<0.5	----	----
Heptachlor	76-44-8	0.5	µg/L		<0.5	----	<0.5	----	----
Aldrin	309-00-2	0.5	µg/L		<0.5	----	<0.5	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	----	<0.5	----	----
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	----	<0.5	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	----	<0.5	----	----
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	----	<0.5	----	----
Dieldrin	60-57-1	0.5	µg/L		<0.5	----	<0.5	----	----
4.4`-DDE	72-55-9	0.5	µg/L		<0.5	----	<0.5	----	----
Endrin	72-20-8	0.5	µg/L		<0.5	----	<0.5	----	----
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	----	<0.5	----	----
4.4`-DDD	72-54-8	0.5	µg/L		<0.5	----	<0.5	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	----	<0.5	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	----	<0.5	----	----
4.4`-DDT	50-29-3	2.0	µg/L		<2.0	----	<2.0	----	----
Endrin ketone	53494-70-5	0.5	µg/L		<0.5	----	<0.5	----	----
Methoxychlor	72-43-5	2.0	µg/L		<2.0	----	<2.0	----	----
^ Total Chlordane (sum)	----	0.5	µg/L		<0.5	----	<0.5	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L		<0.5	----	<0.5	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L		<0.5	----	<0.5	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.5	µg/L		<0.5	----	<0.5	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L		<0.5	----	<0.5	----	----
Monocrotophos	6923-22-4	2.0	µg/L		<2.0	----	<2.0	----	----
Dimethoate	60-51-5	0.5	µg/L		<0.5	----	<0.5	----	----
Diazinon	333-41-5	0.5	µg/L		<0.5	----	<0.5	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L		<0.5	----	<0.5	----	----
Parathion-methyl	298-00-0	2.0	µg/L		<2.0	----	<2.0	----	----
Malathion	121-75-5	0.5	µg/L		<0.5	----	<0.5	----	----
Fenthion	55-38-9	0.5	µg/L		<0.5	----	<0.5	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L		<0.5	----	<0.5	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	US01	MS01	DS01	RC	----
				Client sampling date / time	18-Jan-2019 08:20	18-Jan-2019 09:15	18-Jan-2019 09:55	15-Jan-2019 13:21	----
Compound	CAS Number	LOR	Unit		ES1901722-001	ES1901722-002	ES1901722-003	ES1901722-004	--------
					Result	Result	Result	Result	----
EP068B: Organophosphorus Pesticides (OP) - Continued									
Parathion	56-38-2	2.0	µg/L		<2.0	----	<2.0	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L		<0.5	----	<0.5	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L		<0.5	----	<0.5	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L		<0.5	----	<0.5	----	----
Fenamiphos	22224-92-6	0.5	µg/L		<0.5	----	<0.5	----	----
Prothiofos	34643-46-4	0.5	µg/L		<0.5	----	<0.5	----	----
Ethion	563-12-2	0.5	µg/L		<0.5	----	<0.5	----	----
Carbophenothion	786-19-6	0.5	µg/L		<0.5	----	<0.5	----	----
Azinphos Methyl	86-50-0	0.5	µg/L		<0.5	----	<0.5	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		<1.0	----	<1.0	----	----
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	----	<1.0	----	----
Acenaphthene	83-32-9	1.0	µg/L		<1.0	----	<1.0	----	----
Fluorene	86-73-7	1.0	µg/L		<1.0	----	<1.0	----	----
Phenanthrene	85-01-8	1.0	µg/L		<1.0	----	<1.0	----	----
Anthracene	120-12-7	1.0	µg/L		<1.0	----	<1.0	----	----
Fluoranthene	206-44-0	1.0	µg/L		<1.0	----	<1.0	----	----
Pyrene	129-00-0	1.0	µg/L		<1.0	----	<1.0	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	----	<1.0	----	----
Chrysene	218-01-9	1.0	µg/L		<1.0	----	<1.0	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	----	<1.0	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	----	<1.0	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	----	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	----	<1.0	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	----	<1.0	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	----	<1.0	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		<0.5	----	<0.5	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	----	<0.5	----	----
MW006: Faecal Coliforms & E.coli by MF									
Faecal Coliforms	----	1	CFU/100mL		**160**	**140**	**~400**	<1	----
MW024: Bacillariophytes (Diatoms) - Pennales									
Navicula spp.	----	5	cells/ml		**25**	----	**125**	----	----
Nitzschia spp.	----	5	cells/ml		**25**	----	**75**	----	----
Pinnularia spp.	----	5	cells/ml		----	----	**25**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	US01	MS01	DS01	RC	----
				Client sampling date / time	18-Jan-2019 08:20	18-Jan-2019 09:15	18-Jan-2019 09:55	15-Jan-2019 13:21	----
Compound	CAS Number	LOR	Unit		ES1901722-001	ES1901722-002	ES1901722-003	ES1901722-004	--------
					Result	Result	Result	Result	----
MW024: Bacillariophytes (Diatoms) - Pennales - Continued									
Synedra spp.	----	5	cells/ml		5	----	----	----	----
MW024: Bacillariophytes (Diatoms) - TOTAL BACILLARIOPHYTES									
Total Bacillariophytes	----	5	cells/ml		55	----	225	----	----
MW024: Chlorophytes (Green Algae)									
Chlamydomonas spp.	----	5	cells/ml		----	----	375	----	----
Kirchneriella spp.	----	5	cells/ml		25	----	----	----	----
Monoraphidium spp.	----	5	cells/ml		----	----	25	----	----
Scenedesmus spp.	----	5	cells/ml		1170	----	----	----	----
MW024: Chlorophytes (Green Algae) - TOTAL CHLOROPHYTES									
Total Chlorophytes	----	5	cells/ml		1200	----	400	----	----
MW024: Cyanophytes (Blue Green Algae)									
Pseudanabaena spp.	----	5	cells/ml		475	----	325	----	----
Romeria spp.	----	5	cells/ml		350	----	2790	----	----
Aphanocapsa spp. < 2µm	----	5	cells/ml		300	----	950	----	----
MW024: Cyanophytes (Blue Green Algae) - TOTAL CYANOPHYTES									
Total Cyanophytes	----	5	cells/ml		1120	----	4060	<5	----
MW024: Cyanophytes (Blue Green Algae) - TOTAL POTENTIALLY TOXIC CYANOPHYTES									
Total Potentially Toxic Cyanophytes	----	5	cells/ml		<5	----	<5	<5	----
MW024: Flagellates - Cryptophytes									
Cryptomonas spp.	----	5	cells/ml		125	----	75	----	----
MW024: Flagellates - Euglenophytes									
Euglena spp.	----	5	cells/ml		25	----	175	----	----
Trachelomonas spp.	----	5	cells/ml		25	----	75	----	----
MW024: Flagellates - Pyrrophytes									
Peridinium spp.	----	5	cells/ml		25	----	----	----	----
MW024: Flagellates - TOTAL FLAGELLATES									
Total Flagellates	----	5	cells/ml		200	----	325	----	----
MW024T: TOTAL ALGAE									
Total Algae Count	----	5	cells/ml		2580	----	5020	<5	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%		93.6	----	100	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%		82.9	----	89.1	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	US01	MS01	DS01	RC	----
				Client sampling date / time	18-Jan-2019 08:20	18-Jan-2019 09:15	18-Jan-2019 09:55	15-Jan-2019 13:21	----
Compound	CAS Number	LOR	Unit		ES1901722-001	ES1901722-002	ES1901722-003	ES1901722-004	--------
					Result	Result	Result	Result	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		**22.2**	----	**25.6**	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		**52.5**	----	**56.8**	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%		**53.6**	----	**68.5**	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		**87.4**	----	**96.2**	----	----
Anthracene-d10	1719-06-8	1.0	%		**100**	----	**90.5**	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		**91.3**	----	**96.6**	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	67	111
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	67	111
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2.4.6-Tribromophenol	118-79-6	17	125
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1831929**	Page	: 1 of 10
Client	: **ECO LOGICAL AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR IAN DIXON	Contact	: Customer Services ES
Address	: PO BOX 12 SUTHERLAND NSW 1499	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 8081 2683	Telephone	: +61-2-8784 8555
Project	: Mephemson St Warriewood	Date Samples Received	: 26-Oct-2018 18:12
Order number	:	Date Analysis Commenced	: 26-Oct-2018
C-O-C number	: ----	Issue Date	: 31-Oct-2018 17:45
Sampler	: Claire Wheeler Rizwana Rnmmsia		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 5		
No. of samples analysed	: 5		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sarah Griffiths	Microbiologist	Sydney Microbiology, Smithfield, NSW
Sunitha Kannampilli	Phycologist	Sydney Phycology, Smithfield, NSW

