Appendix C2 Annual Monitoring Report 2022

Annual Monitoring Review

Shoal Bay Waste Management Facility - Soil and Water Monitoring Program

CW1121900



Prepared for

City of Darwin

28 July 2022

Cardno

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Stantec

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Our report is based on information made available by the client. The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Cardno is both complete and accurate. Whilst, to the best of our knowledge, the information contained in this report is accurate at the date of issue, changes may occur to the Site conditions, the Site context or the applicable planning framework. This report should not be used after any such changes without consulting the provider of the report or a suitably qualified person.

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1 Introduction

Cardno has been commissioned by the City of Darwin (CoD) to undertake groundwater, surface water, leachate, soil and dust deposition monitoring at the Shoal Bay Waste Management Facility (the 'Site') operated by City of Darwin (COD) in accordance with the Site's environmental protection license (EPL) EPL 188 – 03 pursuant to the *NT Waste Management and Pollution Control Act* (WMPC Act).

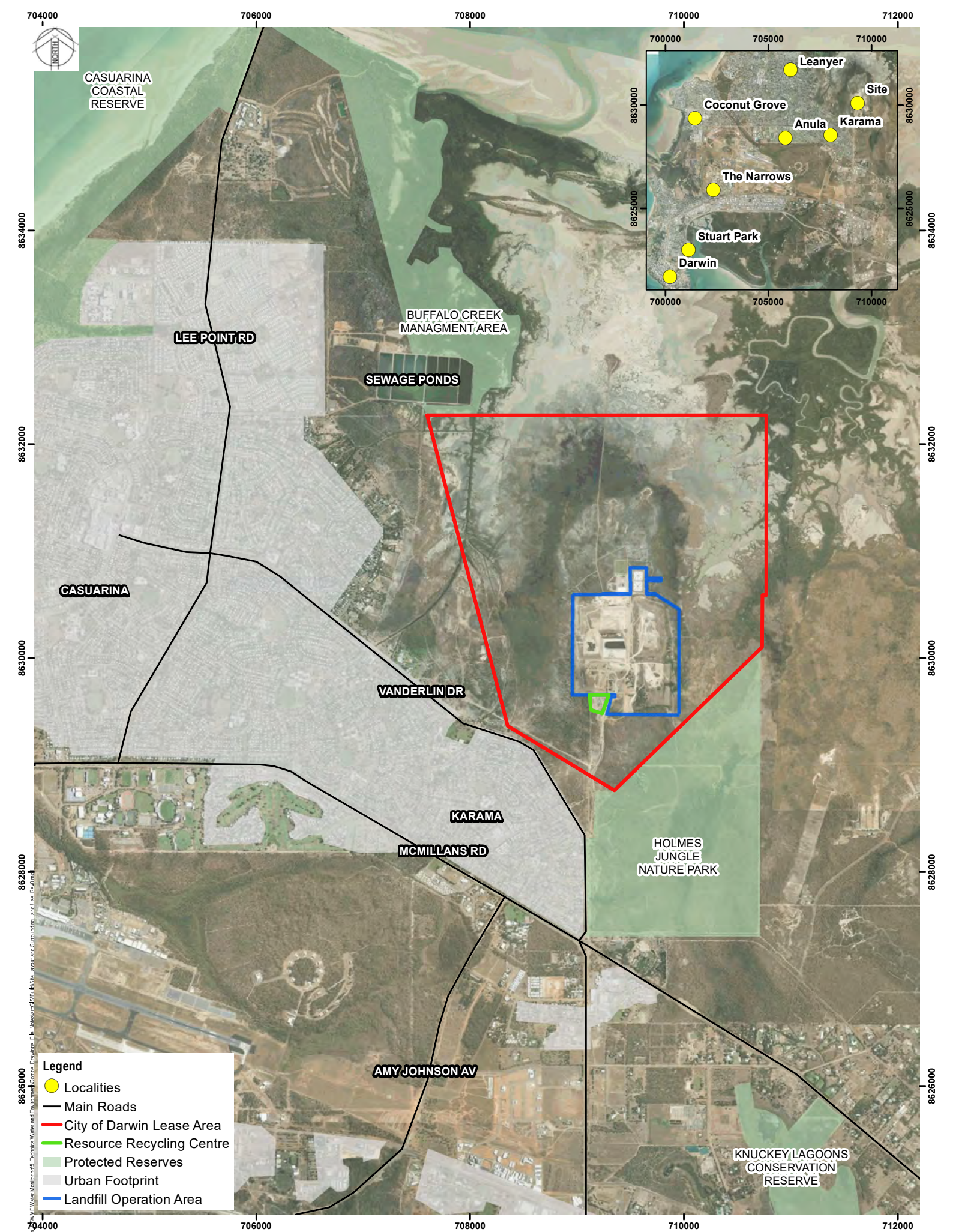
Monitoring activities for the Site are conducted in line with methodologies laid out in the Soil and Water Monitoring Plan (SWMP) (EcOz, 2021a) in order to comply with EPL188-03 and EPA304-01 relevant to the new water treatment facilities adjacent to the western side of the existing leachate treatment ponds.



Figure 1-1 Shoal Bay Waste Management Facility

1.1 Site Location

The SBWMF (**Figure 1-1**, **Figure 1-2**) is located at Lot 03952 Town of Sanderson Plan S 79/149a, Vanderlin Drive, Holmes, Northern Territory (NT) (herein referred to as 'the Site').



