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Stormwater Monitoring Program

238-258 Captain Cook Drive, Kurnell NSW

Prepared for Dicker Data Limited

November 2022

Version 4

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238-258 Captain Cook Drive, Kurnell NSW

Prepared for Dicker Data Limited

Author:	**Dean Stafford** Principal Environmental Scientist	
Reviewer & Approver:	**David Jackson** Principal Hydrogeologist	

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1. Introduction

1.1. Purpose and Application

The purpose of this Stormwater Monitoring Program (SMP, the program) is to describe how Dicker Data Limited (Dicker Data) the owner and operator of the warehousing and office facility located at 238-258 Captain Cook Drive, Kurnell (the Site) will monitor the extent and nature of potential impacts to surface water quality during storm events greater than the 1% Annual Exceedance Probability (i.e > 1:100 year storm event). Refer to Figure 1, **Appendix A** for the site location.

The SMP will be implemented to monitor the quality of water migrating from the site via the overflow stormwater pits within the onsite bio retention basins, to the vegetation zone located on the western portion of the site (Western Vegetation Zone - WVZ) and the nearby Towra Point Nature Reserve Ramsar Site (TPNRRS) during significant storm events. This SMP has been developed in accordance with the Conditions of Approval (SSD -8662-Mod-1) and applicable legislation.

This program should be read in conjunction with the site Operational Environmental Management Plan (OEMP) and the Pre-construction Stormwater Management Plan (TTW).

This SMP has been prepared for the operational (i.e post development) stormwater monitoring.

Monitoring of surface water will continue during the day-to-day operation of the site to identify potential impacts and ensure a comprehensive management regime can be implemented to address potential impacts discharging from the site and manage local water quality.

1.2. Objectives and Targets

The objective of this SMP is to maintain the existing quality of local surface water through early identification of potential impacts through implementation of the SMP to allow for appropriate response.

Table 1-2: Project Targets for the Stormwater Monitoring Program

Metric / measure	Target	Timeframe	Accountability	Documentation / reporting
To avoid or minimise potential adverse impacts to stormwater during a >% Annual Exceedance Probability storm event as a result of operation of the Dicker Data facility through early identification of potential impacts.	Implementation of all monitoring requirements as prescribed in this document. No unacceptable impacts to offsite surface water as a direct result of site operation and maintenance activities	At all times	Facility Manager	OEMP

1.3. Interface with Other Plans

During operation of the site, this SMP is a standalone document within the Dicker Data Environmental Management System. It is closely linked to and should be read in conjunction with the OEMP.

2. Legal and Other Requirements

2.1. Conditions of Approval

The Conditions of Approval (CoA) and other project requirements that relate to the SMP are provided in Table 2-1. A cross reference is included to indicate where the condition/requirement is addressed in this SMP.

Table 2-1: Conditions of Approval Relevant to Stormwater Monitoring

Reference	Condition / requirement	Reference in Document	Responsibility
B18A	Within six months of approval of SSD-8662-Mod-1, the Applicant must prepare a Stormwater Monitoring Program, to the satisfaction of the Planning Secretary. The Program must:	-	-
	a) be undertaken by a suitably qualified expert;	-	Reditus or Others
	b) be undertaken in consultation with the EESG and NPWS;	Section 2.2	Dicker Data
	c) describes the measures undertaken to monitor storm events greater than the 1% Annual Exceedance Probability events in the western vegetation zone and Towra Point Nature Reserve Ramsar Site (TPNRRS);	Section 7	Dicker Data
	d) outline the contingency plan if the monitoring indicates any of the impact assessment criteria or performance criteria has been exceeded;	Section 8	Dicker Data
	e) incorporate a program for ongoing monitoring and review;	Section 7	Dicker Data
	f) mechanisms to report results to relevant agencies.	Section 9	Dicker Data

2.2. Consultation with Relevant Agencies

The Conditions of Approval (CoA) B18A require that the NSW Environment, Energy and Science Group (EESG) (now the Environmental and Heritage Group (EHG)) and the National Parks and Wildlife Service (NPWS) are consulted during preparation of the SMP. Dicker Data has consulted with all required stakeholders during the development of this SMP.

3. Guidelines and Objectives

3.1. Australian and New Zealand Guidelines for Fresh and Marine Water Quality

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 2000) 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 economic and social development. The 2018 revision of the Water Quality Guidelines is presented as an online platform, to improve usability and facilitate updates as new information becomes available.

3.2. Water Quality Objectives

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 (Water Quality Australia, 2018).

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.*

Both the WVZ and the TPNRRS waters could be affected by the site stormwater run-off during a >1:100 year flooding event. The water quality objectives for both of these are:

Protection of:

- Aquatic ecosystems;
- Visual amenity;
- Secondary contact recreation (e.g. boating);
- Primary contact recreation (e.g. swimming) in the longer term (10-year); and
- Protection of aquatic foods (cooked).

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 Water Quality Australia (2018). Note that some of the indicators associated with contact recreation are biological indicators such as faecal coliforms and viruses. The operational land uses are unlikely to directly contribute to an increase in the biological indicators and as such have not been included within the sampling suite.

Much of the project's catchment is becoming more urbanised, therefore waterways are becoming affected by poor water quality and a changed flow regime. The waterways are relatively natural and have not been significantly modified. Wetlands are still in good condition and minimal degradation is evident. Natural vegetation in the WVZ and the TPNRRS are present. Furthermore the TPNRRS is a Ramsar protected area.

Baseline water quality results collected from the onsite Bioretention basins during a rain event indicated the water collecting within bioretention basins that filter to underlying groundwater was considered good. Concentrations of most indicators were reported below the default values given in ANZG (2018) for ecosystems with high conservation value.

3.3. Site-Specific Trigger Values – Surface Water

The Australian and New Zealand Environment and Conservation Council and the Agriculture and Resource Management Council of Australia and New Zealand (ANZECC/ARMCANZ) developed the ANZECC (2000) guidelines. The ANZECC (2000) guidelines provide specific assessment criteria and water quality guideline values that aim to protect and manage the environment supported by a water resource whilst maintaining economic and social development. The 2018 revision of the Water Quality Guidelines is presented as an online platform, with no or very minor revisions to some default guideline values.

The ANZECC (2000) guidelines for marine water quality and freshwater quality specific to NSW coastal rivers have been used throughout this document in accordance with the Conditions of Approval so as to inform ongoing assessments of potential impacts on water quality.

The ANZECC (2000) guidelines provide guidance on the development of management trigger values. The ANZECC (2000) guidelines (Section 7.4.4) recommend a minimum of 24 months of consecutive data to be collected before valid management trigger values for water quality can be established. Twenty-four (24) months of data was unable to be collected for this project, only one sampling event collected from the TPNRRS in November 2021 was conducted. In the absence of significant monitoring data, the results collected from the TPNRRS are considered background concentrations from the surrounding area (i.e concentrations of contaminants of concern in water that have not been sourced from the Dicker Data site.

A sample of water within the TPNRRS, approximately 50m north of Captain Cook Drive, where the stormwater from the WVZ flows into the TPNRRS was collected on 12 November 2021 during a rain event to determine background concentrations of contaminants of concern within the sensitive ecological receptor. Refer to Figure 4, **Appendix A** for the sample collection location. Bureau of Meteorology (BOM) records from the Sydney Airport observation station indicate that 19.2mm of rain fell over the 24hour period.

In the absence of representative background concentrations of contaminants collected from the TPNRRS, the Default Guideline Values (DGVs) have been adopted. The management trigger values for marine water have been adopted for this SMP as the nearest receiving watercourse and ecological receptor, TPNRRS, is estuarine in nature.

Table 3-3 shows the adopted management trigger values for stormwater from the Dicker Data site discharging to the estuarine environment during a storm event greater than the 1% Annual Exceedance Probability event.

Table 3-3: Adopted Management Trigger Values

Parameter	Unit	ANZG (2018) Marine Water 99% Species Protection	Background Data TPNNRS Water Quality (Sample Point 3) 12 November 2021	Adopted Trigger Values
Arsenic	µg/L	0.8*	ND	0.8
Cadmium	µg/L	0.7	ND	0.7
Chromium (III)	µg/L	7.7	ND	7.7
Copper	µg/L	0.3	ND	0.3
Lead	µg/L	2.2	ND	2.2
Nickel	µg/L	7	ND	7
Zinc	µg/L	7	15	15
Mercury	µg/L	0.1	ND	0.1
Total recoverable	µg/L	ND	ND	ND
Benzene	µg/L	500	ND	500
Toluene	µg/L	ND	ND	ND
Ethyl benzene	µg/L	ND	ND	ND
Xylene	µg/L	ND	ND	ND
Naphthalene	µg/L	50	ND	50
Benzo(a)pyrene	µg/L	ND	ND	ND
Endosulfan	µg/L	ND	ND	ND
Endrin	µg/L	ND	ND	ND
Chlorpyrifos	µg/L	ND	ND	ND
Ammonia	mg/L	0.5	0.019	0.5
Total Nitrogen as N	mg/L	1.2** #	0.03	1.2
pH	pH Units	7.0-8.5 #	5.57	6.0-8.5
Dissolved Oxygen	% Sat	80-110 #	37.1	37-110
Turbidity	NTU	10	64	64

ND = Non detect value adopted (i.e below laboratory limits of reporting)
* 99% Freshwater TV adopted in the absence of a reliable marine water TV.
** 95% Estuarine water TV adopted in the absence of a reliable 99% TV.
# Estuarine water TVs adopted in addition to background data

Laboratory reports for the TPNNRS background water quality sampling (Sample Point 3) collected on 12 November 2021 is included in **Appendix B**.