General Comments

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

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

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

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

- Results apply to sample(s) as submitted.
- MF = membrane filtration
- CFU = colony forming unit
- Microbiological Comment: Membrane filtration results are reported as estimate (~) due to the presence of many non-target organism colonies that may have inhibited the growth of the target organisms on the filter membrane. It may be informative to record this fact.
- KEY: PTP=Potential Toxin Producers
; ND=Not Detected; NS=Not Specified
; cf. = comparable from
- Samples were preserved with Lugols Iodine solution.
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- Under microscopic observation, debris present in sample #02
- MW006 is ALS's internal code and is equivalent to AS4276.7.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	US01	DS01	----	----	----
			Client sampling date / time	26-Oct-2018 00:00	26-Oct-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1831929-004	ES1831929-005	--------	--------	--------
				Result	Result	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**74.6**	**38.8**	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	**15**	**5**	----	----	----
Chromium	7440-47-3	2	mg/kg	**38**	**9**	----	----	----
Copper	7440-50-8	5	mg/kg	**62**	**18**	----	----	----
Lead	7439-92-1	5	mg/kg	**93**	**15**	----	----	----
Silver	7440-22-4	2	mg/kg	<2	<2	----	----	----
Zinc	7440-66-6	5	mg/kg	**451**	**88**	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	**0.1**	<0.1	----	----	----
EP035G: Total Phenol by Discrete Analyser								
Phenols (Total)	----	1	mg/kg	<1	<1	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	----	----	----
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	----	----	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	----	----	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	----	----	----
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	----	----	----
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	----	----	----
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	----	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	----	----	----
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	US01	DS01	----	----	----
				Client sampling date / time	26-Oct-2018 00:00	26-Oct-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1831929-004	ES1831929-005	--------	--------	--------
					Result	Result	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued									
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	<0.05	----	----	----
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	<0.2	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		<0.05	<0.05	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg		<0.05	<0.05	----	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		<0.05	<0.05	----	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg		<0.05	<0.05	----	----	----
Monocrotophos	6923-22-4	0.2	mg/kg		<0.2	<0.2	----	----	----
Dimethoate	60-51-5	0.05	mg/kg		<0.05	<0.05	----	----	----
Diazinon	333-41-5	0.05	mg/kg		<0.05	<0.05	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		<0.05	<0.05	----	----	----
Parathion-methyl	298-00-0	0.2	mg/kg		<0.2	<0.2	----	----	----
Malathion	121-75-5	0.05	mg/kg		<0.05	<0.05	----	----	----
Fenthion	55-38-9	0.05	mg/kg		<0.05	<0.05	----	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg		<0.05	<0.05	----	----	----
Parathion	56-38-2	0.2	mg/kg		<0.2	<0.2	----	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		<0.05	<0.05	----	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg		<0.05	<0.05	----	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg		<0.05	<0.05	----	----	----
Fenamiphos	22224-92-6	0.05	mg/kg		<0.05	<0.05	----	----	----
Prothiofos	34643-46-4	0.05	mg/kg		<0.05	<0.05	----	----	----
Ethion	563-12-2	0.05	mg/kg		<0.05	<0.05	----	----	----
Carbophenothion	786-19-6	0.05	mg/kg		<0.05	<0.05	----	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg		<0.05	<0.05	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.8	<0.5	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.8	<0.5	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.8	<0.5	----	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.8	<0.5	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.8	<0.5	----	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.8	<0.5	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.8	<0.5	----	----	----
Pyrene	129-00-0	0.5	mg/kg		<0.8	<0.5	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.8	<0.5	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	US01	DS01	----	----	----
			Client sampling date / time	26-Oct-2018 00:00	26-Oct-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1831929-004	ES1831929-005	--------	--------	--------
				Result	Result	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Chrysene	218-01-9	0.5	mg/kg	<0.8	<0.5	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.8	<0.5	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.8	<0.5	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.8	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.8	<0.5	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.8	<0.5	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.8	<0.5	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	**0.6**	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	**1.2**	----	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	**95.1**	**94.4**	----	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	**85.3**	**79.7**	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**92.0**	**89.5**	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	**94.4**	**96.0**	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	**66.1**	**67.4**	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**96.6**	**97.9**	----	----	----
Anthracene-d10	1719-06-8	0.5	%	**104**	**103**	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	**98.0**	**99.8**	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	US01	DS01	MS01	----	----
				Client sampling date / time	26-Oct-2018 12:30	26-Oct-2018 12:30	26-Oct-2018 12:15	----	----
Compound	CAS Number	LOR	Unit		ES1831929-001	ES1831929-002	ES1831929-003	--------	--------
					Result	Result	Result	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		<5	12	<5	----	----
ED093F: SAR and Hardness Calculations									
Total Hardness as CaCO3	----	1	mg/L		96	110	110	----	----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	0.002	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L		0.002	0.002	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	----	----	----
Silver	7440-22-4	0.001	mg/L		<0.001	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L		0.016	0.018	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		0.04	0.06	0.05	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		0.01	0.03	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		0.06	0.14	0.04	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		0.07	0.17	0.04	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.3	0.4	0.4	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.03	0.06	0.04	----	----
EP020: Oil and Grease (O&G)									
Oil & Grease	----	5	mg/L		<5	<5	----	----	----
EP035G: Total Phenol by Discrete Analyser									
Phenols (Total)	----	0.05	mg/L		<0.05	<0.05	<0.05	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	<0.5	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	<0.5	----	----	----
beta-BHC	319-85-7	0.5	µg/L		<0.5	<0.5	----	----	----
gamma-BHC	58-89-9	0.5	µg/L		<0.5	<0.5	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	US01	DS01	MS01	----	----
				Client sampling date / time	26-Oct-2018 12:30	26-Oct-2018 12:30	26-Oct-2018 12:15	----	----
Compound	CAS Number	LOR	Unit		ES1831929-001	ES1831929-002	ES1831929-003	--------	--------
					Result	Result	Result	----	----
EP068A: Organochlorine Pesticides (OC) - Continued									
delta-BHC	319-86-8	0.5	µg/L		<0.5	<0.5	----	----	----
Heptachlor	76-44-8	0.5	µg/L		<0.5	<0.5	----	----	----
Aldrin	309-00-2	0.5	µg/L		<0.5	<0.5	----	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	<0.5	----	----	----
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	<0.5	----	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	<0.5	----	----	----
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	<0.5	----	----	----
Dieldrin	60-57-1	0.5	µg/L		<0.5	<0.5	----	----	----
4.4`-DDE	72-55-9	0.5	µg/L		<0.5	<0.5	----	----	----
Endrin	72-20-8	0.5	µg/L		<0.5	<0.5	----	----	----
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	<0.5	----	----	----
4.4`-DDD	72-54-8	0.5	µg/L		<0.5	<0.5	----	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	<0.5	----	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	<0.5	----	----	----
4.4`-DDT	50-29-3	2.0	µg/L		<2.0	<2.0	----	----	----
Endrin ketone	53494-70-5	0.5	µg/L		<0.5	<0.5	----	----	----
Methoxychlor	72-43-5	2.0	µg/L		<2.0	<2.0	----	----	----
^ Total Chlordane (sum)	----	0.5	µg/L		<0.5	<0.5	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L		<0.5	<0.5	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L		<0.5	<0.5	----	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.5	µg/L		<0.5	<0.5	----	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L		<0.5	<0.5	----	----	----
Monocrotophos	6923-22-4	2.0	µg/L		<2.0	<2.0	----	----	----
Dimethoate	60-51-5	0.5	µg/L		<0.5	<0.5	----	----	----
Diazinon	333-41-5	0.5	µg/L		<0.5	<0.5	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L		<0.5	<0.5	----	----	----
Parathion-methyl	298-00-0	2.0	µg/L		<2.0	<2.0	----	----	----
Malathion	121-75-5	0.5	µg/L		<0.5	<0.5	----	----	----
Fenthion	55-38-9	0.5	µg/L		<0.5	<0.5	----	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L		<0.5	<0.5	----	----	----
Parathion	56-38-2	2.0	µg/L		<2.0	<2.0	----	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L		<0.5	<0.5	----	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L		<0.5	<0.5	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	US01	DS01	MS01	----	----
			Client sampling date / time	26-Oct-2018 12:30	26-Oct-2018 12:30	26-Oct-2018 12:15	----	----
Compound	CAS Number	LOR	Unit	ES1831929-001	ES1831929-002	ES1831929-003	--------	--------
				Result	Result	Result	----	----
EP068B: Organophosphorus Pesticides (OP) - Continued								
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	----	----	----
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	----	----	----
Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	----	----	----
Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	----	----	----
Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	----	----	----
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	----	----	----
MW006: Faecal Coliforms & E.coli by MF								
Faecal Coliforms	----	1	CFU/100mL	~56	160	110	----	----
MW024: Bacillariophytes (Diatoms) - Pennales								
Nitzschia spp.	----	5	cells/ml	25	5	----	----	----
Synedra spp.	----	5	cells/ml	----	5	----	----	----
MW024: Bacillariophytes (Diatoms) - TOTAL BACILLARIOPHYTES								
Total Bacillariophytes	----	5	cells/ml	25	10	----	----	----
MW024: Chlorophytes (Green Algae)								
Scenedesmus spp.	----	5	cells/ml	25	150	----	----	----
MW024: Chlorophytes (Green Algae) - TOTAL CHLOROPHYTES								
Total Chlorophytes	----	5	cells/ml	25	150	----	----	----
MW024: Cyanophytes (Blue Green Algae)								
Planktolyngbya limnetica	----	5	cells/ml	220	----	----	----	----
Pseudanabaena spp.	----	5	cells/ml	----	925	----	----	----
MW024: Cyanophytes (Blue Green Algae) - TOTAL CYANOPHYTES								
Total Cyanophytes	----	5	cells/ml	220	925	----	----	----
MW024: Cyanophytes (Blue Green Algae) - TOTAL POTENTIALLY TOXIC CYANOPHYTES								
Total Potentially Toxic Cyanophytes	----	5	cells/ml	<5	<5	----	----	----
MW024: Flagellates - Cryptophytes								
Cryptomonas spp.	----	5	cells/ml	50	25	----	----	----
MW024: Flagellates - Euglenophytes								
Euglena spp.	----	5	cells/ml	----	25	----	----	----
MW024: Flagellates - TOTAL FLAGELLATES								
Total Flagellates	----	5	cells/ml	50	50	----	----	----
MW024T: TOTAL ALGAE								
Total Algae Count	----	5	cells/ml	320	1140	----	----	----
EP068S: Organochlorine Pesticide Surrogate								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	US01	DS01	MS01	----	----
				Client sampling date / time	26-Oct-2018 12:30	26-Oct-2018 12:30	26-Oct-2018 12:15	----	----
Compound	CAS Number	LOR	Unit		ES1831929-001	ES1831929-002	ES1831929-003	--------	--------
					Result	Result	Result	----	----
EP068S: Organochlorine Pesticide Surrogate - Continued									
Dibromo-DDE	21655-73-2	0.5	%		**88.6**	**90.0**	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%		**78.7**	**87.0**	----	----	----

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	67	111
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	67	111

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1828653**	Page	: 1 of 3
Client	: **ECO LOGICAL AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: CLAIRE WHEELER	Contact	: Customer Services ES
Address	: PO BOX 12 SUTHERLAND NSW 1499	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: Warriewood	Date Samples Received	: 27-Sep-2018 13:30
Order number	:	Date Analysis Commenced	: 27-Sep-2018
C-O-C number	: ----	Issue Date	: 02-Oct-2018 17:58
Sampler	: CLAIRE WHEELER, DO		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 3		
No. of samples analysed	: 3		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Sarah Griffiths	Microbiologist	Sydney Microbiology, Smithfield, NSW