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SITE LOCALITY AND SURROUNDING LAND USE

CITY OF DARWIN

SHOAL BAY WASTE MANAGEMENT FACILITY ENVIRONMNETAL MANAGEMENT PLAN

FIGURE 1-2

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1.2 Purpose and Objectives

The purpose of this Annual Review is to provide a summary of all of Cardno's monitoring activities for the period 1 July 2021 to 30 June 2022, including analytical results and assessment against adopted criteria in accordance with the Site's Licence conditions. This review has been prepared in accordance with the requirements of the NT EPA *Guideline for Reporting on Environmental Monitoring* and SWMP to include the following:

- Summary of all surface water, groundwater, leachate, air emissions, depositional and soil monitoring undertaken during the monitoring review period.
- Graphical and tabulated interpretation of all monitoring data for the monitoring period;
- Comparison of results with respect to the adopted quality criteria and/or action levels;
- Discussion of results with respect to long term monitoring data over a twelve-month period and temporal and spatial trends;
- Assess compliance with regulatory guidelines and standards including notifying the regulator; and
- Provide recommendations for remediation where impacts are identified during monitoring and reporting activities.

Noting analytical data has also been provided to CoD separately in Microsoft Excel format outside of this report.

2 Site Identification

2.1 Site Use

The SBWMF lies within Lot 3952, Town of Sanderson (see **Figure 1-2**) described in EPL 188-03 as a municipal waste resource recovery and disposal site operated by the CoD which services both domestic and commercial customers in the Darwin area. Under the terms and conditions of the lease, the property is designated as a Waste Management Project Area in which CoD is authorised to conduct the following scheduled activities:

- Operating premises for the disposal of waste by burial that service, or are designed to service, the waste disposal requirements of more than 1,000 persons;
- Collecting, transporting, storing, re-cycling, treating or disposing of a listed waste (see **Table 2-1**) on a commercial or fee for service basis, other than in or for the purpose of a sewage treatment plant; and
- Operating premises, other than a sewage treatment plant, associated with collecting, transporting, storing, re-cycling, treating or disposing of a listed waste (see **Table 2-1**) on a commercial or fee for service basis.

Table 2-1 Listed Wastes Authorised to be Handled

Listed Waste	Collection	Transport	Storage	Treatment	Recycling	Disposal
Acidic solutions or acids in solid form	×	×	✓	×	×	×
Animal effluent and residues	×	×	×	×	×	✓
Asbestos	×	×	×	×	×	✓
Clinical and related wastes	×	×	×	×	×	✓
Lead, lead compounds	×	×	✓	×	×	×
Sewerage sludge and residues including nightsoil and septic tank sludge	×	×	×	×	×	✓
Soils contaminated with a listed waste	×	×	×	×	×	✓
Tyres	×	×	×	×	×	✓
Waste from the production, formulation and use of inks, dyes, pigments, paints, lacquers and varnish	×	×	✓	×	×	×
Waste mineral oils unfit for their original intended use	×	×	✓	×	×	×

✓ Activity authorised by EPL 188 × Activity not authorised by EPL188

2.2 Site Layout

At the end of this monitoring period the Site included used putrescible waste landfill cell (Stage 5), inert waste landfill cell (Stage 2), waste transfer station, recycle shop, mulching/processing facility for green waste, leachate management system and landfill gas management system.

- The Stage 3 and 4 putrescible waste landfill cells reached capacity and were capped during 2016 and 2017, with the waste accepted by the Stage 5 cell currently approaching capacity, where waste has started diverting to the recently constructed Stage 6 landfill cell.
- The Stage 3, 4, and 5 landfill cells are lined and have a leachate collection system. The leachate collected is irrigated back onto the cells, when possible. Leachate storage ponds store excess leachate until it can be applied back onto the landfill cells;
- The Stage 2 landfill cell located in the north eastern portion of the Site is unlined and accepts inert waste (construction and demolition including asbestos). The Stage 1 landfill cell, located in the southeast is an historic unlined landfill, which is capped and not in use. Leachate from the unlined Stage 1 and 2 landfill cells is collected in an underground drain running north-south along the eastern edge of the cells. This then drains into a collection chamber 'LMP02', where it is pumped out and irrigated onto the capped Stage 1 cell;
- Green waste storage and mulching is undertaken on a pad south of Stage 5;
- A facility for the short-term storage of chemicals is located in the southern portion of the Site; and
- Renewable energy is generated on Site using landfill gas (methane) and provided to Darwin's power grid. The landfill gas management system involves capturing methane gas emissions from the landfill via a gas extraction system comprising vertical and horizontal wells drilled into the waste cells connected to a reticulation system. Condensate from the gas extraction system is pumped to disposal trenches within the Stage 2 landfill.

For more details on the disposal, storage and handling of different waste types refer to the SBWMF *Environmental Management Plan* (CoD, 2016), Sections 5.4 and 5.5, and for more details on landfill leachate management and gas management, refer to the SBWMF *Environmental Management Plan* (CoD, 2016), Section 5.6 *Water Quality Management*.

2.3 Environmental Setting

2.3.1 Climate

The regional climate is tropical monsoonal with a distinct wet season (November to April) and dry season (May to October). Average yearly rainfall is 1,723.3 mm, 80% of which occurs between December and March (Darwin Airport, BoM Station Site Number 014015).

2.3.2 Hydrology

Surface water from the eastern portions of the SBWMF flows towards the Meckitt Creek floodplain (see **Figure 2-1**) Flows from the western portion of the Site are towards the Leanyer Swamp and Buffalo Creek. Both Meckitt Creek and Buffalo Creek are mangrove-lined tidal inlets of Shoal Bay, a coastal embayment with extensive sand and mud flats.