4. Site Environment

4.1. Topography

The site is relatively flat and is approximately 2 to 5m above the Australian Height Datum (mAHD).

The nearest down gradient natural water body is Quibray Bay, which is located approximately 500 metres north-west of the site and is part of Botany Bay. Boat Harbour Beach is located approximately 850 m to the south of the site. Based on the site topography and observations of surface cover, precipitation in the surrounding area is expected to consist of overland flow across the developed areas (consisting of industrial, commercial, roads and equine boarding stables) and penetrate unsealed areas of the site.

4.2. Stormwater

The majority of site stormwater is captured via drains and gutters before discharging to one of the two bio retention basins onsite. The water then filters to underlying groundwater. If the capacity of the bio retention basins is reached during significant storm events i.e greater than the 1% Annual Exceedance Probability events, the bioretention basin will overflow to elevated drains which discharge to existing stormwater infrastructure in the Western Vegetation Zone (immediately west of the operational areas of the site) and then through overland flows to Quibray Bay and the TPNRRS located approximately 50m north of the site. Stormwater from the entry driveway to the site (up to the security hut) migrates to a grate in the driveway before discharging to a pit on Captain Cook Drive near the North-eastern end of the site.

4.2.1. Sensitive Receiving Environments

A 'sensitive receiving environment' is defined as one that has a high conservation or community value and/or supports ecosystems or human uses of water that are particularly sensitive to pollution or degradation of water quality.

Sensitive receiving environments include:

- Nationally Important Wetlands and State Environmental Planning Policy No 14 (SEPP 14) wetlands;
- National parks, marine parks, nature reserves and State conservation areas;
- Threatened ecological communities associated with aquatic ecosystems;
- Known and potential habitats for threatened fish;
- Key fish habitats as identified by the NSW Department of Primary Industries (DPI);
- Recreational swimming areas.

The stormwater migrating offsite during storm events greater than the 1% Annual Exceedance Probability event has the potential to interact with a number of sensitive receiving environments:

- The Western Vegetation Zone;
- Towra Point Nature Reserve Ramsar Site; and
- Quibray Bay.

As illustrated in Figure 2 of the Biodiversity Management Plan (BMP) (Biosis, 21 December 2021), the Western Vegetation Zone is considered a 'No-Go Zone'. Further, pursuant to Section 1.4 of the BMP:

"No access into, or storage of materials or machinery is to be undertaken within or immediately adjacent to no-go zones or retained vegetation, no preparation of chemicals or concrete to be mixed in these areas, or adjacent, and care to avoid the compaction of soils to be observed."

Refer to Figure 3, **Appendix A** for the locations of the above sensitive receiving environments, inclusive of the 'No Go Zone'.

4.3. Representative Stormwater Monitoring Results

The stormwater within the onsite bio-retention basis was collected on 12 November 2021 at two locations being Sample Point 1 (eastern basin) and Sample Point 2 (western basin). The locations of these monitoring points are presented in Table 7-1 and Figure 4, Appendix A. Bureau of Meteorology (BOM) records from the Sydney Airport observation station indicate that 19.2mm of rain fell over the 24 hour period.

Onsite stormwater samples were tested for the following analytes:

- Physico-chemical parameters collected in the field (dissolved oxygen (DO), pH, reduction/oxidation potential (Redox), electrical conductivity (EC), temperature and turbidity;
- Total Recoverable Hydrocarbons (TRH);
- BTEX (benzene, toluene, ethylbenzene, xylene);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Pesticides (organochlorine and organophosphorus);
- Heavy metals (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg); and
- Nutrients including Ammonia and Nitrate.

Table 4-3: Representative Onsite Stormwater Sampling Results (12 November 2021)

Parameter	Unit	Sample Point 1 (Eastern Bio-retention Basin)	Sample Point 2 (Western Bio-retention Basin)	Adopted Trigger Values
Arsenic	µg/L	ND	ND	0.8
Cadmium	µg/L	ND	ND	0.7
Chromium (III)	µg/L	1	ND	7.7
Copper	µg/L	ND	ND	0.3
Lead	µg/L	ND	ND	2.2
Nickel	µg/L	ND	ND	7
Zinc	µg/L	11	2	15
Mercury	µg/L	ND	ND	0.1

Parameter	Unit	Sample Point 1 (Eastern Bio-retention Basin)	Sample Point 2 (Western Bio-retention Basin)	Adopted Trigger Values
Total recoverable	µg/L	ND	ND	ND
Benzene	µg/L	ND	ND	500
Toluene	µg/L	ND	ND	ND
Ethyl benzene	µg/L	ND	ND	ND
Xylene	µg/L	ND	ND	ND
Naphthalene	µg/L	ND	ND	50
Benzo(a)pyrene	µg/L	ND	ND	ND
Endosulfan	µg/L	ND	ND	ND
Endrin	µg/L	ND	ND	ND
Chlorpyrifos	µg/L	ND	ND	ND
Ammonia	mg/L	ND	0.005	0.5
Total Nitrogen as N	mg/L	0.04	0.01	1.2
pH	pH Units	7.41	7.32	6.1-8.5
Dissolved Oxygen	% Sat	80.1	82.3	37-110
Turbidity	NTU	3	4	64

The table above indicates that storm water collected from Sample Point 1 and Sample Point 2 reported concentrations of the contaminants of concern below and within the adopted trigger limits and ranges.

Laboratory reports for the representative onsite stormwater sampling collected on 12 November 2021 is included in **Appendix B**.

5. Identification of Potential Water Impacts

5.1. Surface Water Quality Impacts

The quality of site stormwater runoff depends upon a number of factors including land use, degree of imperviousness, population size, sanitation and waste collection methods, topography, geotechnical characteristics of the soil and the amount of rainfall based on climate. Litter, garbage, sediment, soils, nutrients, oils, hydrocarbons, grease, and heavy metals are all examples of pollutants that are typically transported off site by runoff. Whilst these pollutants have an adverse impact on the overall quality of the receiving water body it is gross pollutants, suspended solids and the nutrients which are the most detrimental to the environment. Litter, garbage, oils, hydrocarbons and other pollutants that typically float on the surface generally have a bigger aesthetic impact to water quality.

This section addresses the permanent water quality measures that have been implemented on the site.

5.2. Stormwater Quality Control Measures

To mitigate any negative impacts to offsite receptors, the site stormwater management system has been designed to capture and retain the majority of stormwater onsite for filtration to the underlying groundwater. No stormwater, during normal storm events, flows offsite to the existing downstream trunk drainage systems with the exception of a stormwater from a small catchment consisting of the entry driveway to the site (up to the security hut). The stormwater from this area migrates to a grate in the driveway before discharging to a pit on Captain Cook Drive near the North-eastern end of the site.,

There are a number of measures that have been installed to reduce pollutant loadings with their effectiveness varying depending on the targeted pollutant, land use type, maintenance access or requirements and site topography. A combination of measures aims to provide the most efficient and manageable measures suited to the site.

The individual elements of the onsite treatment train are summarised in Table 5-2.

Table 5-2: Water Quality Measures

Element	Number of Units	Description
Rainwater Tanks	1 x 350kL	▪ Rainwater tanks are an effective measure as they can remove pollutant loads at source. ▪ The pollutant removal process occurs through harvesting roof runoff for reuse, thereby reducing the nutrients that are discharged into the stormwater network. ▪ The rainwater harvesting and retention system will reduce the reliance on potable water whilst providing an improvement to the quality of stormwater discharge and a level of stormwater detention. The harvested rainwater will be connected for reuse and provide water for landscape irrigation and water for onsite water closet and urinal flushing. ▪ The rainwater tank shall receive a mains top up from a potable water source.