General Comments

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

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

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

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

- MF = membrane filtration
- CFU = colony forming unit
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- MW006 is ALS's internal code and is equivalent to AS4276.7.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	US01	MS01	DS01	----	----
				Client sampling date / time	27-Sep-2018 09:40	27-Sep-2018 10:40	27-Sep-2018 11:20	----	----
Compound	CAS Number	LOR	Unit		ES1828653-001	ES1828653-002	ES1828653-003	--------	--------
					Result	Result	Result	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		<5	<5	<5	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.06**	**0.04**	**0.04**	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.01**	**0.01**	**0.02**	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.31**	**0.29**	**0.32**	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.32**	**0.30**	**0.34**	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.3**	**0.3**	**0.3**	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.6**	**0.6**	**0.6**	----	----
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser									
Filtered Total Phosphorus as P	----	0.01	mg/L		**0.03**	**0.03**	**0.03**	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.04**	**0.04**	**0.04**	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
MW006: Faecal Coliforms & E.coli by MF									
Faecal Coliforms	----	1	CFU/100mL		**430**	**390**	**290**	----	----

Appendix C: Quality Control Report

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1901722**	Page	: 1 of 7
Client	: **ECO LOGICAL AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR Ian Dixon	Contact	: Customer Services ES
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Project	: 11527 Macpherson St, Warrie Wood	Date Samples Received	: 18-Jan-2019
Order number	:	Date Analysis Commenced	: 19-Jan-2019
C-O-C number	: ----	Issue Date	: 25-Jan-2019
Sampler	: Claire Wheeler/Rizwaua Kumman		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Sarah Griffiths	Microbiologist	Sydney Microbiology, Smithfield, NSW
Sunitha Kannampilli	Phycologist	Sydney Phycology, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW

General Comments

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2147875)									
ES1901546-010	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	9	28	105	No Limit
ES1901704-005	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	10	8	17.1	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2150327)									
ES1901611-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
ES1901720-005	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 2146607)									
ES1901664-009	Anonymous	EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.005	0.004	25.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.022	0.022	0.00	0% - 20%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.031	0.045	37.4	No Limit
ES1901665-001	Anonymous	EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.006	0.008	38.6	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.028	0.031	8.40	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2146304)									
ES1901715-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1901737-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2147440)									
ES1901609-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	56.0	52.0	7.41	0% - 20%
EW1900231-004	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.12	0.13	9.23	0% - 50%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2144998)									
ES1901709-011	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2144998) - continued									
ES1901709-020	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.13	0.13	0.00	0% - 50%
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2147441)									
ES1901665-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	15.3	15.2	0.322	0% - 20%
ES1901609-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.95	0.95	0.00	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2147444)									
ES1901609-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	65.2	63.6	2.48	0% - 20%
ES1901665-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	35.8	34.6	3.41	0% - 50%
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser (QC Lot: 2147447)									
ES1901722-001	US01	EK067FG: Filtered Total Phosphorus as P	----	0.01	mg/L	0.08	0.08	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2147443)									
ES1901609-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	9.96	9.84	1.16	0% - 20%
ES1901665-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	43.0	40.4	6.24	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2147445)									
WN1900406-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.01	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2145001)									
ES1901722-001	US01	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.02	0.02	0.00	No Limit
EP035G: Total Phenol by Discrete Analyser (QC Lot: 2150824)									
ES1901639-001	Anonymous	EP035G: Phenols (Total)	----	0.05	mg/L	<0.05	<0.05	0.00	No Limit

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

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

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2147875)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	116	83	129
				<5	1000 mg/L	94.9	82	110
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2150327)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	92.7	83	129
				<5	1000 mg/L	88.8	82	110
EG020T: Total Metals by ICP-MS (QCLot: 2146607)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	102	82	114
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	92.2	86	116
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	103	83	118
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	101	85	115
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	111	79	117
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2146304)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	99.0	77	111
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2147440)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	97.4	90	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2144998)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	105	82	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2147441)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	101	91	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2147444)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	88.4	69	101
				<0.1	1 mg/L	76.7	70	118
				<0.1	5 mg/L	102	74	118
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser (QCLot: 2147447)								
EK067FG: Filtered Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	98.5	71	115
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2147443)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	99.1	71	101
				<0.01	0.442 mg/L	98.9	72	108
				<0.01	1 mg/L	116	78	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2147445)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	97.9	71	101
				<0.01	0.442 mg/L	97.6	72	108
				<0.01	1 mg/L	101	78	118

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2145001)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	106	85	117
EP020: Oil and Grease (O&G) (QCLot: 2149937)								
EP020: Oil & Grease	----	5	mg/L	<5	5000 mg/L	102	81	121
EP035G: Total Phenol by Discrete Analyser (QCLot: 2150824)								
EP035G: Phenols (Total)	----	0.05	mg/L	<0.05	0.5 mg/L	90.6	64	98
EP068A: Organochlorine Pesticides (OC) (QCLot: 2145594)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	84.2	65	107
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	77.8	58	111
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	104	69	117
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	85.0	70	112
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	100	69	110
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	95.6	65	108
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	84.9	66	109
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	82.4	67	107
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	85.3	64	110
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	82.9	67	112
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	86.7	63	111
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	89.9	65	113
EP068: 4.4`-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	93.3	66	112
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	102	65	113
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	100	67	114
EP068: 4.4`-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	94.3	72	122
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	91.4	67	109
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	95.1	65	112
EP068: 4.4`-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	97.4	65	112
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	103	64	110
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	99.8	61	114
EP068B: Organophosphorus Pesticides (OP) (QCLot: 2145594)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	85.8	66	114
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	92.8	64	113
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	26.1	20	48
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	84.4	70	110
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	86.7	71	110
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	82.1	77	119
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	91.7	70	124
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	102	68	116
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	93.3	69	112
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	87.4	75	119

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP068B: Organophosphorus Pesticides (OP) (QCLot: 2145594) - continued								
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	100	67	121
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	97.0	69	121
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	106	72	110
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	96.0	68	112
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	108	64	116
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	92.1	68	114
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	98.9	74	120
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	93.6	66	114
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	92.7	52	128
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2145595)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	68.8	50	94
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	95.4	64	114
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	85.0	62	113
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	89.7	64	115
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	93.5	63	116
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	81.4	64	116
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	86.0	64	118
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	94.3	63	118
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	91.4	64	117
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	95.7	63	116
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	95.3	62	119
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	86.4	63	115
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	86.1	63	117
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	84.3	60	118
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	89.4	61	117
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	83.8	59	118

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020T: Total Metals by ICP-MS (QCLot: 2146607)							
ES1901664-010	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	97.8	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	101	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	101	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 2146607) - continued							
ES1901664-010	Anonymous	EG020A-T: Lead	7439-92-1	1 mg/L	106	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	103	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2146304)							
ES1901722-001	US01	EG035T: Mercury	7439-97-6	0.01 mg/L	104	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2147440)							
ES1901609-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	# Not Determined	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2144998)							
ES1901709-011	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	98.6	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2147441)							
ES1901609-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	110	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2147444)							
ES1901650-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	92.8	70	130
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser (QCLot: 2147447)							
ES1901722-002	MS01	EK067FG: Filtered Total Phosphorus as P	----	1 mg/L	110	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2147443)							
ES1901650-001	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	# Not Determined	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2147445)							
WN1900406-002	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	102	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2145001)							
ES1901722-001	US01	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	100	70	130
EP035G: Total Phenol by Discrete Analyser (QCLot: 2150824)							
ES1901639-001	Anonymous	EP035G: Phenols (Total)	----	0.42 mg/L	82.4	70	130

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1831929**	Page	: 1 of 11
Client	: **ECO LOGICAL AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR IAN DIXON	Contact	: Customer Services ES
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Project	: Mephemson St Warriewood	Date Samples Received	: 26-Oct-2018
Order number	:	Date Analysis Commenced	: 26-Oct-2018
C-O-C number	: ----	Issue Date	: 31-Oct-2018
Sampler	: Claire Wheeler Rizwana Rnmmsia		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 5		
No. of samples analysed	: 5		

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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sarah Griffiths	Microbiologist	Sydney Microbiology, Smithfield, NSW
Sunitha Kannampilli	Phycologist	Sydney Phycology, Smithfield, NSW

General Comments

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2006728)									
ES1831929-004	US01	EA055: Moisture Content	----	0.1	%	74.6	74.1	0.620	0% - 20%
ES1832000-003	Anonymous	EA055: Moisture Content	----	0.1	%	16.9	16.8	0.768	0% - 50%
EG005T: Total Metals by ICP-AES (QC Lot: 2009433)									
ES1831568-008	Anonymous	EG005T: Chromium	7440-47-3	2	mg/kg	28	26	5.61	0% - 50%
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	11	14	20.2	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	8	8	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	20	19	0.00	No Limit
ES1832100-001	Anonymous	EG005T: Chromium	7440-47-3	2	mg/kg	9	8	0.00	No Limit
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	7	8	15.4	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	19	20	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	12	17	31.7	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2009432)									
ES1831568-008	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1832100-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP035G: Total Phenol by Discrete Analyser (QC Lot: 2009037)									
ES1831812-001	Anonymous	EP035G: Phenols (Total)	----	1	mg/kg	<1	<1	0.00	No Limit
ES1831812-010	Anonymous	EP035G: Phenols (Total)	----	1	mg/kg	<1	<1	0.00	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 2005502)									
ES1831919-001	Anonymous	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP068A: Organochlorine Pesticides (OC) (QC Lot: 2005502) - continued									
ES1831919-001	Anonymous	EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 2005502)									
ES1831919-001	Anonymous	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2005501)									

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2005501) - continued									
ES1831954-006	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	0.5	0.6	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	2.0	2.2	9.92	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	2.3	2.2	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	1.1	1.0	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	1.2	1.0	12.4	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	1.3	1.2	9.96	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	0.6	0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	1.2	1.1	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	0.6	0.6	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	0.9	0.7	15.2	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	11.7	11.1	5.26	0% - 20%
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	1.6	1.4	8.85	No Limit
ES1831919-001	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	0.5	0.6	16.8	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	0.6	0.6	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	0.5	0.6	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	1.6	1.8	11.8	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2008199)									
ES1831677-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	50	49	0.00	0% - 50%
ES1831929-001	US01	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 2005698)									
EW1804281-002	Anonymous	EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.070	0.072	2.48	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.031	0.030	3.60	0% - 20%
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.136	0.142	3.89	0% - 20%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.035	0.036	0.00	0% - 20%
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.095	0.099	3.99	0% - 50%
ES1831929-001	US01	EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.002	0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.016	0.015	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 2005699)									
ES1831929-001	US01	EG020B-T: Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2007262)									
ES1831915-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1831918-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2005277)									
ES1831822-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.21	0.20	4.90	0% - 20%
ES1831838-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.03	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2005073)									
ES1831876-010	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	960	980	2.06	0% - 20%
ES1831830-005	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2005278)									
ME1801391-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1831838-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.01	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2005270)									
EW1804325-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.6	0.6	0.00	No Limit
EW1804280-005	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	2.8	2.8	0.00	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2005268)									
ES1831697-002	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.22	0.20	9.10	0% - 20%
ES1831822-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.02	0.01	0.00	No Limit
EP035G: Total Phenol by Discrete Analyser (QC Lot: 2006632)									
EB1825801-001	Anonymous	EP035G: Phenols (Total)	----	0.05	mg/L	<0.05	<0.05	0.00	No Limit