2.3.3 Hydrogeology

Geology and groundwater aquifers beneath the Site are described in detail in the *Shoal Bay Waste Disposal Site, Hydrogeological Investigation* (URS 2015).

The lithology encountered during groundwater bore drilling for the investigation comprised topsoils (silts and clays), generally underlain by weathered (lateralised) siltstone over most of the Site, and claystone east of Stage 1. Beneath this, sandstone was encountered at depths of 9.0 to 20 m below the surface across most of the Site.

Groundwater exists within the unconsolidated overlying sediments and fractured and weathered underlying bedrock. Bore yields are generally very poor; less than 5.0 L/sec. Seasonal groundwater levels measured as part of the SBWMF water monitoring plan are greater than 12 meters below ground level (mbgl) at the end of the dry season and usually within 2.0 m of the ground surface during the peak of the wet season.

Groundwater down-gradient of the SBWMF is saline due to its close proximity to the coast and tidal saline intrusion; see *the Groundwater Resources of the Darwin Area Map* (DIPE 2003). There are no groundwater

bores or groundwater uses down-gradient of SBWMF other than that potentially associated with environmental supply of groundwater seepage into wetlands and tidal inlets.

Higher yielding weathered and fractured carbonate rock aquifers occur in the wider region, with yields commonly greater than 5.0 L/sec. *The Groundwater Supply Prospects and Hydrogeology of the Cox Peninsula Region Map* (NRETA 2008) identifies a high yielding carbonate aquifer south-east of the SBWMF, trending in a northerly direction. Groundwater from this aquifer discharges to the surface within the Holmes Jungle Nature Park and maintains streamflow through the dry season. This spring and associated shallow groundwater support the Holmes Jungle rainforest. Further to the southeast around the Knuckey Lagoon area, a large number of bores draw groundwater from this carbonate aquifer for domestic and agricultural purposes.

The carbonate rock aquifer and associated springs, Holmes Jungle rainforest and groundwater users are all located upgradient of the SBWMF. No significant areas of carbonate rock aquifer are located down-gradient of the SBWMF, and no carbonate rocks were encountered during the installation of the 32 groundwater bores, to depths of up to 30 mbgl, across the Site for the hydrogeological investigation (URS 2016).

For detailed analysis of potential contamination pathways for leachate and other pollutants from the SBWMF towards potential human health and environmental receptors, refer to the *Shoal Bay Waste Disposal Site Conceptual Site Model* (URS 2016).