Element	Number of Units	Description
Buffers: Landscape strip	Landscape buffering bypass area	▪ Landscape strips and buffers typically consist of pervious area over which stormwater runoff from an adjacent impervious area can traverse prior to entering the drainage network. ▪ Buffer strips provide a discontinuity between paved surfaces and the drainage network. They receive water from impervious areas in a distributed manner before treating stormwater by filtering pollutants and nutrients.
Swales	1,050 metres of grass swale at 0.5% bed slope	▪ Swales are open vegetated or grass lined channels that can be used as an alternative stormwater conveyance system to typical kerbs or channel drains in roadways. ▪ Surface flows are flowed by the vegetation in a swale which facilitates an even distribution of flow and the settlement of particles.
Bio-retention: Basin	5,000m^2 filter area	▪ A bio-retention basin is a vertical filtration system that filters stormwater through a prescribed media (e.g. sandy loam) before migrating to the underlying groundwater. ▪ The bio-retention basins installed onsite will also provide a level of stormwater attenuation. ▪ The bioretention basins will be maintained on a regular basis, to prevent gross pollutants (littler, sediment and vegetation detritus) from migrating offsite during storm events. Regular inspection and maintenance of the onsite bio-retention basins will ensure that there will not be an increase of plastic bottles and litter that will wash up on the beaches of the TPNRSS (as sourced from the site). Refer to Section 8 for more information.

6. Risk Management Framework

6.1. Risk Assessment

A risk management framework for the evaluation of risks to sensitive environments as a result of storm events at the site greater than the 1% Annual Exceedance Probability is provided to identify the level of risk based on the following:

- The likelihood of a potential impact occurring; and
- The consequence of that potential impact.

The definition of likelihood and the consequences are detailed in Table 6-1a and Table 6-1b respectively. Table 6-1c provides the risk assessment matrix.

Table 6-1a: Classification of Likelihood for Operation Activities

Level	Likelihood	Description	Frequency
A	Almost certain	Can be expected to occur >90% probability	Less than 1 event per month
B	Likely	Can quite commonly occur ~50% probability	More than 1 event per year
C	Moderate	May occasional occur ~25% probability	One event per 1 to 10 years
D	Unlikely	May infrequently occur ~10% probability	One event per 10 to 100 years
E	Rare	May occur in exceptional circumstances <1% probability	Less than one event per 100 years

Table 6-2b: Classification of Consequence

Level	Consequence	Description
1	Negligible	Short term ecological damage to WVZ or TPNRRS
2	Minor	Limited but medium-term ecological damage to WVZ or TPNRRS
3	Moderate	Major but recoverable ecological damage to WVZ or TPNRRS
4	Major	Heavy ecological damage, costly restoration to WVZ or TPNRRS
5	Severe	Permanent widespread ecological damage to WVZ or TPNRRS

Table 6-3c: Risk Assessment Matrix

		Consequence				
		1 Negligible	**2** Minor	**3** Moderate	**4** Major	**5** Severe
Likelihood	**A** Almost Certain	Medium	Significant	High	High	Extreme
	B Likely	Medium	Medium	Significant	High	Extreme
	C Moderate	Low	Medium	Significant	High	High
	D Unlikely	Low	Low	Medium	Significant	High
	E Rare	Low	Low	Low	Medium	Significant

6.2. Risk Evaluation

The risks of potential impacts caused by the site are summarised in Table 6-2. Potential impacts identified as having a significant or above risk classification can be downgraded if appropriate controls and management measures are implemented and maintained.

Table 6-2: Assessment of Potential Water Quality Impacts During Storm Events >1% Annual Exceedance Probability During Operation of the Site

Activity	Potential Impact(s)	Risk Analysis (likelihood and consequence)				
		Low	Medium	Significant	High	Extreme
Following rainfall event	Increased runoff leading to ecological changes to local waterways.		B2			
	Excess rainfall causes deposits build up on internal road surfaces and pavement areas during dry weather to be washed off and transported to the bio retention basin and local waterways		D3			
	Excess rainfall causes erosion in WVZ.			C3		
	Changes in water quality leading to impacts on downstream ecology and downstream community users.		D3			
	Drainage including bioretention basins causes reduced water quality in local waterways due to increased turbidity and sediment loading through sediment-laden runoff.		E4			
Stage 2 Soil Stockpile Area	Excess rainfall causes sediment runoff from soil stockpiles in the Stage 2 development area and transported to bio-retention and stormwater.		D3			
Emergency scenarios	Fuel spills from freight truck at loading bay or other vehicles onsite causes contamination of bio retention basin and stormwater by hydrocarbons.		E4			
	Fire onsite and fire water (containing firefighting foam) migrates to Bioretention basins		E4			
Litter from site users	Accumulated litter, such as non-biodegradable litter and food wastes impacts water quality, amenity and aquatic ecosystems if transported into receiving waterways.		D3			
Maintenance Activities	Sediment-laden water from maintenance of vegetation in bio retention basins and cleaning of drainage and bio retention basins discharged into waterways.	E3				

7. Stormwater Monitoring Program

7.1. Introduction

Monitoring will be undertaken in accordance with Australian Standards, ANZECC/ARMCANZ (2000), and the site OEMP.

7.2. Stormwater Monitoring

7.2.1. Stormwater Monitoring

The SMP will continue while the site remains operational unless otherwise approved or directed by the Secretary.

During operation, stormwater monitoring will occur via grab samples at the locations shown in Table 7-2. The monitoring locations for stormwater quality will help establish a data set trend of the quality of stormwater likely to discharge to the WVZ and TPNRRS during a storm event greater than the 1% annual exceedance probability event. Stormwater monitoring will be undertaken on a six-monthly basis (on any rain event of at least 20mm within a 24-hour period or when there is sufficient water within the bio retention basis to allow sampling to occur) (i.e., maximum of two scheduled sampling events per year) for a period of three years or unless approved or directed by the Secretary. Subsequent to the initial three-year period, monitoring will then be undertaken once every two years (during a rain event of at least 20mm within a 24-hour period or when there is sufficient water within the bio retention basis to allow sampling to occur). In addition to this, sampling will also be undertaken immediately following any storm event greater than 1% of the annual exceedance probability events during operation of the site (i.e., during rain events large enough to result in overflows from the bioretention basins into the open stormwater channel while the site remains operational).

Table 3-3 contains the parameters to be tested as part of the operation SMP. Management trigger values will be used to assess potential impacts on the receiving environment (Section 4.2.1). In addition:

- Physical parameters (i.e. pH and EC) and dissolved metals will be used to assess basic water characteristics;
- Nutrients such as ammonia, nitrates provide an indication of the in-organic load present in the water; and
- Total petroleum hydrocarbons (TPH) and BTEXN provide an indication of pollution from hydrocarbons that are considered the most likely onsite source of pollution e.g. from fuels, oils, solvents and grease.

Section 5 outlines the operational activities which have the potential to impact surface water quality via stormwater runoff. Stormwater runoff from the site has the potential to affect levels of sediments, nutrients, hydrocarbons and metals, as they may be deposited around the site or on the internal road surfaces.

Based on the potential impacts and parameters of interest associated with operational activities, the project does not propose to include biological indicators in the monitoring program.

The Dicker Data facility manager responsible for site operations and maintenance will ensure the sampling and monitoring is undertaken in accordance with the appropriate standard for

collection of stormwater samples. The facility manager will also review the monitoring and results report.

Table 7-2: Stormwater Monitoring Locations within the Onsite Bioretention Basins (GDA 1994)

Location ID	Easting	Northing
Sample Point 1	333786	6233925
Sample Point 2	333610	6233828
Sample Point 3	333415	6233917

Proposed sample locations are shown in Figure 4, **Appendix A**.

7.3. Stormwater Sampling Methodology

Grab samples will be collected manually from the sampling locations identified in Table 7-2. The volume of sample collected will be of sufficient volume for the required analyses, including any repeat analyses and will be collected into sampling bottles and jars provided by the NATA accredited testing laboratory.

7.3.1. Quality Assurance

As part of the operation sampling, quality assurance and control samples will be undertaken to ensure the integrity of the dataset in accordance with Geoscience Australia's Groundwater sampling and Analysis – A Field Guide (Geoscience Australia 2009). This includes the following QA/QC procedures:

- Samples will be collected in clearly labelled bottles with appropriate preservation solutions;
- Samples will be delivered to the laboratories within the specified holding times; and
- Unstable parameters will be analysed in the field (physico-chemical parameters) – see below.

All containers are to be clearly labelled with the location, date/time, method, name and duplicate details, with the same documented on dedicated field sheets. Samples are to be placed immediately in chilled containers and transported to a NATA-accredited laboratory under documented chain-of-custody protocols.

7.3.2. Physico-chemical Measurements

Field water quality parameters including temperature, electric conductivity (EC), pH, dissolved oxygen (DO), redox potential (redox) and turbidity will be measured at each sampling location with a multi-probe field water quality meter. Other observations including odour and colour will also be recorded.

The multi-probe field water quality meter will be calibrated against known standards, as supplied by the manufacturer, at the start and completion of each day of water quality sampling. Calibration records will be maintained in accordance with the appropriate standard.

7.3.3. Decontamination

Generally, sampling equipment will not require specific cleaning from rinsing the equipment well at the end of each day. Dedicated sampling bottles and equipment will be utilised to collect samples to prevent cross contamination between sampling points.