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 2009433)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	100	86	126
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	105	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	106	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	104	80	114
EG005T: Silver	7440-22-4	2	mg/kg	<2	2.1 mg/kg	114	77	117
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	108	80	122
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2009432)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	83.7	70	105
EP035G: Total Phenol by Discrete Analyser (QCLot: 2009037)								
EP035G: Phenols (Total)	----	1	mg/kg	<1	5 mg/kg	71.1	60	102
EP068A: Organochlorine Pesticides (OC) (QCLot: 2005502)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	99.3	69	113
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	93.3	65	117
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	92.3	67	119
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	97.9	68	116
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	102	65	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	94.0	67	115
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	86.4	69	115
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	90.7	62	118
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	89.4	63	117
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	90.7	66	116
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	91.4	64	116
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	94.8	66	116
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	97.8	67	115
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	90.0	67	123
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	95.9	69	115
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	97.3	69	121
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	106	56	120
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	100	62	124
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	99.6	66	120
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	101	64	122
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	81.9	54	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 2005502)								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	101	59	119

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP068B: Organophosphorus Pesticides (OP) (QCLot: 2005502) - continued								
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	93.8	62	128
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	77.8	54	126
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	93.6	67	119
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	82.2	70	120
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	89.3	72	120
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	84.0	68	120
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	89.9	68	122
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	88.5	69	117
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	90.2	76	118
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	83.8	64	122
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	103	70	116
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	80.1	69	121
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	86.3	66	118
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	107	68	124
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	90.9	62	112
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	93.3	68	120
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	90.7	65	127
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	105	41	123
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2005501)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	98.2	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	96.3	72	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	92.8	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	98.2	72	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	97.8	75	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	99.2	77	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	101	73	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	96.7	74	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	91.4	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	92.5	75	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	96.1	68	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	97.6	74	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	91.6	70	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	85.5	61	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	86.4	62	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	89.0	63	121

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2008199)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	94.3	83	129
				<5	1000 mg/L	93.4	82	110
EG020T: Total Metals by ICP-MS (QCLot: 2005698)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	106	82	114
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	99.6	86	116
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	102	83	118
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	97.2	85	115
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	99.6	79	117
EG020T: Total Metals by ICP-MS (QCLot: 2005699)								
EG020B-T: Silver	7440-22-4	0.001	mg/L	<0.001	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2007262)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	92.2	77	111
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2005277)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	98.4	90	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2005073)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	109	82	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2005278)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	101	91	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2005270)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	97.6	69	101
				<0.1	1 mg/L	110	70	118
				<0.1	5 mg/L	104	74	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2005268)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	97.1	71	101
				<0.01	0.442 mg/L	100	72	108
				<0.01	1 mg/L	103	78	118
EP020: Oil and Grease (O&G) (QCLot: 2006959)								
EP020: Oil & Grease	----	5	mg/L	<5	5000 mg/L	96.4	81	121
EP035G: Total Phenol by Discrete Analyser (QCLot: 2006632)								
EP035G: Phenols (Total)	----	0.05	mg/L	<0.05	0.5 mg/L	82.0	64	98
EP068A: Organochlorine Pesticides (OC) (QCLot: 2005939)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	91.1	65	107
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	84.7	58	111
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	97.2	69	117
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	101	70	112
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	106	69	110
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	95.7	65	108

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 2005939) - continued								
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	93.4	66	109
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	103	67	107
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	103	64	110
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	102	67	112
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	101	63	111
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	106	65	113
EP068: 4.4`-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	97.0	66	112
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	101	65	113
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	105	67	114
EP068: 4.4`-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	108	72	122
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	95.3	67	109
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	108	65	112
EP068: 4.4`-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	99.6	65	112
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	91.3	64	110
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	83.8	61	114
EP068B: Organophosphorus Pesticides (OP) (QCLot: 2005939)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	94.1	66	114
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	91.0	64	113
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	24.1	20	48
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	86.5	70	110
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	99.3	71	110
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	95.9	77	119
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	81.1	70	124
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	97.5	68	116
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	92.3	69	112
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	99.0	75	119
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	78.6	67	121
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	91.2	69	121
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	101	72	110
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	95.2	68	112
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	93.8	64	116
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	98.1	68	114
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	106	74	120
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	104	66	114
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	78.6	52	128

Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 2009433)							
ES1831568-008	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	101	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	99.4	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	102	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	96.6	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	98.7	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2009432)							
ES1831568-008	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	86.2	70	130
EP035G: Total Phenol by Discrete Analyser (QCLot: 2009037)							
ES1831812-001	Anonymous	EP035G: Phenols (Total)	----	4.2 mg/kg	71.9	70	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 2005502)							
ES1831919-001	Anonymous	EP068: gamma-BHC	58-89-9	0.5 mg/kg	95.3	70	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	78.2	70	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	76.9	70	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	76.7	70	130
		EP068: Endrin	72-20-8	2 mg/kg	92.2	70	130
		EP068: 4.4`-DDT	50-29-3	2 mg/kg	83.0	70	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 2005502)							
ES1831919-001	Anonymous	EP068: Diazinon	333-41-5	0.5 mg/kg	89.4	70	130
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	98.0	70	130
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	80.8	70	130
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	81.6	70	130
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	78.2	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2005501)							
ES1831919-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	93.0	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	99.1	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 2005698)							
ES1831929-001	US01	EG020A-T: Arsenic	7440-38-2	1 mg/L	106	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	106	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	105	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	109	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	106	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2007262)							
ES1831915-002	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	91.3	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2005277)							
ES1831748-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	99.4	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2005073)							
ES1831830-005	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	103	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2005278)							
ES1831835-007	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	106	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2005270)							
EW1804324-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	100	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2005268)							
ES1831697-003	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	106	70	130
EP035G: Total Phenol by Discrete Analyser (QCLot: 2006632)							
EB1825801-001	Anonymous	EP035G: Phenols (Total)	----	0.42 mg/L	72.1	70	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1828653**	Page	: 1 of 6
Client	: **ECO LOGICAL AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: CLAIRE WHEELER	Telephone	: +61-2-8784 8555
Project	: Warriewood	Date Samples Received	: 27-Sep-2018
Site	: ----	Issue Date	: 02-Oct-2018
Sampler	: CLAIRE WHEELER, DO	No. of samples received	: 3
Order number	:	No. of samples analysed	: 3

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

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

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

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

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

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
US01, MS01, DS01	**27-Sep-2018**	**----**	----	----	**28-Sep-2018**	04-Oct-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
US01, MS01, DS01	**27-Sep-2018**	**----**	----	----	**27-Sep-2018**	25-Oct-2018	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
US01, MS01, DS01	**27-Sep-2018**	**----**	----	----	**27-Sep-2018**	29-Sep-2018	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
US01, MS01, DS01	**27-Sep-2018**	**----**	----	----	**27-Sep-2018**	25-Oct-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
US01, MS01, DS01	**27-Sep-2018**	**27-Sep-2018**	25-Oct-2018	✓	**27-Sep-2018**	25-Oct-2018	✓
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067FG)							
US01, MS01, DS01	**27-Sep-2018**	**28-Sep-2018**	25-Oct-2018	✓	**28-Sep-2018**	25-Oct-2018	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
US01, MS01, DS01	**27-Sep-2018**	**27-Sep-2018**	25-Oct-2018	✓	**27-Sep-2018**	25-Oct-2018	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
US01, MS01, DS01	**27-Sep-2018**	**----**	----	----	**27-Sep-2018**	29-Sep-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
MW006: Faecal Coliforms & E.coli by MF							
Sterile Plastic Bottle - Sodium Thiosulfate (MW006)							
US01, MS01, DS01	**27-Sep-2018**	**----**	----	----	**27-Sep-2018**	28-Sep-2018	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Filtered Total Phosphorus as P By Discrete Analy	EK067FG	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	4	17	**23.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	3	22	**13.64**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	4	18	**22.22**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Filtered Total Phosphorus as P By Discrete Analy	EK067FG	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	17	**11.76**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	22	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	6	18	**33.33**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	20	**15.00**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Filtered Total Phosphorus as P By Discrete Analy	EK067FG	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	17	**11.76**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	22	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	18	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Filtered Total Phosphorus as P By Discrete Analy	EK067FG	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	17	**11.76**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	22	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	18	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Filtered Total Phosphorus as P By Discrete Analy	EK067FG	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a filtered sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Thermotolerant Coliforms & E.coli by Membrane Filtration	MW006	WATER	AS 4276.7 2007

Preparation Methods	Method	Matrix	Method Descriptions

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
TKN/TP (filtered) Digestion	EK061F/EK067F	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)

Appendix D: Chain of Custody

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com

BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5800 E: gladstone@alsglobal.com

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PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com

SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com

WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: Eco Logical Australia	TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☑ Standard TAT (List due date): 24/1/19	FOR LABORATORY USE ONLY (Circle)
OFFICE: Sydney		☐ Non Standard or urgent TAT (List due date):	Custody seal intact? YES / NO
PROJECT: 11527 Macpherson St, Warriewood	ALS QUOTE NO.:	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7	Free ice cubes present upon receipt? YES / NO
ORDER NUMBER:			Random Sample Temperature on Receipt: 3.0 °C
PROJECT MANAGER: Ian Dixon	CONTACT PH:		Other comment:
SAMPLER: Claire Wheeler/Rizwana Rahman	SAMPLER MOBILE: 0405 068 123	RELINQUISHED BY:	RECEIVED BY: ANDREW
COC emailed to ALS? (YES / NO) No	EDD FORMAT (or default):		
Email Reports to (will default to PM if no other addresses are listed): Claire.Wheeler@ecoaus.com.au		DATE/TIME:	DATE/TIME: 18/1/18 4:00 pm
Email Invoice to (will default to PM if no other addresses are listed): Claire.Wheeler@ecoaus.com.au			