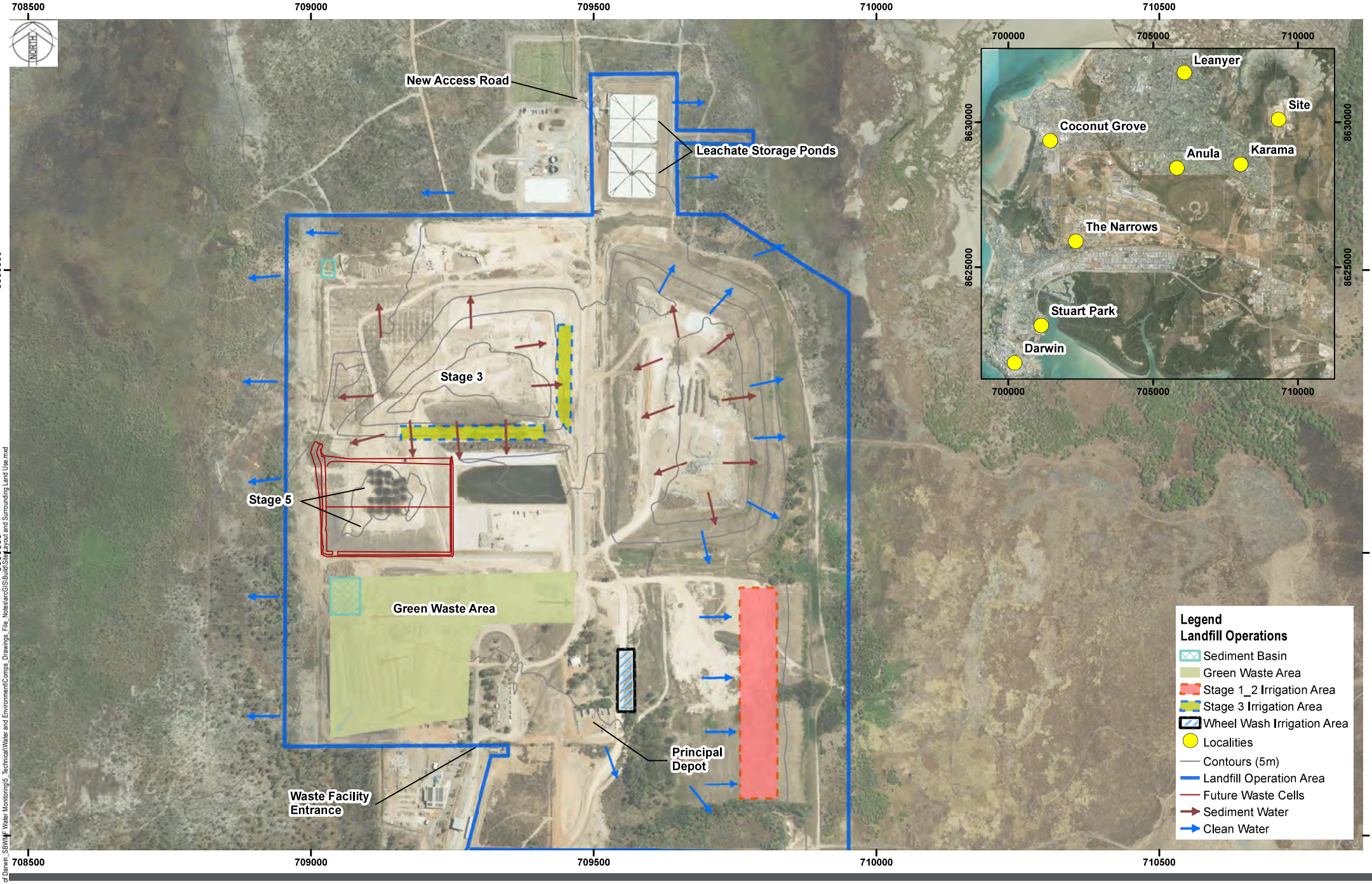
2.3.4 Environmental Values

EPL188-03 lists the following 'Environment Protection Objectives' (Part 4 of the WMPC Act), 'Beneficial Uses and Water Quality Standards' (section 73 of the NT Water Act) and 'environmental interests' that apply to the Site and immediate surrounds:

- *An Environment Protection Objective (EPO) is a statutory instrument to establish principles on which:*
  - a) *environmental quality is to be maintained, enhanced, managed or protected;*
  - b) *pollution, or environmental harm resulting from pollution, is to be assessed, prevented, reduced, controlled, rectified or cleaned up; and*
  - c) *effective waste management is to be implemented or evaluated.*
- *In accordance with section 18 of the WMPC Act a beneficial use, quality standard, criteria or objective declared under section 73 of the Water Act and in force is an environment protection objective for the purposes of the WMPC Act.*
- *Declared Beneficial Uses for the Darwin Harbour Area: Water Quality Objectives, NTG Gazette 29, June 2010; these include the beneficial uses of: environment, agriculture, cultural and rural stock and domestic. Of these, the 'environmental' beneficial use is the stringent in regard to water quality requirements given aquatic organisms are the most sensitive of these beneficial uses to water quality changes.*
- *Darwin Harbour Site of Conservation Significance (SOC 6)*

The SBWMF also lies within the Shoal Bay Site of Conservation Significance (SOC 8); see Factsheet available on the NT Government information and services website:

https://nt.gov.au/environment/environment-data-maps/important-biodiversity-conservation-sites/conservation-significance-list



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SITE LAYOUT AND SURFACE WATER FLOWS

CITY OF DARWIN

SHOAL BAY WASTE MANAGEMENT FACILITY
ENVIRONMNETAL MANAGEMENT PLAN

FIGURE 2-1

3 Monitoring

Groundwater, surface water and leachate water quality monitoring have been undertaken at the SBWMF as per the URS monitoring plan (2016) and subsequent EcOz monitoring plan since July 2016, when EPL188 was issued. Throughout this time, CoD initially commissioned EcOz Environmental Consultants (EcOz), assisted by Larrakia Nation Rangers, to carry out the monitoring, prior to engaging Cardno to undertake the monitoring activities.

Cardno has developed a specific safe work method statement (SWMS) and standard operating procedures (SOP) for soil, groundwater and surface water (applicable to leachate), which are always adhered to.

3.1 Methodologies

Cardno's suitably qualified scientist undertook groundwater, surface water, soil and dust deposition sampling detailed below, consistent with procedures laid out in the SWMP and in accordance with the following best practice industry standards and guidelines:

- NT EPA 'Guideline for Reporting on Environmental Monitoring'
- AS 4482.1-2005 "Guide to the investigation and sampling of sites with potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds";
- AS 4482.2-1999 "Guide to the sampling and investigation of potentially contaminated soil, Part 2: Volatile substances";
- AS 5667.1 "Water Quality-Sampling: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples";
- AS 5667.11-1998 "Water Quality-Sampling: Guidance on sampling of groundwater";
- Department of Environment and Regulation (DER), 2014, "Assessment and Management of Contaminated Sites";
- AS/NZS 5667.4:1998 "Water Quality Sampling - Part 4: Guidance on sampling from lakes, natural and man-made";
- AS/NZS 5667.6:1998 "Water Quality Sampling – Part 6: Guidance on sampling of rivers and streams";
- AN/NZS 5667.10:1998 "Water Quality Sampling – Part 10: Guidance on sampling of waste waters";
- DoH, 2014, Contaminated Sites Ground and Surface Water Chemical Screening Guidelines
- National Environment Protection Council (NEPC), 1999, *National Environmental Protection (Assessment of Site Contamination) Measure (as amended)*, registered May 2013;
- AS/NZS 3580.10.1-2016 Methods for sampling and analysis of ambient air - Determination of particulate matter – deposited matter – gravimetric method;
- AS/NZS 3580.1.1-2016 Methods for sampling and analysis of ambient air - Guide to Siting Air Monitoring Equipment;
- NEPC Schedule B (1): Guideline on the Investigation Levels for Soil and Groundwater.