8. Management and Mitigation

The control measures to achieve best management water quality practices are included in the OEMP and are not repeated here. The following sections detail incident management and trigger response actions.

8.1. Surface Water Quality

The ongoing water monitoring program will be used to identify potential impacts on the receiving waters during a storm event greater than 1% of the annual exceedance probability events during operation of the site, and to inform appropriate management and mitigation responses. For surface water quality, a management response will be triggered if exceedances of any of the management trigger values listed in Table 3-3 occurs.

It is important to note that the method used to calculate management trigger values for the project recognises the inherent variability of natural systems by acknowledging natural and sampling induced variation. The data's occasional excursion beyond a management trigger value may be a chance occurrence, may be due to other land use factors or may indicate a potential problem. The method used to calculate management trigger values for the project recognises the inherent variability of natural systems by acknowledging natural and sampling induced variation.

Water quality management trigger values will be reviewed for appropriateness on an annual basis.

8.2. Incidents

Table 8-2 describes potential incidents and potential responses that could be undertaken for their mitigation. Note that other responses might be deemed appropriate at the discretion of the Dicker Data Facility Manager.

Table 8-2: Incident Triggers and Potential Responses

Incident	Potential Responses (note that others are possible)
Exceptional rainfall event	▪ Use erosion controls (i.e. source controls) wherever possible. ▪ Maintain/manage erosion and sediment control devices, gross pollutant traps including bio/retention basins. ▪ Conduct ongoing monitoring and maintenance of controls.
Storm Event >1% Annual Exceedance and water flowing to overflow pits	▪ Collect grab samples of stormwater from Bio-attenuation basins – only if and when safe to do so. ▪ Report the incident and sampling results (if obtainable) to DP&E, NPWS, EPA and Sutherland Shire Council.
Spillage of hazardous materials	▪ Activate spill containment procedures (Refer to OEMP) immediately. ▪ Document the incident in the site's incident register.
Treatment train/basin failure	▪ If rain is forecast cover all exposed soil surfaces with soil binder or geotextile. ▪ Repair the bioretention basin and/or treatment train as soon as possible (within 2 weeks if practicable).

Incident	Potential Responses (note that others are possible)
	▪ Refer to the water quality monitoring data and seek professional help in the case of a treatment train failure.
Two or more monitoring events exceeding adopted trigger values	▪ Adopt contingency measures presented in the OEMP and described below.

The Dicker Data Facility Manager is deemed responsible for the above

8.3. Contingency Plan

If onsite stormwater samples exceed the adopted thresholds listed in Table 3-3, the following contingency measures will be adopted, particularly if the adopted trigger values are exceeded by an order of magnitude in concentration:

- Investigate probable sources of contaminants migrating to bioretention basin during storm events.
- Inspect hardstand areas for surface staining, build-up of sediments, litter and vegetation detritus. Clean and restore identified areas where necessary.
- Inspect site for any areas of bare ground (i.e areas where recent excavation or erosion has occurred). Cover areas of bare ground with landscaping (plantings/mulch/turf) or replacement hardstand (asphalt or concrete paving). Areas of bare ground can be temporarily covered with an appropriate geofabric to prevent wind blow dust and sediment run-off following rain.
- Inspect the onsite treatment train including bio retention basin. Basins should be cleaned and replaced as necessary.
- Inspect onsite stormwater pits, swales and drains for the accumulation of sediments and clean where required.

A maintenance program should be developed/updated should exceedance of trigger values continue to occur. Groundwater quality underlying the site and in the vicinity of the bio-retention basins may also need to be investigated as the source of elevated contaminants in stormwater may be from groundwater/offsite sources.

If a second consecutive stormwater sampling event also records results exceeding the adopted trigger values following the implementation of the above, then the exceedance should be reported to EPA, NPWS and Sutherland Shire Council and further investigative and remediation measures may be required.

9. Reporting

Reporting is required as part of this SMP to ensure Dicker Data operation and management is responsive and appropriate.

Table 9-1 details the proposed reporting schedule.

Table 9-1: Reporting Schedule

Report timing	Report requirements
Six-monthly (for a minimum of three years)	Stormwater sampling data to be collected and tabulated. Trigger exceedances to be highlighted.
	Report to confirm implementation and compliance of required operational water control measures, including bio retention basins. Monitoring data collected will be utilised to review and, if required, revise the management trigger values so they are consistent with ANZECC guidelines.
Two-yearly (following the initial 3 years)	Summary report of water monitoring data discharging from the site, including any relevant findings and trigger value exceedances, to be provided to DP&E, NPWS, EPA and Sutherland Shire Council.
As required after three years	Report on the SMP as required.
Following a >1% Annual Exceedance Probability Storm Event	Summary report of water monitoring data discharging from the site, including any relevant findings and trigger value exceedances, to be provided to DP&E, NPWS, EPA and Sutherland Shire Council.

10. Review and Improvement

Continual improvement is achieved through constant measurement and evaluation, audit and review of the effectiveness of the program, and adjustment and improvement of the site's OEMP, project environmental outcomes and the Dicker Data Environmental Management System.

This program will be updated as required:

- To take into account changes to the environment or generally accepted environmental management practices, new risks to the environment, any hazardous substances, contamination or changes in law;
- Where requested or required by the NSW Department of Planning and Environment (DP&E) or any other Authority; or
- In response to internal or external audits or annual management reviews.

11. References

ANZECC/ARMCANZ (2000). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (collectively known as the 'ANZECC Guidelines').

ANZECC/ARMCANZ (2000). *Australian and New Zealand Guidelines for Water Quality Monitoring and Reporting* (collectively known as the 'ANZECC Guidelines').

Landcom (2004). *Managing Urban Stormwater: Soils and Construction.* Volume 1, 4th Edition. NSW Government, Sydney.

Taylor Thompson Whiting (NSW) Pty Lt (2018) Development: Stormwater Management Plan, Dicker Data Warehouse and Distribution Centre, 26 February 2018. Ref: 171516 CAAA.

Reditus (2021) Operation Environmental Management Plan (OEMP), 238-258 Captain Cook Drive, Kurnell NSW, 5 January 2021. Ref: 19074RP04v3.

12. Limitations

This report has been prepared in accordance with the scope of services described in Section 1.1. The report has been prepared for the sole use of the client and has been prepared in accordance with a scope of work agreed by the client.

The report or document does not purport to provide legal advice and any conclusions or recommendations made should not be relied upon as a substitute for such advice.

The report does not constitute a recommendation by Reditus for the client or any other party to engage in any commercial or financial transaction and any decision by the client or other party to engage in such activities is strictly a matter for the client.

The report relies upon data, surveys, measurements and results taken at or under the site at particular times and conditions specified herein. Any findings, conclusions or recommendations only apply to the aforementioned circumstances and no greater reliance should be assumed or drawn by the client. Furthermore, the report has been prepared solely for use by the client and Reditus accepts no responsibility for its use by other parties. The client agrees that Reditus' report or associated correspondence will not be used or reproduced in full or in part for promotional purposes and cannot be used or relied upon by any other individual, party, group or company in any prospectus or offering. Any individual, party, group or company seeking to rely this report cannot do so and should seek their own independent advice.

No warranties, express or implied, are made. Subject to the scope of work undertaken, Reditus assessment is limited strictly to identifying typical environmental conditions associated with the subject property based on the scope of work and testing undertaken and does not include and evaluation of the structural conditions of any buildings on the subject property or any other issues that relate to the operation of the site and operational compliance of the site with state or federal laws, guidelines, standards or other industry recommendations or best practice. Scope of work undertaken for assessments are agreed in advance with the client and may not necessarily comply with state or federal laws or industry guidelines for the type of assessment conducted.

Additionally, unless otherwise stated Reditus did not conduct soil, air or wastewater analyses including asbestos or perform contaminated sampling of any kind. Nor did Reditus investigate any waste material from the property that may have been disposed off the site, or undertake and assessment or review of related site waste management practices.

The results of this assessment are based upon (if undertaken as part of the scope work) a site inspection conducted by Reditus personnel and/or information from interviews with people who have knowledge of site conditions and/or information provided by regulatory agencies. All conclusions and recommendations regarding the property are the professional opinions of the Reditus personnel involved with the project, subject to the qualifications made above.

While normal assessments of data reliability have been made, Reditus assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside of Reditus, or developments resulting from situations outside the scope of this project/assessment.

Reditus is not engaged in environmental auditing and/or reporting of any kind for the purpose of advertising sales promoting, or endorsement of any client's interests, including raising investment capital, recommending investment decisions, or other publicity purposes. Reditus assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside of Reditus, or developments resulting from situations outside the scope of this project.

In relation the conduct of Asbestos inspections or the preparation of hazardous materials reports Reditus has conducted inspections and the identification of hazardous material within the constraints presented by the property. Whist efforts are made to access areas not normally accessed during normal use of the site to identify the presence of asbestos or other hazardous material, unless explicitly tested no guarantee can be provided that such material is or is not present.