RELINQUISHED BY:	RECEIVED BY:
DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS — MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	Hardness / NO2-NO3 / TSS, Reactive P, Cl, F, SO4, conductivity	Ammonia, TKN/TP, Total Phenolics	Oil & Grease	Metals (Cr, Pb, Zn, As, Hg, Cu)	Fe	Algal ID and Count	OC/OP pesticides	PAH	
1	US01	18.01.19 8:20	W		8	X	X	X	X	X	X	X		Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
2	BMS01	18.01.19 9:15	W		4	X	X			X				
3	DS01	18.01.19 9:55	W		8	X	X	X	X	X	X	X		
4	Re	18.01.19 1:21	W		3	X	X		X	X	X			
				TOTAL	23									

HT

URGENT

Environmental Division Sydney
Work Order Reference
ES1901722

Telephone : +61-2-8784 8555

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic; V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

TAT HT

ALS Environmental

CHAIN OF CUSTODY

ALS Laboratory: please tick →

CLIENT: Eco Logical Australia	TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☐ Standard TAT (List due date): due on 31/10/18	FOR LABORATORY USE ONLY (Circle)
OFFICE: Sydney		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
PROJECT: Mepherson St Warrieewood	ALS QUOTE NO.:	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER:		COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Ian Dixon CONTACT PH:		OF: 1 2 3 4 5 6 7	Other comment:

SAMPLER: Claire Wheeler Rizwana Rumman SAMPLER MOBILE: 0405 068 123	RELINQUISHED BY:	RECEIVED BY: JUSTIN	RELINQUISHED BY:
COC emailed to ALS? (YES / NO) No EDD FORMAT (or default):			
Email Reports to (will default to PM if no other addresses are listed): claire.wheeler@ecoaus.com.au	DATE/TIME:	DATE/TIME: 26/10 6.12pm	DATE/TIME:
Email Invoice to (will default to PM if no other addresses are listed): claire.wheeler@ecoaus.com.au			

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).									Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	(H.E.M) OIL & GREASE	NO_2/NO_3 TSS, Hardness	PAH OC/OP Cu, Pb, Zn, Ni, Hg, Cu phenolic comp.	Algae ID & count	TP, NH_3 TKN, phenolic compound	Fe	Cr, Pb, Zn, As, Hg, Cu OC/OP Pest			Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	US01	26/10/18 12:30	VB	250 ml glass/$NaHSO_4$	1	✓									
	US01	26/10/18 12:30	P	500 ml plastic	1		✓								
	US01	26/10/18 12:30		250 ml glass jar	1			✓							
	US01	26/10/18 12:30		200 ml plastic/ Lugol's solution	1				✓						
	US01	26/10/18 12:30	SG	60 ml plastic	1					✓					
	US01	26/10/18 12:30		250 ml plastic NaS_2O_3	1						✓				
	US01	26/10/18 12:30		60 mL/HNO_3 plastic	1								✓		
	DS01	26/10/18	VB	250 ml glass/$NaHSO_4$	1	✓									
	DS01	26/10/18 12:30	P	500 ml plastic	1		✓								
	DS01	26/10/18		250 ml glass jar	1			✓							
	DS01	26/10/18 13:15		200 ml plastic/ Lugol's solution	1				✓						
	DS01	26/10/18	SG	60 ml plastic	1					✓					
				TOTAL											

Environmental Division Sydney
Work Order Reference
ES1831929

Telephone : +61-2-8784 8555

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic; V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com

☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

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☐NEWCASTLE 5/585 Maitland Rd Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com

☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com

☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com

☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com

☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT:	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☐ Standard TAT (List due date):
OFFICE:		☐ Non Standard or urgent TAT (List due date):
PROJECT:	ALS QUOTE NO.:	COC SEQUENCE NUMBER (Circle)
ORDER NUMBER:		COC: 1 2 3 4 5 6 7
PROJECT MANAGER:	CONTACT PH:	OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt °C

Other comments:

SAMPLER:	SAMPLER MOBILE:	RELINQUISHED BY:	RECEIVED BY:
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default):		
Email Reports to (will default to PM if no other addresses are listed):		DATE/TIME:	DATE/TIME:
Email Invoice to (will default to PM if no other addresses are listed):			

RELINQUISHED BY:	RECEIVED BY:
DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	FC	Cr, Pb, Zn As Hg, Cu OC/OP Pest	TP, NH3 TKN Phenolic comp	NO2, NO3 TSS, Hardness					Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
2	DS01	26/10/18		250 ml plastic NaS2O3		✓								
	DS01	26/10/18		60 ml / HNO3 plastic			✓							
3	MS01	26.10.18 12:15		250 ml plastic NaS2O3		✓								
	MS01	26/10/18 12:15	SG					✓						
	MS01	26/10/18 12:15	P	500 ml plastic					✓					
				TOTAL										

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic

V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

2/10/18

CHAIN OF CUSTODY

ALS

ALS Laboratory: please tick →

☐ ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐ BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐ GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
☐ MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐ MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐ MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐ NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
☐ NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
☐ PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐ SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐ TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐ WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT:	Eco Logical Australia
OFFICE:	Sydney
PROJECT:	Warriewood
ORDER NUMBER:	
PROJECT MANAGER:	CLAIRE WHEELER — CONTACT PH: 0405 068 123
SAMPLER:	CW & DO — SAMPLER MOBILE: 0405068123
COC emailed to ALS? (YES / NO)	NO (circled) — EDD FORMAT (or default):
Email Reports to (will default to PM if no other addresses are listed):	claire.wheeler@ecoaus.com.au
Email Invoice to (will default to PM if no other addresses are listed):	claire.wheeler@ecoaus.com.au
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:	

TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)
☐ Standard TAT (List due date):
☑ Non Standard or urgent TAT (List due date): Urgent ~~AS~~ 2/10/18

ALS QUOTE NO.:

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
CW	Vishal		
DATE/TIME: 13:27	DATE/TIME: 27/09/18 1:30pm	DATE/TIME:	DATE/TIME:

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comment:

SAMPLE DETAILS MATRIX: SOLID (S) WATER (W) — CONTAINER INFORMATION — ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required). — Additional Information

ALS USE: LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	Faecal coliform	Nitrates Nitrites TKN, Total N	Ammonia/N Total Phosphorus Ortho phosphate	Non-filterable phosphorus	Total Suspended Solids				Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	US01	27/9/18 9.40		P 500mL	1					✓				
	US01	27/9/18 9.40		250mL $Na_2S_2O_3$	1	✓								
	US01	27/9/18 9.40		P 250mL	1		✓							
	US01	"		60mL H_2SO_4	1			✓						
	MS01	27/9/18 10.40		P 500mL	1					✓				
MS01		" 10.40		250mL $Na_2S_2O_3$	1	✓								
	MS01	27/9/18 10.40		P 250mL	1		✓							
	MS01	27/9/18 10.40		60mL H_2SO_4	1			✓						
	DS01	27/9/18 11.20		P 500mL	1					✓				
	DS01	27/9/18 11.20		250mL $Na_2S_2O_3$	1	✓								
DS01		27/9/18 11.20		P 250mL	1		✓							
DS01		27/9/18 11.20		60mL H_2SO_4	1			✓						
				TOTAL	12									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

Environmental Division
Sydney
Work Order Reference
ES1828653

Telephone : + 61-2-8784 8555

URGENT

Appendix E: Non-filterable Phosphorus Report

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

CERTIFICATE OF ANALYSIS

BATCH NUMBER: ES1901722

CLIENT: ECOAUS

ADDRESS: PO BOX 12
Sutherland NSW, AUSTRALIA
1499

CONTACT: CLAIRE WHEELER

ANALYSIS:	Non-filtered Phosphorous
ALS METHOD:	Non-filtered Phosphorous
UNITS:	mg/L

Sub-Matrix			WATER	WATER
Sample Name			US01	MS01
Sample Description				
Depth Type				
Depth in metres				
Analyte			18/01/2019 8:20	18/01/2019 9:15
	Units	LOR	ES1901722-001	ES1901722-002
Non-filtered Phosphorous	mg/L	0.01	< 0.01	0.03

Sub-Matrix			WATER	WATER
Sample Name			DS01	RC
Sample Description				
Depth Type				
Depth in metres				
Analyte			18/01/2019 9:55	15/01/2019 13:21
	Units	LOR	ES1901722-003	ES1901722-004
Non-filtered Phosphorous	mg/L	0.01	0.1	< 0.01

Wisam Marassa

30/1/2019

ALS | Environmental Division

This report is not covered by ALS' NATA accreditation

CERTIFICATE OF ANALYSIS

BATCH NUMBER: ES1828653

CLIENT: ECOAUS

ADDRESS: PO BOX 12
Sutherland NSW, AUSTRALIA
1499

CONTACT: CLAIRE WHEELER

ANALYSIS:	Non-filtered Phosphorous
ALS METHOD:	Non-filtered Phosphorous
UNITS:	mg/L

Sub-Matrix			WATER	WATER	WATER
Sample Name			US01	MS01	DS01
Sample Description					
Depth Type					
Depth in metres					
Analyte			27/09/2018 9:40	27/09/2018 10:40	27/09/2018 11:20
	Units	LOR	ES1828653-001	ES1828653-002	ES1828653-003
Non-filtered Phosphorous	mg/L	0.01	0.01	0.01	0.01

WISAM MARASSA

02/10/2018

ALS | Environmental Division

This report is not covered by ALS' NATA accreditation

Appendix F: QA/QC Compliance Assessment

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1901722**	Page	: 1 of 12
Client	: **ECO LOGICAL AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR Ian Dixon	Telephone	: +61-2-8784 8555
Project	: 11527 Macpherson St, Warrie Wood	Date Samples Received	: 18-Jan-2019
Site	: ----	Issue Date	: 25-Jan-2019
Sampler	: Claire Wheeler/Rizwaua Kumman	No. of samples received	: 4
Order number	:	No. of samples analysed	: 4