3.1.1 General Monitoring Approach

During each monitoring round a team of two of Cardno's suitably qualified environmental scientists and hydrologists undertook groundwater and surface water monitoring in line with the aforementioned standards and SWMP. Ad Hoc soil sampling was also carried out during this reporting period. On each monitoring event, surveys were undertaken for up to 3 consecutive days. The monitoring procedures for groundwater and surface water monitoring were carried out concurrently and consisted of the following preliminaries:

- Prior to attendance to site preparation/update the Site Works Method Statement (SWMS) which include details of health and safety procedures, map showing location of sacred sites likely to have restrictions to access, and identification of required PPE for site conditions/requirements.
- At start of each field day and prior to each survey commencing, conduct a safety start meeting identifying potential hazards. Liaise with site manager to identify no-go zones regarding site's operations and other relevant safety information.

- Scope specific sampling procedures, data collection, and analysis are discussed in their respective sections below.

3.1.2 Ground Water Monitoring

During this monitoring period the following groundwater monitoring procedures were carried out by Cardno's suitably qualified personnel at each ground water monitoring location where hydrasleeve was the predominant sampling technique prior to the new SWMP:

- HydraSleeve sampling
  - HydraSleeves are deployed with top weight for sample collection to begin at the lowest point. HydraSleeve sampling devices are left in wells for a minimum of 4 hours to allow restabilisation of the well following the slight disturbance caused by sampler deployment.
  - Samples are then collected via continuous pull method at a rate allowing the water to pass through the check value into the sample sleeve.
  - Samples are discharged immediately (minimise changes in chemistry) via discharge tube.
- Low Flow Purging and sampling
  - Groundwater is purged utilising the "continue flow" technique using a low flow bladder pump.
  - Purging of each monitoring bore continues until groundwater field parameters [including pH, electrical conductivity (EC), oxidation reduction potential (ORP), dissolved oxygen (DO), turbidity and temperature] stabilise (as indicated by at least three consecutive measurements falling within +/- 5% of each other) and a sustainable sampling flow rate (i.e., minimal draw down) has been established to confirm that a representative sample of the Superficial Aquifer is collected.
- In situ temperature, pH, dissolved oxygen (DO), turbidity (NTU), electrical conductivity and redox (mV) is measured using a YSI Pro Plus Multiparameter Instrument
- Groundwater sampling can commence once the physiochemical parameters have stabilised, indicating that they represent natural groundwater in the aquifer.
- Samples collected for dissolved heavy metal analysis are filtered in the field using an in-line 0.45 micron (µm) filter to remove suspended solids and colloids
- Use of dedicated pump tubing at each groundwater well; and thorough washing of all re-usable sampling equipment (i.e., pumps) and with detergent (Liquinox), then double rinsing with clean water and drying before the collection of each sample.
- Samples are collected directly in into appropriately labelled and preserved laboratory supplied bottles and packed in chilled containers for delivery to the laboratory under Chain of Custody documentation.
- Sample containers, preservation procedures, sample storage requirements and holding times are undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate). All holding times comply with the requirements set out in "Australian Standard AS/NZS 5567.1:1998 and AS 4482.1".

3.1.3 Storm / Surface Water and Leachate Monitoring Procedures

The following surface water sampling procedures were carried out by Cardno's suitably qualified personnel at each surface and stormwater sampling location:

- In situ temperature, pH, dissolved oxygen (DO), turbidity (NTU), electrical conductivity and redox (mV) shall be measured using a YSI Pro Plus Multiparameter Instrument or equivalent
- The specific method of sampling adhered to those specified in and SWMP;
- Samples are collected directly in into appropriately labelled and preserved laboratory supplied bottles and packed in chilled containers for delivery to the laboratory under Chain of Custody documentation.
- Surface water samples collected for dissolved heavy metal analysis are filtered in the field using an in-line 0.45 micron (µm) filter to remove suspended solids and colloids.
- Sample containers, preservation procedures, sample storage requirements and holding times are undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate). All holding times comply with the requirements set out in "Australian Standard AS/NZS 5567.1:1998 and AS 4482.1".

- Use of dedicated disposable sampling equipment at each surface water location; and, thorough washing of all re-usable sampling equipment with detergent (Liquinox), then double rinsing with clean water and drying before the collection of each sample.

3.1.4 Soil Sampling Procedures

The following soil sampling procedures were carried out by Cardno's suitably qualified personnel at each soil sampling location:

- Two replicate surficial sediment samples (e.g., top 200 mm) are collected from each soil sampling location;
- Samples are collected directly in into appropriately labelled and preserved laboratory supplied bottles and packed in chilled containers for delivery to the laboratory under Chain of Custody documentation.
- Sample containers, preservation procedures, sample storage requirements and holding times will be undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate). All holding times comply with the requirements set out in "Australian Standard AS/NZS 5567.1:1998 and AS 4482.1".

3.1.5 Dust Depositional Sampling Procedures

Dust depositional sampling will closely adhere to those specified in the SWMP in accordance with Australian Standards and include the following approach:

- Installation of laboratory supplied deposition dust stand, glass funnel and stopper and 4L sample bottle with copper sulphate preservative at a height of 2magl;
- All gauges are labelled with site name, date and time of installation to ensure correct timing of sample collection;
- After each biannual 30-day sample period all deposited matter on the glass funnel will be washed into the deposition bottle using a minimum amount of demineralised water.
- Samples are collected directly in into appropriately labelled and preserved laboratory supplied bottles and packed in chilled containers for delivery to the laboratory under Chain of Custody documentation.
- Sample containers, preservation procedures, sample storage requirements and holding times are undertaken in accordance with those recommended by Standards Australia (AS/NZS 3580.10.1and AS/NZS 3580.1.1). All holding times comply with the requirements set out in "Australian Standard AS/NZS 3580.10.1and AS/NZS 3580.1.1".