Reditus' professional opinions are based upon its professional judgment, experience, and training. These opinions are also based upon data derived from the limited testing and analysis described in this report or reports reviewed. It is possible that additional testing and analysis might produce different results and/or different opinions or other opinions. Reditus has limited its investigation(s) to the scope agreed upon with its client. Reditus believes that its opinions are reasonably supported by the testing and analysis that has been undertaken (if any), and that those opinions have been developed according to the professional standard of care for the environmental consulting profession in this area at this time. Other opinions and interpretations may be possible. That standard of care may change and new methods and practices of exploration, testing and analysis may develop in the future, which might produce different results.

Appendix A - Figures

REDITUS

Map	
21310_rp01_f01_siteloc_v01	
Date of Export	
29/08/2022	
Author	**Approver**
KS	DS
Data Source	
Metromap, Google Maps, Open Street Map, NSW Government	

Legend

Site Boundary

Figure 1 - Site Location

238-258 Captain Cook Drive, Kurnell NSW

21310 - Stormwater Monitoring Program

Dicker Data Ltd

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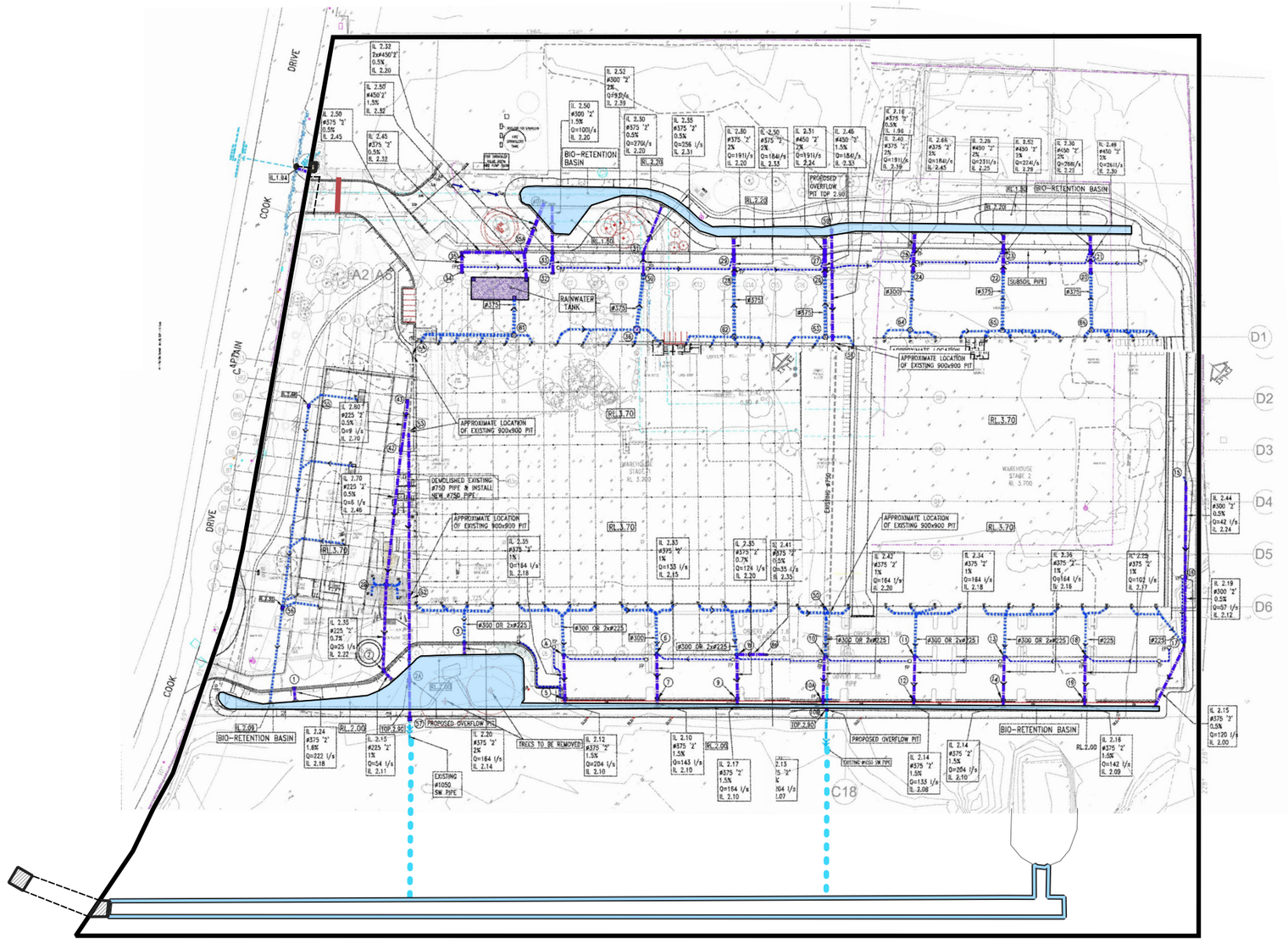

Map	21310_rp01_f02_stormwater_v01
Date of Export	29/08/2022
Author	MB
Approver	DS
Data Source	Metromap, Google Maps, NSW Government

Legend

- Site Boundary
- Existing Stormwater Pipe
- New Stormwater Pipe
- Rainwater Tank
- Open Stormwater Channel
- Bioretention Basin Outline
- Discharge Point
- Discharge Lines
- Driveway Gate
- Driveway Stormwater Pit

1:2,800

Approximate Scale at A3

Figure 2 - Onsite Stormwater Network

238-258 Captain Cook Drive, Kurnell, NSW

21310 - Stormwater Monitoring Program

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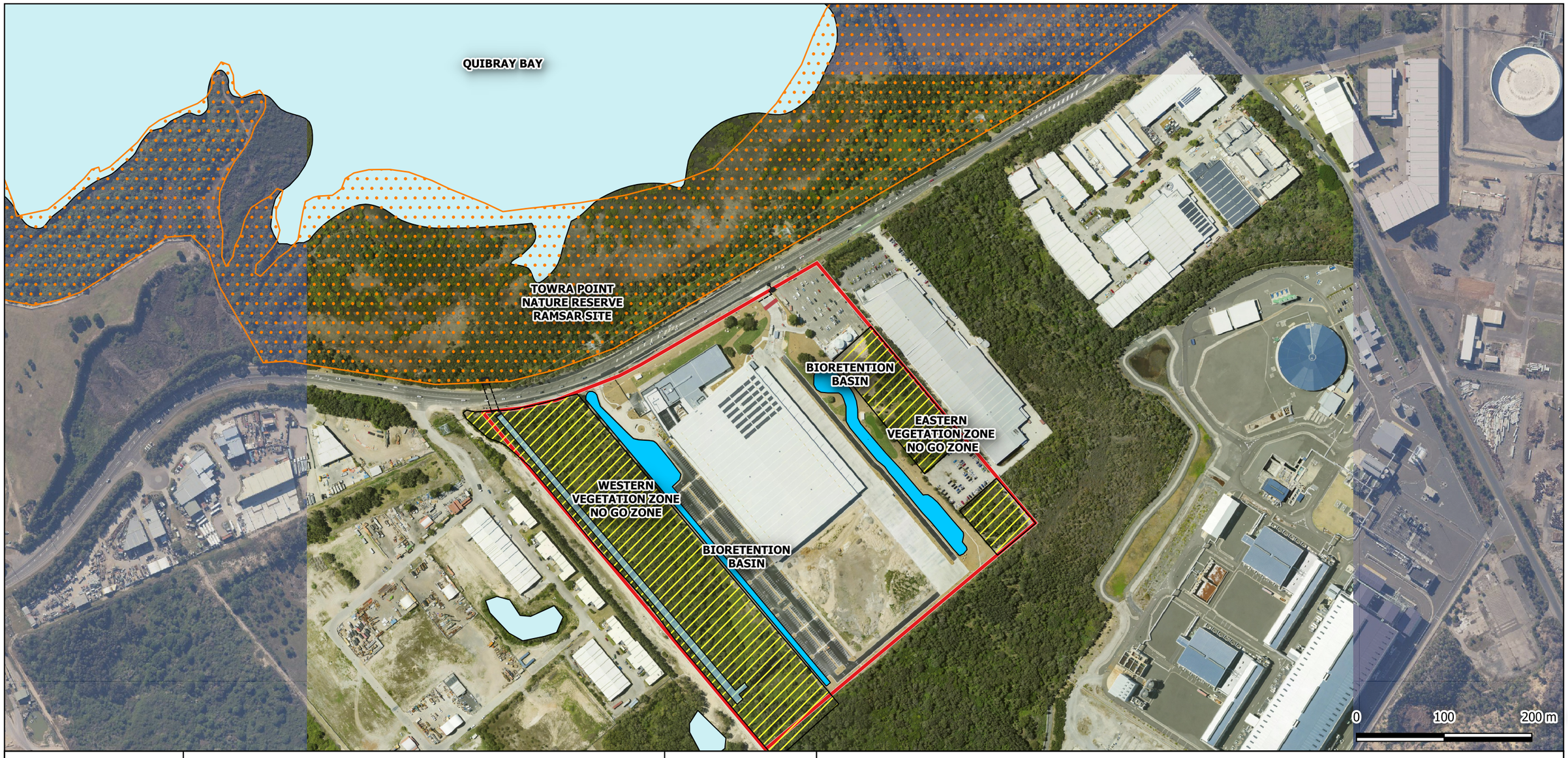