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK055G: Ammonia as N by Discrete Analyser	ES1901609--001	Anonymous	**Ammonia as N**	7664-41-7	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EK067G: Total Phosphorus as P by Discrete Analyser	ES1901650--001	Anonymous	**Total Phosphorus as P**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EK055G: Ammonia as N by Discrete Analyser						
Clear Plastic Bottle - Natural						
RC	----	----	----	22-Jan-2019	16-Jan-2019	**6**
EK057G: Nitrite as N by Discrete Analyser						
Clear Plastic Bottle - Natural						
RC	----	----	----	19-Jan-2019	17-Jan-2019	**2**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser						
Clear Plastic Bottle - Natural						
RC	----	----	----	22-Jan-2019	17-Jan-2019	**5**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser						
Clear Plastic Bottle - Natural						
RC	22-Jan-2019	16-Jan-2019	**6**	----	----	----
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser						
Clear Plastic Bottle - Natural						
RC	22-Jan-2019	17-Jan-2019	**5**	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser						
Clear Plastic Bottle - Natural						
RC	22-Jan-2019	17-Jan-2019	**5**	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser						
Clear Plastic Bottle - Natural						
RC	----	----	----	19-Jan-2019	17-Jan-2019	**2**
MW006: Faecal Coliforms & E.coli by MF						
Clear Plastic Bottle - Natural						
RC	----	----	----	19-Jan-2019	16-Jan-2019	**3**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	18	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	5	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	18	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	5	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container / Client Sample ID(s)*	*Sample Date*	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
RC	**15-Jan-2019**	**----**	----	----	**22-Jan-2019**	22-Jan-2019	✓
Clear Plastic Bottle - Natural (EA025H)							
US01, MS01, DS01	**18-Jan-2019**	**----**	----	----	**23-Jan-2019**	25-Jan-2019	✓
ED093F: SAR and Hardness Calculations							
Clear Plastic Bottle - Natural (ED093F)							
RC	**15-Jan-2019**	**----**	----	----	**22-Jan-2019**	22-Jan-2019	✓
Clear Plastic Bottle - Natural (ED093F)							
US01, MS01, DS01	**18-Jan-2019**	**----**	----	----	**22-Jan-2019**	25-Jan-2019	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T)							
RC	**15-Jan-2019**	**21-Jan-2019**	14-Jul-2019	✓	**21-Jan-2019**	14-Jul-2019	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T)							
US01, DS01	**18-Jan-2019**	**21-Jan-2019**	17-Jul-2019	✓	**21-Jan-2019**	17-Jul-2019	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T)							
RC	**15-Jan-2019**	**----**	----	----	**21-Jan-2019**	12-Feb-2019	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T)							
US01, DS01	**18-Jan-2019**	**----**	----	----	**21-Jan-2019**	15-Feb-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK055G)							
RC	**15-Jan-2019**	**----**	----	----	**22-Jan-2019**	16-Jan-2019	×
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
US01, MS01, DS01	**18-Jan-2019**	**----**	----	----	**22-Jan-2019**	15-Feb-2019	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
RC	**15-Jan-2019**	**----**	----	----	**19-Jan-2019**	17-Jan-2019	×
Clear Plastic Bottle - Natural (EK057G)							
US01, MS01, DS01	**18-Jan-2019**	**----**	----	----	**19-Jan-2019**	20-Jan-2019	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Natural (EK059G)							
RC	**15-Jan-2019**	**----**	----	----	**22-Jan-2019**	17-Jan-2019	×
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
US01, MS01, DS01	**18-Jan-2019**	**----**	----	----	**22-Jan-2019**	15-Feb-2019	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Natural (EK061G)							
RC	**15-Jan-2019**	**22-Jan-2019**	16-Jan-2019	×	**22-Jan-2019**	19-Feb-2019	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
US01, MS01, DS01	**18-Jan-2019**	**22-Jan-2019**	15-Feb-2019	✓	**22-Jan-2019**	15-Feb-2019	✓
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Natural (EK067FG)							
RC	**15-Jan-2019**	**22-Jan-2019**	17-Jan-2019	×	**22-Jan-2019**	19-Feb-2019	✓
Clear Plastic Bottle - Sulfuric Acid (EK067FG)							
US01, MS01, DS01	**18-Jan-2019**	**22-Jan-2019**	15-Feb-2019	✓	**22-Jan-2019**	15-Feb-2019	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Natural (EK067G)							
RC	**15-Jan-2019**	**22-Jan-2019**	17-Jan-2019	×	**22-Jan-2019**	19-Feb-2019	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
US01, MS01, DS01	**18-Jan-2019**	**22-Jan-2019**	15-Feb-2019	✓	**22-Jan-2019**	15-Feb-2019	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
RC	**15-Jan-2019**	**----**	----	----	**19-Jan-2019**	17-Jan-2019	×
Clear Plastic Bottle - Natural (EK071G)							
US01, MS01, DS01	**18-Jan-2019**	**----**	----	----	**19-Jan-2019**	20-Jan-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP020: Oil and Grease (O&G)							
Amber Jar - Sulfuric Acid or Sodium Bisulfate (EP020)							
US01, DS01	**18-Jan-2019**	**----**	----	----	**23-Jan-2019**	15-Feb-2019	✓
EP035G: Total Phenol by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EP035G)							
US01, MS01, DS01	**18-Jan-2019**	**23-Jan-2019**	15-Feb-2019	✓	**23-Jan-2019**	15-Feb-2019	✓
EP068A: Organochlorine Pesticides (OC)							
Amber Glass Bottle - Unpreserved (EP068)							
US01, DS01	**18-Jan-2019**	**21-Jan-2019**	25-Jan-2019	✓	**23-Jan-2019**	02-Mar-2019	✓
EP068B: Organophosphorus Pesticides (OP)							
Amber Glass Bottle - Unpreserved (EP068)							
US01, DS01	**18-Jan-2019**	**21-Jan-2019**	25-Jan-2019	✓	**23-Jan-2019**	02-Mar-2019	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
US01, DS01	**18-Jan-2019**	**21-Jan-2019**	25-Jan-2019	✓	**23-Jan-2019**	02-Mar-2019	✓
MW006: Faecal Coliforms & E.coli by MF							
Clear Plastic Bottle - Natural (MW006)							
RC	**15-Jan-2019**	**----**	----	----	**19-Jan-2019**	16-Jan-2019	×
Sterile Plastic Bottle - Sodium Thiosulfate (MW006)							
US01, MS01, DS01	**18-Jan-2019**	**----**	----	----	**19-Jan-2019**	19-Jan-2019	✓
MW024: Bacillariophytes (Diatoms) - Centrales							
Plastic Bottle - Lugols Iodine (MW024_TOT)							
RC	**15-Jan-2019**	**----**	----	----	**21-Jan-2019**	14-Jul-2019	✓
Plastic Bottle - Lugols Iodine (MW024_TOT)							
US01, DS01	**18-Jan-2019**	**----**	----	----	**21-Jan-2019**	17-Jul-2019	✓
MW024: Bacillariophytes (Diatoms) - Pennales							
Plastic Bottle - Lugols Iodine (MW024_TOT)							
RC	**15-Jan-2019**	**----**	----	----	**21-Jan-2019**	14-Jul-2019	✓
Plastic Bottle - Lugols Iodine (MW024_TOT)							
US01, DS01	**18-Jan-2019**	**----**	----	----	**21-Jan-2019**	17-Jul-2019	✓
MW024: Bacillariophytes (Diatoms) - TOTAL BACILLARIOPHYTES							
Plastic Bottle - Lugols Iodine (MW024_TOT)							
RC	**15-Jan-2019**	**----**	----	----	**21-Jan-2019**	14-Jul-2019	✓
Plastic Bottle - Lugols Iodine (MW024_TOT)							
US01, DS01	**18-Jan-2019**	**----**	----	----	**21-Jan-2019**	17-Jul-2019	✓