It is noted that the dust analysis method follows Australian Standard AS/NZ 3580.10.1:2003 - Determination of Particulate Matter - Deposited matter - Gravimetric and this requires the addition of a known volume of copper sulfate solution to prevent mould growth. Being analytical reagent grade $CuSO_4$, Copper cannot be analysed as per the methods stipulated by the EPL and SWMP.

3.1.6 Quality Assurance / Quality Control

QA/QC samples are collected at the frequency detailed in the SWMP and analysed for the same analytes as the primary samples:

Water sampling

- Field duplicate (intra-laboratory) at 1 per 10 primary water samples
- Field triplicate (inter-laboratory) at 1 per 10 primary water samples
- Field blank (one per event)

Soil Sampling

- Field duplicate (intra-laboratory) at 1 per 20 primary sediment samples and/or sampling event
- Field duplicate (inter-laboratory) at 1 per 20 primary sediment samples and/or sampling event

3.1.7 Emissions Monitoring

Emissions testing methodologies associated with the evapoconcentrators, BeneVap (BV300) and BeneVap (BV150) are discussed in detail in the following reports, also provided in **Appendix A**:

- *Source Emissions Monitoring – Shoal Bay BeneVap300*, Report Ref. *14107_BV300_MON_R0-signed* (Assured Environmental, 2022)
- *Source Emissions Monitoring – Shoal Bay BeneVap150*, Report Ref. *14107_BV150_MON_R0-signed* (Assured Environmental, 2022)

3.2 Monitoring Sites

The current network of monitoring sites relevant to this review period includes 10 leachate sites, 43 groundwater sites, and 9 surface water and stormwater sampling sites. Each monitoring network is described in detail in their respective sections below.

3.2.1 Leachate Monitoring Network

Leachate sampling sites allow for the characterisation of contaminant concentrations in landfill leachate to allow for comparison with groundwater and surface water samples. The leachate sampling locations are detailed in **Table 3-1** and include:

- Deleaching Well (DW) DW2 - collects leachate from the south-west corner of the Stage 3/4 landfill;
- DW3 - collects leachate from the north-west corner of the Stage 3/4 landfill;
- Stage 3 leachate sump (TC Sump) - collects leachate from the eastern side of the Stage 3/4 landfill;
- DW5 - collects leachate from the western side of the Stage 5 landfill;
- DW6 - collects leachate from the south-west corner of the Stage 5 landfill;
- Leachate Pond (LP) LP01 - Northern leachate storage pond;
- LP02 - Southern leachate storage pond; and
- LMP02 - Sump at the end of a trench that runs along the western side of the Stage 1 and Stage 2, landfills and collects leachate from these landfills.

Table 3-1 Leachate Sampling Locations

Site ID	Easting (m)	Northing (m)	Location	Source
DW2	709029	8630459	Deleaching well on southwest corner of Stage 3/4 landfill	Represents leachate from Stage 3/4 landfill cells
DW3	709038	8630216	Deleaching well on northwest corner of Stage 3/4 landfill	Represents leachate from Stage 3/4 landfill cells
DW5	709023	8630122	Deleaching well on west side of Stage 5 landfill	Represents leachate from Stage 5 landfill cell
DW6	709041	8630039	Deleaching well on southwest corner of Stage 5 landfill	Represents leachate from Stage 5 landfill cell
TC Sump	709465	8630233	Sump on southeast corner of Stage 3/4 landfill	Represents leachate from Stage 3/4 landfill cells
LMP02	709938	8629759	East of Stage 1	Sump that receives leachate from Stage 1 and 2 landfills via an interception trench that runs north-south along the eastern edge of the Stage 1 and 2 landfills.
LP01	709534	8630726	Northern leachate storage pond	Represents leachate in northern storage pond
LP02	709531	8630713	Southern leachate storage pond	Represents leachate in southern storage pond

3.2.2 Groundwater Monitoring Network

Ground water monitoring bores provide an indication of landfill leachate and/or other contaminants associated with SBWMF operations migrating from site in groundwater down gradient. The 43 groundwater monitoring bores to be monitored under EPL188-03 and bores previously monitored in line with the URS WMP are detailed in **Table 3-2**, and comprise:

- A total 41 bores at 22 locations across the Site, with up to 3 bores (nested) at some locations. Installation of this monitoring network began in 2015 to inform a hydrogeological investigation (URS 2015) and development of a CSM (URS 2016). Since then, additional clustered have been installed in 2019 and 2021 to inform groundwater impacts from newly constructed Stage 6 landfill and future leachate treatment infrastructure. Generally, each of the 22 locations includes a shallow bore screened between 1.5 and 3 m below ground level (mbgl), and a deeper bore screened between 9 and 12 mbgl. Three of the locations have a third bore screened at 30 mbgl. The IDs for these bores are prefixed with a 'GW' and suffixed with a -3, -12 or -30 to indicate bore screening depth.
- Four bores of the current monitoring network installed prior to the URS (2015) hydrogeological investigation prefixed with a 'WW' with varying screened intervals; all less than 10 m deep.
- The most recent installation includes GW19 and GW20 (renamed from GWI5 and GWI6) which represent water from underneath the two landfill stages (stage 5/6 ad stage 2). These monitoring sites are technically inception points which have not been installed with monument and complete monitoring well infrastructure. They therefore do not have TOC and other bore related information.