Map 21310_rp01_f03_Ecological Receptors_v01	**Legend** Site Boundary Bio-Retention Basins Vegetation Zone Towra Point Nature Reserve Ramsar Site Quibray Bay (Botany Bay) Open Stormwater Channel Discharge Point Discharge Lines Driveway Stormwater Pit Driveway Gate	N 1:5,500 Approximate Scale at A3	**Figure 3 - Ecological Receptors** 238-258 Captain Cook Drive, Kurnell, NSW 21310 - Stormwater Monitoring Program Dicker Data Ltd
Date of Export 29/08/2022			
Author MB / **Approver** DS			
Data Source Metromap, Google Maps, NSW Government			

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REDITUS

Map	
21310_rp01_f04_samplelocs_v01	
Date of Export	**Map Scale (approx. at A3)**
29/08/2022	1:3,000
Author	**Approver**
MB	DS
Data Source	
Metromap, Google Maps, Open Street Map	

Legend

- Site Boundary
- Stormwater Sample Locations
- Bio-Retention Basins
- Open stormwater channel
- Discharge Point
- Discharge Lines
- Driveway Stormwater Pit
- Driveway Gate

N

Figure 4 - Stormwater Sample Locations

238-258 Captain Cook Drive, Kurnell, NSW

21310 - Stormwater Monitoring Program

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Appendix B – Surface Water and Stormwater Laboratory Reports

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 282648

Client Details

Client	Reditus Consulting
Attention	Dean Stafford
Address	Suite 1, 11-15 Gray Street, SUTHERLAND, NSW, 2232

Sample Details

Your Reference	**19074**
Number of Samples	3 Water
Date samples received	12/11/2021
Date completed instructions received	12/11/2021

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

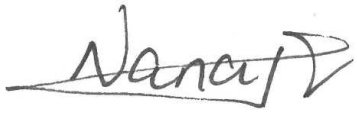
Date results requested by	19/11/2021
Date of Issue	19/11/2021

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Dragana Tomas, Senior Chemist
Hannah Nguyen, Metals Supervisor
Priya Samarawickrama, Senior Chemist
Steven Luong, Organics Supervisor

Authorised By



Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Water				
Our Reference	UNITS	282648-1	282648-2	282648-3
Your Reference		1	2	3
Date Sampled		12/11/2021	12/11/2021	12/11/2021
Type of sample		Water	Water	Water
Date extracted	-	12/11/2021	12/11/2021	12/11/2021
Date analysed	-	15/11/2021	15/11/2021	15/11/2021
TRH C_6 - C_9	µg/L	<10	<10	<10
TRH C_6 - C_{10}	µg/L	<10	<10	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	<10	<10
Benzene	µg/L	<1	<1	<1
Toluene	µg/L	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2
o-xylene	µg/L	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1
Surrogate Dibromofluoromethane	%	100	100	100
Surrogate toluene-d8	%	98	100	100
Surrogate 4-BFB	%	101	103	103

svTRH (C10-C40) in Water				
Our Reference		282648-1	282648-2	282648-3
Your Reference	UNITS	1	2	3
Date Sampled		12/11/2021	12/11/2021	12/11/2021
Type of sample		Water	Water	Water
Date extracted	-	16/11/2021	16/11/2021	16/11/2021
Date analysed	-	16/11/2021	16/11/2021	16/11/2021
TRH C_{10} - C_{14}	µg/L	<50	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100	<100
Total +ve TRH (C10-C36)	µg/L	<50	<50	<50
TRH >C_{10} - C_{16}	µg/L	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100
Total +ve TRH (>C10-C40)	µg/L	<50	<50	<50
Surrogate o-Terphenyl	%	110	106	97

PAHs in Water				
Our Reference		282648-1	282648-2	282648-3
Your Reference	UNITS	1	2	3
Date Sampled		12/11/2021	12/11/2021	12/11/2021
Type of sample		Water	Water	Water
Date extracted	-	16/11/2021	16/11/2021	16/11/2021
Date analysed	-	17/11/2021	17/11/2021	17/11/2021
Naphthalene	µg/L	<1	<1	<1
Acenaphthylene	µg/L	<1	<1	<1
Acenaphthene	µg/L	<1	<1	<1
Fluorene	µg/L	<1	<1	<1
Phenanthrene	µg/L	<1	<1	<1
Anthracene	µg/L	<1	<1	<1
Fluoranthene	µg/L	<1	<1	<1
Pyrene	µg/L	<1	<1	<1
Benzo(a)anthracene	µg/L	<1	<1	<1
Chrysene	µg/L	<1	<1	<1
Benzo(b,j+k)fluoranthene	µg/L	<2	<2	<2
Benzo(a)pyrene	µg/L	<1	<1	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1	<1	<1
Dibenzo(a,h)anthracene	µg/L	<1	<1	<1
Benzo(g,h,i)perylene	µg/L	<1	<1	<1
Benzo(a)pyrene TEQ	µg/L	<5	<5	<5
Total +ve PAH's	µg/L	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	73	104	92

Organochlorine Pesticides in Water				
Our Reference		282648-1	282648-2	282648-3
Your Reference	UNITS	1	2	3
Date Sampled		12/11/2021	12/11/2021	12/11/2021
Type of sample		Water	Water	Water
Date extracted	-	16/11/2021	16/11/2021	16/11/2021
Date analysed	-	17/11/2021	17/11/2021	17/11/2021
alpha-BHC	µg/L	<0.2	<0.2	<0.2
HCB	µg/L	<0.2	<0.2	<0.2
beta-BHC	µg/L	<0.2	<0.2	<0.2
gamma-BHC	µg/L	<0.2	<0.2	<0.2
Heptachlor	µg/L	<0.2	<0.2	<0.2
delta-BHC	µg/L	<0.2	<0.2	<0.2
Aldrin	µg/L	<0.2	<0.2	<0.2
Heptachlor Epoxide	µg/L	<0.2	<0.2	<0.2
gamma-Chlordane	µg/L	<0.2	<0.2	<0.2
alpha-Chlordane	µg/L	<0.2	<0.2	<0.2
Endosulfan I	µg/L	<0.2	<0.2	<0.2
pp-DDE	µg/L	<0.2	<0.2	<0.2
Dieldrin	µg/L	<0.2	<0.2	<0.2
Endrin	µg/L	<0.2	<0.2	<0.2
Endosulfan II	µg/L	<0.2	<0.2	<0.2
pp-DDD	µg/L	<0.2	<0.2	<0.2
Endrin Aldehyde	µg/L	<0.2	<0.2	<0.2
pp-DDT	µg/L	<0.2	<0.2	<0.2
Endosulfan Sulphate	µg/L	<0.2	<0.2	<0.2
Methoxychlor	µg/L	<0.2	<0.2	<0.2
Surrogate TCMX	%	75	93	88

OP Pesticides in Water				
Our Reference		282648-1	282648-2	282648-3
Your Reference	UNITS	1	2	3
Date Sampled		12/11/2021	12/11/2021	12/11/2021
Type of sample		Water	Water	Water
Date extracted	-	16/11/2021	16/11/2021	16/11/2021
Date analysed	-	17/11/2021	17/11/2021	17/11/2021
Dichlorvos	µg/L	<0.2	<0.2	<0.2
Dimethoate	µg/L	<0.2	<0.2	<0.2
Diazinon	µg/L	<0.2	<0.2	<0.2
Chlorpyriphos-methyl	µg/L	<0.2	<0.2	<0.2
Ronnel	µg/L	<0.2	<0.2	<0.2
Fenitrothion	µg/L	<0.2	<0.2	<0.2
Malathion	µg/L	<0.2	<0.2	<0.2
Chlorpyriphos	µg/L	<0.2	<0.2	<0.2
Parathion	µg/L	<0.2	<0.2	<0.2
Bromophos ethyl	µg/L	<0.2	<0.2	<0.2
Ethion	µg/L	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	µg/L	<0.2	<0.2	<0.2
Surrogate TCMX	%	75	93	88