MW024: Chlorophytes (Green Algae)							
Plastic Bottle - Lugols Iodine (MW024_TOT)							
RC	**15-Jan-2019**	**----**	----	----	**21-Jan-2019**	14-Jul-2019	✓
Plastic Bottle - Lugols Iodine (MW024_TOT)							
US01, DS01	**18-Jan-2019**	**----**	----	----	**21-Jan-2019**	17-Jul-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
MW024: Chlorophytes (Green Algae) - TOTAL CHLOROPHYTES							
Plastic Bottle - Lugols Iodine (MW024_TOT) RC	**15-Jan-2019**	**----**	----	----	**21-Jan-2019**	14-Jul-2019	✓
Plastic Bottle - Lugols Iodine (MW024_TOT) US01, DS01	**18-Jan-2019**	**----**	----	----	**21-Jan-2019**	17-Jul-2019	✓
MW024: Chrysophytes (Golden Algae)							
Plastic Bottle - Lugols Iodine (MW024_TOT) RC	**15-Jan-2019**	**----**	----	----	**21-Jan-2019**	14-Jul-2019	✓
Plastic Bottle - Lugols Iodine (MW024_TOT) US01, DS01	**18-Jan-2019**	**----**	----	----	**21-Jan-2019**	17-Jul-2019	✓
MW024: Chrysophytes (Golden Algae) - TOTAL CHRYSOPHYTES							
Plastic Bottle - Lugols Iodine (MW024_TOT) RC	**15-Jan-2019**	**----**	----	----	**21-Jan-2019**	14-Jul-2019	✓
Plastic Bottle - Lugols Iodine (MW024_TOT) US01, DS01	**18-Jan-2019**	**----**	----	----	**21-Jan-2019**	17-Jul-2019	✓
MW024: Cyanophytes (Blue Green Algae)							
Plastic Bottle - Lugols Iodine (MW024_TOT) RC	**15-Jan-2019**	**----**	----	----	**21-Jan-2019**	14-Jul-2019	✓
Plastic Bottle - Lugols Iodine (MW024_TOT) US01, DS01	**18-Jan-2019**	**----**	----	----	**21-Jan-2019**	17-Jul-2019	✓
MW024: Cyanophytes (Blue Green Algae) - Other Cyanophytes							
Plastic Bottle - Lugols Iodine (MW024_TOT) RC	**15-Jan-2019**	**----**	----	----	**21-Jan-2019**	14-Jul-2019	✓
Plastic Bottle - Lugols Iodine (MW024_TOT) US01, DS01	**18-Jan-2019**	**----**	----	----	**21-Jan-2019**	17-Jul-2019	✓
MW024: Cyanophytes (Blue Green Algae) - TOTAL CYANOPHYTES							
Plastic Bottle - Lugols Iodine (MW024_TOT) RC	**15-Jan-2019**	**----**	----	----	**21-Jan-2019**	14-Jul-2019	✓
Plastic Bottle - Lugols Iodine (MW024_TOT) US01, DS01	**18-Jan-2019**	**----**	----	----	**21-Jan-2019**	17-Jul-2019	✓
MW024: Cyanophytes (Blue Green Algae) - TOTAL POTENTIALLY TOXIC CYANOPHYTES							
Plastic Bottle - Lugols Iodine (MW024_TOT) RC	**15-Jan-2019**	**----**	----	----	**21-Jan-2019**	14-Jul-2019	✓
Plastic Bottle - Lugols Iodine (MW024_TOT) US01, DS01	**18-Jan-2019**	**----**	----	----	**21-Jan-2019**	17-Jul-2019	✓
MW024: Flagellates - Cryptophytes							
Plastic Bottle - Lugols Iodine (MW024_TOT) RC	**15-Jan-2019**	**----**	----	----	**21-Jan-2019**	14-Jul-2019	✓
Plastic Bottle - Lugols Iodine (MW024_TOT) US01, DS01	**18-Jan-2019**	**----**	----	----	**21-Jan-2019**	17-Jul-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
MW024: Flagellates - Euglenophytes							
Plastic Bottle - Lugols Iodine (MW024_TOT) RC	**15-Jan-2019**	**----**	----	----	**21-Jan-2019**	14-Jul-2019	✓
Plastic Bottle - Lugols Iodine (MW024_TOT) US01, DS01	**18-Jan-2019**	**----**	----	----	**21-Jan-2019**	17-Jul-2019	✓
MW024: Flagellates - Pyrrophytes							
Plastic Bottle - Lugols Iodine (MW024_TOT) RC	**15-Jan-2019**	**----**	----	----	**21-Jan-2019**	14-Jul-2019	✓
Plastic Bottle - Lugols Iodine (MW024_TOT) US01, DS01	**18-Jan-2019**	**----**	----	----	**21-Jan-2019**	17-Jul-2019	✓
MW024: Flagellates - TOTAL FLAGELLATES							
Plastic Bottle - Lugols Iodine (MW024_TOT) RC	**15-Jan-2019**	**----**	----	----	**21-Jan-2019**	14-Jul-2019	✓
Plastic Bottle - Lugols Iodine (MW024_TOT) US01, DS01	**18-Jan-2019**	**----**	----	----	**21-Jan-2019**	17-Jul-2019	✓
MW024: Raphidophyte							
Plastic Bottle - Lugols Iodine (MW024_TOT) RC	**15-Jan-2019**	**----**	----	----	**21-Jan-2019**	14-Jul-2019	✓
Plastic Bottle - Lugols Iodine (MW024_TOT) US01, DS01	**18-Jan-2019**	**----**	----	----	**21-Jan-2019**	17-Jul-2019	✓
MW024: Raphidophyte - TOTAL RAPHIDOPHYTE							
Plastic Bottle - Lugols Iodine (MW024_TOT) RC	**15-Jan-2019**	**----**	----	----	**21-Jan-2019**	14-Jul-2019	✓
Plastic Bottle - Lugols Iodine (MW024_TOT) US01, DS01	**18-Jan-2019**	**----**	----	----	**21-Jan-2019**	17-Jul-2019	✓
MW024T: TOTAL ALGAE							
Plastic Bottle - Lugols Iodine (MW024_TOT) RC	**15-Jan-2019**	**----**	----	----	**21-Jan-2019**	14-Jul-2019	✓
Plastic Bottle - Lugols Iodine (MW024_TOT) US01, DS01	**18-Jan-2019**	**----**	----	----	**21-Jan-2019**	17-Jul-2019	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Filtered Total Phosphorus as P By Discrete Analy	EK067FG	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	18	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	5	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phenol by Discrete Analyser	EP035G	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	27	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Filtered Total Phosphorus as P By Discrete Analy	EK067FG	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Oil and Grease	EP020	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	20	**15.00**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phenol by Discrete Analyser	EP035G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	6	27	**22.22**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Filtered Total Phosphorus as P By Discrete Analy	EK067FG	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Oil and Grease	EP020	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phenol by Discrete Analyser	EP035G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	27	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Filtered Total Phosphorus as P By Discrete Analy	EK067FG	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	18	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	5	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phenol by Discrete Analyser	EP035G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	27	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Filtered Total Phosphorus as P By Discrete Analy	EK067FG	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a filtered sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Oil and Grease	EP020	WATER	In house: Referenced to APHA 5520 B. Oil & grease is a gravimetric procedure to determine the amount of oil & grease residue in an aqueous sample. The sample is serially extracted three times n-hexane. The resultant extracts are combined, dehydrated and concentrated prior to gravimetric determination. This method is compliant with NEPM (2013) Schedule B(3)
Total Phenol by Discrete Analyser	EP035G	WATER	In house: Referenced to APHA 5530 B&D. Steam distillable Phenols are reacted with 4-aminoantipyrine. The resultant colour intensity is measured by Seal. This method is compliant with NEPM (2013) Schedule B(3)
Pesticides by GCMS	EP068	WATER	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Thermotolerant Coliforms & E.coli by Membrane Filtration	MW006	WATER	AS 4276.7 2007
Total Algae Count	MW024 TOT	WATER	In house: Referenced to Hotzel and Groome, 1999 and APHA 10200