Table 3-2 Monitoring Bore Locations and Construction Details

Bore	Easting (m)	Northing (m)	Monument Elevation (m AHD)	PVC Elevation (m AHD)	Ground Elevation (m AHD)	Screened Interval (m bgl)	Screened Interval Lithology
GW1-3	709564	8631004	8.71	8.63	8.02	1.5-3	Siltstone
GW1-12	709566	8631004	8.71	8.59	8.00	9-12	Siltstone
GW2-3	709629	8630835	8.06	7.94	7.33	1.5-3	Siltstone
GW2-12	709631	8630835	8.08	7.94	7.28	9-12	Siltstone
GW3-3	709652	8630746	9.94	9.80	9.12	1.5-3	Siltstone
GW3-12	709654	8630746	9.87	9.82	9.10	9-12	Siltstone
GW4-3	709775	8630634	5.65	5.49	4.88	1.5-3	Siltstone
GW4-12	709776	8630633	5.61	5.44	5.36	9-12	Siltstone
GW4-30	709777	8630631	5.50	5.20	5.33	15-21	Gravelly sand, Sandstone
GW5-3	709880	8630224	5.51	5.41	4.70	1.5-3	Siltstone
GW5-12	709880	8630226	5.48	5.33	4.70	9-12	Siltstone, Gravelly Clay
GW7-3	709900	8629992	5.18	5.03	4.33	1.5-3	Siltstone
GW7-12	709900	8629994	5.16	5.08	4.33	9-12	Siltstone, Sandy Silt
GW8-3	709896	8629708	5.42	5.28	4.65	1.5-3	Claystone
GW8-12	709896	8629708	5.37	5.22	4.62	9.1-12.1	Claystone, Sandstone
GW9-12	709660	8629469	16.18	15.93	15.44	9-12	Siltstone
GW10-3	709147	8629507	18.12	18.06	17.32	1.5-3	Siltstone
GW10-12	709149	8629507	18.13	17.98	17.37	9.1-12.1	Siltstone
GW11-3	709040	8629671	13.50	13.38	12.72	1.5-3	Siltstone
GW11-12	709042	8629671	13.52	13.38	12.84	9-12	Siltstone, Sandstone
GW12-3	709024	8629881	12.20	12.07	11.44	1.5-3	Siltstone
GW12-12	709024	8629883	12.22	12.04	11.50	9-12	Siltstone
GW12-30	709024	8629885	12.21	12.05	11.55	24-30	Sandstone
GW13-3	709017	8630175	12.93	12.88	12.32	3-4.5	Siltstone
GW13-12	709016	8630174	12.91	12.86	12.25	10-13.5	Siltstone
GW14-3	709013	8630423	6.78	6.73	6.09	1.5-3	Siltstone
GW14-12	709013	8630424	6.77	6.64	6.08	9-12	Siltstone
GW15-3	709230	8630599	11.27	11.06	10.44	1.5-3	Siltstone
GW15-12	709233	8630599	11.20	11.04	10.44	9-12	Siltstone

Bore	Easting (m)	Northing (m)	Monument Elevation (m AHD)	PVC Elevation (m AHD)	Ground Elevation (m AHD)	Screened Interval (m bgl)	Screened Interval Lithology
GW16-3	709493	8630030	TBC	TBC	TBC	1.5-3	Sandy Claystone
GW16-12	709494	8630025	TBC	TBC	TBC	9-12	Siltstone
GW16-30	709495	8630021	TBC	TBC	TBC	30	Siltstone
GW17-3	709418	8630692	TBC	TBC	TBC	3	-
GW17-12	709418	8630691	TBC	TBC	TBC	12	-
GW17-30	709418	8630691	TBC	TBC	TBC	30	-
GW18-3	709464	8630729	TBC	TBC	TBC	3	-
GW18-12	709464	8630728	TBC	TBC	TBC		-
GW19	708952	8630107	-	-	-	-	-
GW20	709811	8629975	-	-	-	-	-
WW1	709471	8630255	-	16.60	15.90	0-6.3	-
WW6	709047	8630478	-	7.46	6.76	0-20.4	-
WW9	709016	8630598	-	7.09	6.39	1-9.8	Siltstone
WW13	709457	8630598	+0.8	+0.7	Not available	1-10	Siltstone

3.2.3 Stormwater and Surface Water Monitoring Network

Surface water sampling locations provide an indication of landfill leachate and/or other contaminants associated with SBWMF operations that have the potential flow downstream and offsite affecting surrounding receptors. The surface water monitoring sites are detailed in **Table 3-3** and include:

- Wheel Wash Sump - collects the wash-down water from the bunded area used to wash commercial waste disposal vehicles;
- Water outfall from Stage 1 and Stage 2 landfills (STG1 & 2) - surface water drain along the western edge of the Stage 1 and Stage 2 landfills;
- Water outfall from Stage 3 and Stage 5 landfills (SWStg5) - surface water drain along the western edge of the Stage 3 and Stage 5 landfills
- Green waste (GW) Sump - collects surface water drainage from the green waste processing area; and
- SW12, SW13 and SW14 - receive surface water runoff (and potentially seepage) from the Stage 3 and 4 landfill cells.
- SW15 and SW16 - receive surface water runoff from the newly installed leachate treatment facilities associated with EPA304-01

Table 3-3 Stormwater and Surface Water Monitoring Locations

Site ID	Easting (m)	Northing (m)	Location	Source
SWStg1&2 (formerly STG1&2)	709448	8629979	Surface drain between Stage 1 and Stage 2	Receives surface water runoff from central SBWMF areas
SWStg5	709003	8630206	Northwest of Stage 5	Receives surface water runoff from central Stage 3 and Stage 5 landfills.
GW Sump	709102	8629880	Sump within green waste processing and storage area	Receives surface water runoff from green waste processing and storage area. Possibly also surface runoff from the Stage 3 and 5 landfills.
GWILP	709771	8630733	East of the leachate ponds	Receives surface runoff from the existing leachate ponds.