PCBs in Water				
Our Reference		282648-1	282648-2	282648-3
Your Reference	UNITS	1	2	3
Date Sampled		12/11/2021	12/11/2021	12/11/2021
Type of sample		Water	Water	Water
Date extracted	-	16/11/2021	16/11/2021	16/11/2021
Date analysed	-	17/11/2021	17/11/2021	17/11/2021
Aroclor 1016	µg/L	<2	<2	<2
Aroclor 1221	µg/L	<2	<2	<2
Aroclor 1232	µg/L	<2	<2	<2
Aroclor 1242	µg/L	<2	<2	<2
Aroclor 1248	µg/L	<2	<2	<2
Aroclor 1254	µg/L	<2	<2	<2
Aroclor 1260	µg/L	<2	<2	<2
Surrogate TCMX	%	75	93	88

HM in water - dissolved				
Our Reference		282648-1	282648-2	282648-3
Your Reference	UNITS	1	2	3
Date Sampled		12/11/2021	12/11/2021	12/11/2021
Type of sample		Water	Water	Water
Date prepared	-	18/11/2021	18/11/2021	18/11/2021
Date analysed	-	18/11/2021	18/11/2021	18/11/2021
Arsenic-Dissolved	µg/L	<1	<1	<1
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1
Chromium-Dissolved	µg/L	1	<1	<1
Copper-Dissolved	µg/L	<1	<1	<1
Lead-Dissolved	µg/L	<1	<1	<1
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	<1	<1	<1
Zinc-Dissolved	µg/L	11	2	15

HM in water - total				
Our Reference		282648-1	282648-2	282648-3
Your Reference	UNITS	1	2	3
Date Sampled		12/11/2021	12/11/2021	12/11/2021
Type of sample		Water	Water	Water
Date prepared	-	15/11/2021	15/11/2021	15/11/2021
Date analysed	-	15/11/2021	15/11/2021	15/11/2021
Arsenic-Total	µg/L	<1	<1	<1
Cadmium-Total	µg/L	<0.1	<0.1	<0.1
Chromium-Total	µg/L	1	1	<1
Copper-Total	µg/L	<1	<1	<1
Lead-Total	µg/L	<1	<1	<1
Mercury-Total	µg/L	<0.05	<0.05	<0.05
Nickel-Total	µg/L	<1	<1	<1
Zinc-Total	µg/L	13	2	16

Miscellaneous Inorganics				
Our Reference		282648-1	282648-2	282648-3
Your Reference	UNITS	1	2	3
Date Sampled		12/11/2021	12/11/2021	12/11/2021
Type of sample		Water	Water	Water
Date prepared	-	12/11/2021	12/11/2021	12/11/2021
Date analysed	-	12/11/2021	12/11/2021	12/11/2021
Nitrate as N in water	mg/L	0.04	0.01	0.03
Ammonia as N in water	mg/L	<0.005	0.005	0.019

Method ID	Methodology Summary
Inorg-055	Nitrate - determined colourimetrically. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
Inorg-057	Ammonia - determined colourimetrically, based on APHA latest edition 4500-NH3 F. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a KCl extraction.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-021	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-023	Water samples are analysed directly by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W4	[NT]
Date extracted	-			12/11/2021	1	12/11/2021	15/11/2021		12/11/2021	[NT]
Date analysed	-			15/11/2021	1	15/11/2021	15/11/2021		15/11/2021	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	1	<10	<10	0	104	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	1	<10	<10	0	104	[NT]
Benzene	µg/L	1	Org-023	<1	1	<1	<1	0	100	[NT]
Toluene	µg/L	1	Org-023	<1	1	<1	<1	0	100	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	1	<1	<1	0	105	[NT]
m+p-xylene	µg/L	2	Org-023	<2	1	<2	<2	0	108	[NT]
o-xylene	µg/L	1	Org-023	<1	1	<1	<1	0	105	[NT]
Naphthalene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	103	1	100	98	2	102	[NT]
Surrogate toluene-d8	%		Org-023	100	1	98	100	2	100	[NT]
Surrogate 4-BFB	%		Org-023	103	1	101	103	2	101	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			16/11/2021	1	16/11/2021	16/11/2021		16/11/2021	[NT]
Date analysed	-			16/11/2021	1	16/11/2021	16/11/2021		16/11/2021	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	1	<50	<50	0	115	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	1	<100	<100	0	119	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	1	<100	<100	0	109	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	1	<50	<50	0	115	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	1	<100	<100	0	119	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	1	<100	<100	0	109	[NT]
Surrogate o-Terphenyl	%		Org-020	130	1	110	113	3	90	[NT]

QUALITY CONTROL: PAHs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W5	282648-2
Date extracted	-			16/11/2021	1	16/11/2021	16/11/2021		16/11/2021	16/11/2021
Date analysed	-			17/11/2021	1	17/11/2021	17/11/2021		17/11/2021	17/11/2021
Naphthalene	µg/L	1	Org-022/025	<1	1	<1	<1	0	80	70
Acenaphthylene	µg/L	1	Org-022/025	<1	1	<1	<1	0	[NT]	[NT]
Acenaphthene	µg/L	1	Org-022/025	<1	1	<1	<1	0	77	65
Fluorene	µg/L	1	Org-022/025	<1	1	<1	<1	0	89	73
Phenanthrene	µg/L	1	Org-022/025	<1	1	<1	<1	0	88	84
Anthracene	µg/L	1	Org-022/025	<1	1	<1	<1	0	[NT]	[NT]
Fluoranthene	µg/L	1	Org-022/025	<1	1	<1	<1	0	72	74
Pyrene	µg/L	1	Org-022/025	<1	1	<1	<1	0	75	75
Benzo(a)anthracene	µg/L	1	Org-022/025	<1	1	<1	<1	0	[NT]	[NT]
Chrysene	µg/L	1	Org-022/025	<1	1	<1	<1	0	70	68
Benzo(b,j+k)fluoranthene	µg/L	2	Org-022/025	<2	1	<2	<2	0	[NT]	[NT]
Benzo(a)pyrene	µg/L	1	Org-022/025	<1	1	<1	<1	0	100	98
Indeno(1,2,3-c,d)pyrene	µg/L	1	Org-022/025	<1	1	<1	<1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	1	Org-022/025	<1	1	<1	<1	0	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	1	Org-022/025	<1	1	<1	<1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	69	1	73	88	19	75	129

QUALITY CONTROL: Organochlorine Pesticides in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W5	282648-2
Date extracted	-			16/11/2021	1	16/11/2021	16/11/2021		16/11/2021	16/11/2021
Date analysed	-			17/11/2021	1	17/11/2021	17/11/2021		17/11/2021	17/11/2021
alpha-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	76	66
HCB	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
beta-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	104	82
gamma-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Heptachlor	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	84	80
delta-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Aldrin	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	79	77
Heptachlor Epoxide	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	79	79
gamma-Chlordane	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
alpha-Chlordane	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endosulfan I	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDE	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	69	69
Dieldrin	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	86	88
Endrin	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	68	71
Endosulfan II	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDD	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	71	71
Endrin Aldehyde	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDT	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	88	85
Methoxychlor	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	77	1	75	89	17	81	122

QUALITY CONTROL: OP Pesticides in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W5	282648-2
Date extracted	-			16/11/2021	1	16/11/2021	16/11/2021		16/11/2021	16/11/2021
Date analysed	-			17/11/2021	1	17/11/2021	17/11/2021		17/11/2021	17/11/2021
Dichlorvos	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	70	64
Dimethoate	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Diazinon	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Chlorpyriphos-methyl	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Ronnel	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	84	84
Fenitrothion	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	68	62
Malathion	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	83	77
Chlorpyriphos	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	85	83
Parathion	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	63	60
Bromophos ethyl	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Ethion	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	68	68
Azinphos-methyl (Guthion)	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	77	1	75	89	17	81	122

QUALITY CONTROL: PCBs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W5	282648-2
Date extracted	-			16/11/2021	1	16/11/2021	16/11/2021		16/11/2021	16/11/2021
Date analysed	-			17/11/2021	1	17/11/2021	17/11/2021		17/11/2021	17/11/2021
Aroclor 1016	µg/L	2	Org-021	<2	1	<2	<2	0	[NT]	[NT]
Aroclor 1221	µg/L	2	Org-021	<2	1	<2	<2	0	[NT]	[NT]
Aroclor 1232	µg/L	2	Org-021	<2	1	<2	<2	0	[NT]	[NT]
Aroclor 1242	µg/L	2	Org-021	<2	1	<2	<2	0	[NT]	[NT]
Aroclor 1248	µg/L	2	Org-021	<2	1	<2	<2	0	[NT]	[NT]
Aroclor 1254	µg/L	2	Org-021	<2	1	<2	<2	0	84	86
Aroclor 1260	µg/L	2	Org-021	<2	1	<2	<2	0	[NT]	[NT]
Surrogate TCMX	%		Org-021	77	1	75	89	17	81	122