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
TKN/TP (filtered) Digestion	EK061F/EK067F	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Phenols After Microdistillation	EP035D	WATER	In house: Referenced to APHA 5530 A, B&D pH adjusted Steam distillable Phenolic compounds. The resultant colour intensity is measured by Discrete Analyser.

Preparation Methods	Method	Matrix	Method Descriptions
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1831929**	Page	: 1 of 12
Client	: **ECO LOGICAL AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR IAN DIXON	Telephone	: +61-2-8784 8555
Project	: Mephemson St Warriewood	Date Samples Received	: 26-Oct-2018
Site	: ----	Issue Date	: 31-Oct-2018
Sampler	: Claire Wheeler Rizwana Rnmmsia	No. of samples received	: 5
Order number	:	No. of samples analysed	: 5

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
MW006: Faecal Coliforms & E.coli by MF						
Sterile Plastic Bottle - Sodium Thiosulfate						
US01, DS01, MS01	----	----	----	28-Oct-2018	27-Oct-2018	**1**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Pesticides by GCMS	0	2	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)					
Total Metals by ICP-MS - Suite B	0	2	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Pesticides by GCMS	0	2	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
US01, DS01	**26-Oct-2018**	**----**	----	----	**29-Oct-2018**	09-Nov-2018	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
US01, DS01	**26-Oct-2018**	**30-Oct-2018**	24-Apr-2019	✓	**30-Oct-2018**	24-Apr-2019	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
US01, DS01	**26-Oct-2018**	**30-Oct-2018**	23-Nov-2018	✓	**31-Oct-2018**	23-Nov-2018	✓
EP035G: Total Phenol by Discrete Analyser							
Soil Glass Jar - Unpreserved (EP035G)							
US01, DS01	**26-Oct-2018**	**30-Oct-2018**	09-Nov-2018	✓	**30-Oct-2018**	09-Nov-2018	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP068A: Organochlorine Pesticides (OC)								
Soil Glass Jar - Unpreserved (EP068)								
US01,	DS01	**26-Oct-2018**	**29-Oct-2018**	09-Nov-2018	✓	**29-Oct-2018**	08-Dec-2018	✓
EP068B: Organophosphorus Pesticides (OP)								
Soil Glass Jar - Unpreserved (EP068)								
US01,	DS01	**26-Oct-2018**	**29-Oct-2018**	09-Nov-2018	✓	**29-Oct-2018**	08-Dec-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
US01,	DS01	**26-Oct-2018**	**29-Oct-2018**	09-Nov-2018	✓	**29-Oct-2018**	08-Dec-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C								
Clear Plastic Bottle - Natural (EA025H)								
US01, MS01	DS01,	**26-Oct-2018**	**----**	----	----	**30-Oct-2018**	02-Nov-2018	✓
ED093F: SAR and Hardness Calculations								
Clear Plastic Bottle - Natural (ED093F)								
US01, MS01	DS01,	**26-Oct-2018**	**----**	----	----	**29-Oct-2018**	02-Nov-2018	✓
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Natural (EG020B-T)								
US01		**26-Oct-2018**	**29-Oct-2018**	24-Apr-2019	✓	**29-Oct-2018**	24-Apr-2019	✓
Clear Plastic Bottle - Nitric Acid; Unspecified (EG020B-T)								
DS01		**26-Oct-2018**	**29-Oct-2018**	24-Apr-2019	✓	**29-Oct-2018**	24-Apr-2019	✓
EG035T: Total Recoverable Mercury by FIMS								
Clear Plastic Bottle - Natural (EG035T)								
US01		**26-Oct-2018**	**----**	----	----	**29-Oct-2018**	23-Nov-2018	✓
Clear Plastic Bottle - Nitric Acid; Unspecified (EG035T)								
DS01		**26-Oct-2018**	**----**	----	----	**29-Oct-2018**	23-Nov-2018	✓
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G)								
US01, MS01	DS01,	**26-Oct-2018**	**----**	----	----	**27-Oct-2018**	23-Nov-2018	✓
EK057G: Nitrite as N by Discrete Analyser								
Clear Plastic Bottle - Natural (EK057G)								
US01, MS01	DS01,	**26-Oct-2018**	**----**	----	----	**26-Oct-2018**	28-Oct-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
US01, DS01, MS01	**26-Oct-2018**	**----**	----	----	**27-Oct-2018**	23-Nov-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
US01, DS01, MS01	**26-Oct-2018**	**27-Oct-2018**	23-Nov-2018	✓	**27-Oct-2018**	23-Nov-2018	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
US01, DS01, MS01	**26-Oct-2018**	**27-Oct-2018**	23-Nov-2018	✓	**27-Oct-2018**	23-Nov-2018	✓
EP020: Oil and Grease (O&G)							
Amber Jar - Sulfuric Acid or Sodium Bisulfate (EP020)							
US01, DS01	**26-Oct-2018**	**----**	----	----	**29-Oct-2018**	23-Nov-2018	✓
EP035G: Total Phenol by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EP035G)							
US01, DS01, MS01	**26-Oct-2018**	**29-Oct-2018**	23-Nov-2018	✓	**29-Oct-2018**	23-Nov-2018	✓
EP068A: Organochlorine Pesticides (OC)							
Amber Glass Bottle - Unpreserved (EP068)							
US01, DS01	**26-Oct-2018**	**29-Oct-2018**	02-Nov-2018	✓	**30-Oct-2018**	08-Dec-2018	✓
EP068B: Organophosphorus Pesticides (OP)							
Amber Glass Bottle - Unpreserved (EP068)							
US01, DS01	**26-Oct-2018**	**29-Oct-2018**	02-Nov-2018	✓	**30-Oct-2018**	08-Dec-2018	✓
MW006: Faecal Coliforms & E.coli by MF							
Sterile Plastic Bottle - Sodium Thiosulfate (MW006)							
US01, DS01, MS01	**26-Oct-2018**	**----**	----	----	**28-Oct-2018**	27-Oct-2018	×
MW024: Bacillariophytes (Diatoms) - Centrales							
White Plastic Bottle-Lugols Iodine (MW024_TOT)							
US01, DS01	**26-Oct-2018**	**----**	----	----	**29-Oct-2018**	24-Apr-2019	✓
MW024: Bacillariophytes (Diatoms) - Pennales							
White Plastic Bottle-Lugols Iodine (MW024_TOT)							
US01, DS01	**26-Oct-2018**	**----**	----	----	**29-Oct-2018**	24-Apr-2019	✓
MW024: Bacillariophytes (Diatoms) - TOTAL BACILLARIOPHYTES							
White Plastic Bottle-Lugols Iodine (MW024_TOT)							
US01, DS01	**26-Oct-2018**	**----**	----	----	**29-Oct-2018**	24-Apr-2019	✓
MW024: Chlorophytes (Green Algae)							
White Plastic Bottle-Lugols Iodine (MW024_TOT)							
US01, DS01	**26-Oct-2018**	**----**	----	----	**29-Oct-2018**	24-Apr-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
MW024: Chlorophytes (Green Algae) - TOTAL CHLOROPHYTES							
White Plastic Bottle-Lugols Iodine (MW024_TOT)							
US01, DS01	**26-Oct-2018**	**----**	----	----	**29-Oct-2018**	24-Apr-2019	✓
MW024: Chrysophytes (Golden Algae)							
White Plastic Bottle-Lugols Iodine (MW024_TOT)							
US01, DS01	**26-Oct-2018**	**----**	----	----	**29-Oct-2018**	24-Apr-2019	✓
MW024: Chrysophytes (Golden Algae) - TOTAL CHRYSOPHYTES							
White Plastic Bottle-Lugols Iodine (MW024_TOT)							
US01, DS01	**26-Oct-2018**	**----**	----	----	**29-Oct-2018**	24-Apr-2019	✓
MW024: Cyanophytes (Blue Green Algae)							
White Plastic Bottle-Lugols Iodine (MW024_TOT)							
US01, DS01	**26-Oct-2018**	**----**	----	----	**29-Oct-2018**	24-Apr-2019	✓
MW024: Cyanophytes (Blue Green Algae) - Other Cyanophytes							
White Plastic Bottle-Lugols Iodine (MW024_TOT)							
US01, DS01	**26-Oct-2018**	**----**	----	----	**29-Oct-2018**	24-Apr-2019	✓
MW024: Cyanophytes (Blue Green Algae) - TOTAL CYANOPHYTES							
White Plastic Bottle-Lugols Iodine (MW024_TOT)							
US01, DS01	**26-Oct-2018**	**----**	----	----	**29-Oct-2018**	24-Apr-2019	✓
MW024: Cyanophytes (Blue Green Algae) - TOTAL POTENTIALLY TOXIC CYANOPHYTES							
White Plastic Bottle-Lugols Iodine (MW024_TOT)							
US01, DS01	**26-Oct-2018**	**----**	----	----	**29-Oct-2018**	24-Apr-2019	✓
MW024: Flagellates - Cryptophytes							
White Plastic Bottle-Lugols Iodine (MW024_TOT)							
US01, DS01	**26-Oct-2018**	**----**	----	----	**29-Oct-2018**	24-Apr-2019	✓
MW024: Flagellates - Euglenophytes							
White Plastic Bottle-Lugols Iodine (MW024_TOT)							
US01, DS01	**26-Oct-2018**	**----**	----	----	**29-Oct-2018**	24-Apr-2019	✓
MW024: Flagellates - Pyrrophytes							
White Plastic Bottle-Lugols Iodine (MW024_TOT)							
US01, DS01	**26-Oct-2018**	**----**	----	----	**29-Oct-2018**	24-Apr-2019	✓
MW024: Flagellates - TOTAL FLAGELLATES							
White Plastic Bottle-Lugols Iodine (MW024_TOT)							
US01, DS01	**26-Oct-2018**	**----**	----	----	**29-Oct-2018**	24-Apr-2019	✓
MW024: Raphidophyte							
White Plastic Bottle-Lugols Iodine (MW024_TOT)							
US01, DS01	**26-Oct-2018**	**----**	----	----	**29-Oct-2018**	24-Apr-2019	✓
MW024: Raphidophyte - TOTAL RAPHIDOPHYTE							
White Plastic Bottle-Lugols Iodine (MW024_TOT)							
US01, DS01	**26-Oct-2018**	**----**	----	----	**29-Oct-2018**	24-Apr-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
MW024T: TOTAL ALGAE							
White Plastic Bottle-Lugols Iodine (MW024_TOT)							
US01, DS01	**26-Oct-2018**	**----**	----	----	**29-Oct-2018**	24-Apr-2019	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	9	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phenol By Discrete Analyser	EP035G	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phenol By Discrete Analyser	EP035G	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phenol By Discrete Analyser	EP035G	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phenol By Discrete Analyser	EP035G	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	2	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP) - Continued							
Total Metals by ICP-MS - Suite A	EG020A-T	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite B	EG020B-T	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phenol by Discrete Analyser	EP035G	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Oil and Grease	EP020	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	13	**23.08**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite B	EG020B-T	0	2	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Total Phenol by Discrete Analyser	EP035G	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	20	**15.00**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Oil and Grease	EP020	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite B	EG020B-T	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phenol by Discrete Analyser	EP035G	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	2	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phenol by Discrete Analyser	EP035G	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Total Phenol By Discrete Analyser	EP035G	SOIL	In house: Referenced to APHA 5530 B&D Steam distillable Phenols are reacted with 4-aminoantipyrine. The resultant colour intensity is measured by Seal
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013) Schedule B(3) (Method 504,505)
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Total Metals by ICP-MS - Suite B	EG020B-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Oil and Grease	EP020	WATER	In house: Referenced to APHA 5520 B. Oil & grease is a gravimetric procedure to determine the amount of oil & grease residue in an aqueous sample. The sample is serially extracted three times n-hexane. The resultant extracts are combined, dehydrated and concentrated prior to gravimetric determination. This method is compliant with NEPM (2013) Schedule B(3)
Total Phenol by Discrete Analyser	EP035G	WATER	In house: Referenced to APHA 5530 B&D. Steam distillable Phenols are reacted with 4-aminoantipyrine. The resultant colour intensity is measured by Seal. This method is compliant with NEPM (2013) Schedule B(3)
Pesticides by GCMS	EP068	WATER	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Thermotolerant Coliforms & E.coli by Membrane Filtration	MW006	WATER	AS 4276.7 2007
Total Algae Count	MW024 TOT	WATER	In house: Referenced to Hotzel and Groome, 1999 and APHA 10200

Preparation Methods	Method	Matrix	Method Descriptions

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Phenols After Microdistillation	EP035D	SOIL	In house: Referenced to APHA 5530 A, B&D. pH adjusted Steam distillable Phenolic compounds. The resultant colour intensity is measured by Discrete Analyser.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Phenols After Microdistillation	EP035D	WATER	In house: Referenced to APHA 5530 A, B&D pH adjusted Steam distillable Phenolic compounds. The resultant colour intensity is measured by Discrete Analyser.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1828653**	Page	: 1 of 6
Client	: **ECO LOGICAL AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: CLAIRE WHEELER	Telephone	: +61-2-8784 8555
Project	: Warriewood	Date Samples Received	: 27-Sep-2018
Site	: ----	Issue Date	: 02-Oct-2018
Sampler	: CLAIRE WHEELER, DO	No. of samples received	: 3
Order number	:	No. of samples analysed	: 3

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

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

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

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

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

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
US01, MS01, DS01	**27-Sep-2018**	**----**	----	----	**28-Sep-2018**	04-Oct-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
US01, MS01, DS01	**27-Sep-2018**	**----**	----	----	**27-Sep-2018**	25-Oct-2018	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
US01, MS01, DS01	**27-Sep-2018**	**----**	----	----	**27-Sep-2018**	29-Sep-2018	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
US01, MS01, DS01	**27-Sep-2018**	**----**	----	----	**27-Sep-2018**	25-Oct-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
US01, MS01, DS01	**27-Sep-2018**	**27-Sep-2018**	25-Oct-2018	✓	**27-Sep-2018**	25-Oct-2018	✓
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067FG)							
US01, MS01, DS01	**27-Sep-2018**	**28-Sep-2018**	25-Oct-2018	✓	**28-Sep-2018**	25-Oct-2018	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
US01, MS01, DS01	**27-Sep-2018**	**27-Sep-2018**	25-Oct-2018	✓	**27-Sep-2018**	25-Oct-2018	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
US01, MS01, DS01	**27-Sep-2018**	**----**	----	----	**27-Sep-2018**	29-Sep-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
MW006: Faecal Coliforms & E.coli by MF							
Sterile Plastic Bottle - Sodium Thiosulfate (MW006)							
US01, MS01, DS01	**27-Sep-2018**	**----**	----	----	**27-Sep-2018**	28-Sep-2018	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Filtered Total Phosphorus as P By Discrete Analy	EK067FG	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	4	17	**23.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	3	22	**13.64**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	4	18	**22.22**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Filtered Total Phosphorus as P By Discrete Analy	EK067FG	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	17	**11.76**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	22	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	6	18	**33.33**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	20	**15.00**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Filtered Total Phosphorus as P By Discrete Analy	EK067FG	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	17	**11.76**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	22	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	18	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Filtered Total Phosphorus as P By Discrete Analy	EK067FG	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	17	**11.76**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	22	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	18	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Filtered Total Phosphorus as P By Discrete Analy	EK067FG	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a filtered sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Thermotolerant Coliforms & E.coli by Membrane Filtration	MW006	WATER	AS 4276.7 2007

Preparation Methods	Method	Matrix	Method Descriptions

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
TKN/TP (filtered) Digestion	EK061F/EK067F	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)

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