QUALITY CONTROL: HM in water - dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date prepared	-			18/11/2021	1	18/11/2021	18/11/2021		18/11/2021	[NT]
Date analysed	-			18/11/2021	1	18/11/2021	18/11/2021		18/11/2021	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	94	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	<0.1	<0.1	0	95	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	1	1	0	91	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	93	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	95	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	<0.05	[NT]		100	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	94	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	11	12	9	95	[NT]

QUALITY CONTROL: HM in water - total						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			15/11/2021	[NT]	[NT]	[NT]	[NT]	15/11/2021	[NT]
Date analysed	-			15/11/2021	[NT]	[NT]	[NT]	[NT]	15/11/2021	[NT]
Arsenic-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Cadmium-Total	µg/L	0.1	Metals-022	<0.1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Chromium-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Copper-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	114	[NT]
Lead-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Mercury-Total	µg/L	0.05	Metals-021	<0.05	[NT]	[NT]	[NT]	[NT]	100	[NT]
Nickel-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Zinc-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	106	[NT]

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W4	[NT]
Date prepared	-			12/11/2021	[NT]	[NT]	[NT]	[NT]	12/11/2021	[NT]
Date analysed	-			12/11/2021	[NT]	[NT]	[NT]	[NT]	12/11/2021	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	[NT]	[NT]	[NT]	[NT]	108	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	[NT]	[NT]	[NT]	[NT]	107	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

Dissolved Metals: no filtered, preserved sample was received, therefore the unpreserved sample was filtered through 0.45µm filter at the lab.
Note: there is a possibility some elements may be underestimated.

REDITUS

CHAIN OF CUSTODY

Suite 1
11-15 Gray Street
Sutherland NSW 2232

Reditus Use ONLY	Project ID: 19074	Project Name: DICKER DATA KURNELL	**EDD Format:** PDF, Esdat online, reditusconsulting@esdat.com.au		
	Project Manager: D. STAFFORD	Sampler: D. STAFFORD	**Emails for invoice:** accounts@reditus.com.au		
	Contact info: deanstafford@reditus.com		**Email for Results:** deanstafford @reditus.com.au		
Laboratory Use	Eurofins / Pri / Sec / Job #	SYD/ BNE/ MEL/ PER/ ADL/ NTL/ DRW	Quote ID:	Date: 12 / 11 / 21	**TAT Req** *Same Day* 1/2/3/4/(STD)
	Envirolab / (Pri) / Sec / Name	Signature:	(Hand delivered)/Courier/Post		
	SGS / Pri / Sec / T° C	**Cooling:** Ice/ Ice Pack/ None	**Seal:** Intact/ Broken/(None)		

Sample Information				Required Analysis																Comments
Sample ID	**Date**	**Depth**	**Matrix**	Combo (lab filt metals)	Nitrate	Ammonia	8 Metals (total)												**HOLD**	
1	12/11/21		WATER	X	X	X	X													plase lab filter metals then unpreserved bottle
2	2	12/11/21		WATER	X	X	X	X													"
3	3	12/11/21		WATER	X	X	X	X													"

Lab Services
2 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 282648

Date Received: 12/11/21
Time Received: 10:10
Received By: CP
Temp: (Cool)/Ambient
(Ice)/Icepack
Intact/Broken/(None)

Sydney Airport, New South Wales
November 2021 Daily Weather Observations

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Mo	13.4	23.4	0	5.2	4.3	NNE	41	11:23	18.9	57	7	W	11	1026.5	21.6	51	7	NE	24	1024.0
2	Tu	16.0	25.4	0	6.6	11.1	E	50	12:34	20.5	70	3	ENE	24	1027.7	23.7	45	5	ENE	31	1026.4
3	We	17.9	25.3	0	7.4	10.9	NE	54	13:04	21.9	49	3	N	24	1026.9	23.4	46	7	NE	41	1022.9
4	Th	18.4	22.1	0	10.0	0.0	N	31	08:46	20.5	67	8	NE	20	1021.5	19.5	77	8	NE	17	1020.6
5	Fr	16.7	23.2	12.6	1.4	1.6	NE	41	15:12	18.8	91	8	ESE	7	1021.5	21.7	64	7	ENE	31	1018.9
6	Sa	17.3	25.6	0	4.6	11.6	NNE	56	17:53	21.1	61	2	WNW	9	1015.9	24.8	52	1	NE	33	1010.7
7	Su	17.9	25.7	0.2	7.6	0.5	W	35	12:06	19.8	84	8	W	13	1009.8	20.9	82	8	NNW	13	1006.8
8	Mo	17.4	23.5	11.8	1.0	7.2	S	33	22:35	19.3	90	7	SSE	11	1008.2	21.1	73	6	SE	19	1007.7
9	Tu	16.6	23.5	0.4	6.8	8.2	SSW	31	04:33	18.7	84	7	S	19	1013.0	21.6	67	6	E	17	1010.7
10	We	17.7	22.1	0	4.4	0.4	NE	37	20:51	22.1	75	7	WNW	13	1009.1	19.8	94	8	ENE	9	1006.9
11	Th	17.1	18.8	13.2	1.2	0.0	S	54	05:20	17.7	86	8	S	35	1006.5	17.0	79	8	SE	26	1005.9
12	Fr	13.1	19.1	19.2	5.2	4.0	SSE	41	23:04	14.8	96	8	WSW	19	998.1	18.3	81	6	SSE	26	994.5
13	Sa	14.7	22.4	0.2	4.4	7.5	WNW	78	08:33	18.3	41	3	WNW	48	998.2	21.4	34	7	WNW	44	997.4
14	Su	13.0	23.6	0.4	10.2	10.7	NW	70	16:54	17.2	39	7	WNW	31	1007.7	21.5	26	5	W	44	1003.9
15	Mo	12.4	23.3	0	6.4	11.8	WSW	65	15:06	17.0	37	1	W	24	1007.5	21.5	27	3	WSW	39	1007.0
16	Tu	13.7	19.6	0	8.8	13.0	SW	48	07:54	16.2	40	1	SW	33	1015.9	18.0	42	1	SE	28	1017.1
17	We	13.6	21.4	0	8.0	10.1	ENE	39	15:24	16.6	72	5	S	20	1024.6	20.3	53	2	E	24	1022.6
18	Th	15.8	25.1	0	8.0	11.3	NNE	54	17:04	21.1	59	3	N	15	1021.2	23.6	54	1	NE	33	1015.5
19	Fr	18.9	29.7	0.4	7.6	3.4	SSW	63	17:00	20.0	80	8	NE	9	1013.4	28.8	37	8	NE	30	1010.0
20	Sa	16.7	19.6	0.2	4.2	0.2	S	48	15:43	18.1	85	8	SSE	17	1010.7	17.7	87	8	SSE	30	1010.8
21	Su	14.9	18.6	12.4	3.6	0.0	S	54	11:37	16.2	95	8	SSE	30	1016.3	15.5	98	8	SSE	43	1015.8
22	Mo	15.0	20.3	14.2	2.0	4.0	SSE	46	23:24	18.0	79	7	S	35	1022.4	19.2	73	5	S	30	1021.1
23	Tu	16.1	22.1	2.6	4.8	2.6	ESE	31	23:06	19.8	77	7	E	24	1021.2	19.8	86	7	S	24	1019.1
24	We	17.9	26.8	0	2.2	3.8	NNE	56	16:18	21.8	80	8	ENE	7	1017.3	26.1	61	7	NE	28	1014.0
25	Th		25.4	4.0	5.0	0.2	NE	37	17:42	22.0	85	8	NNE	13	1011.7	23.4	84	7	NE	17	1007.2
26	Fr	16.4	18.7	37.8	8.8	0.0	S	74	13:01	17.4	93	8	S	41	1009.0	18.1	87	8	S	52	1009.9
27	Sa	15.5	18.5	7.8	2.6	0.7	SSE	67	23:06	16.4	90	8	SSE	46	1018.1	17.8	73	7	S	48	1018.7
28	Su	15.2	19.1	0.8	4.6	4.1	SSE	54	08:33	16.8	76	5	S	33	1022.4	18.7	65	7	SSE	33	1021.1
29	Mo	14.2	21.7	0	4.0	3.2	SE	28	13:14	17.9	66	7	SSE	19	1021.1	20.0	55	6	E	17	1018.5
30	Tu	17.6	23.6	0	5.8	0.0	NE	26	16:39	19.3	79	8	S	11	1018.7	19.0	95	8	SE	15	1016.5
Statistics for November 2021																					
Mean		15.9	22.6		5.4	4.9				18.8	72	6		22	1015.4	20.8	64	6		28	1013.4
Lowest		12.4	18.5		1.0	0.0				14.8	37	1	#	7	998.1	15.5	26	1	ENE	9	994.5
Highest		18.9	29.7	37.8	10.2	13.0	WNW	78		22.1	96	8	WNW	48	1027.7	28.8	98	8	S	52	1026.4
Total				138.2	162.4	146.4															

Observations were drawn from Sydney Airport AMO {station 066037}

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