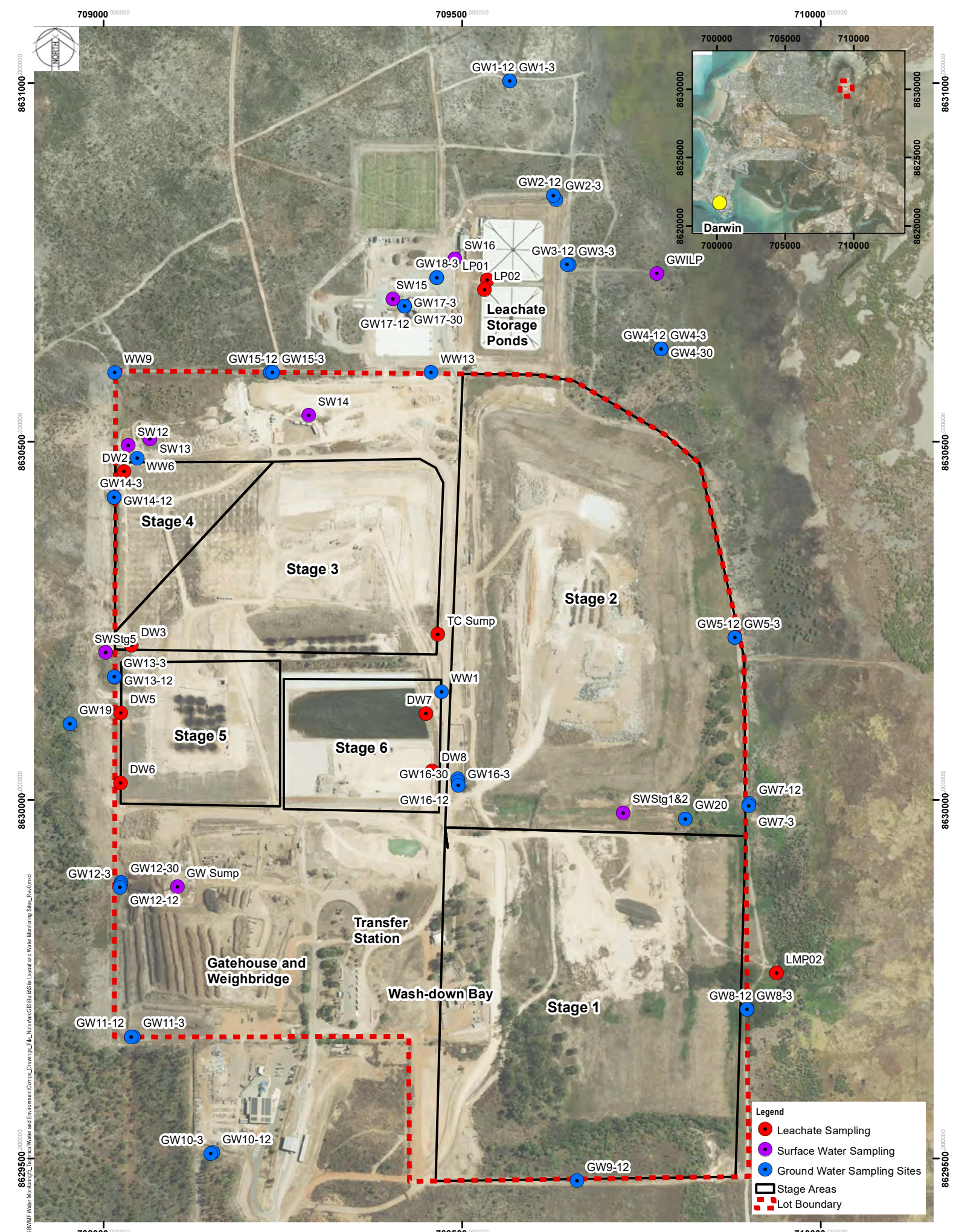
Site ID	Easting (m)	Northing (m)	Location	Source
SW12	709035	8630495	Catchment dam at base of northwest corner of Stage 3/4 landfill	Receives surface water runoff (and potentially seepage) from the northern and western sides of the Stage 3/4 landfill cells
SW13	709065	8630504	Catchment dam at base of northwest corner of Stage 3/4 landfill	Receives surface water runoff (and potentially seepage) from the northern and western sides of the Stage 3/4 landfill cells
SW14	709287	8630536	Catchment dam north of Stage 3/4 landfill	Receives surface water runoff (and potentially seepage) from the western landfill cells
SW15	709405	8630699	North of leachate treatment	Receives runoff from the new leachate treatment plant
SW16	709490	8630756	West of leachate treatment plant	Receives runoff from the new leachate treatment plant

3.2.4 Soil and Dust Depositional Monitoring Network

In line with the new EPL and monitoring plan, 4 soil and dust depositional monitoring sites have been added to the monitoring network. Both soil and dust monitoring sites coincide with the same locations and are detailed below in **Table 3-4** and presented in **Figure 3-2**.

Table 3-4 Soil and dust monitoring locations details

Site ID	Easting	Northing	Location
SS01 / DS01	709187	8630904	North west of leachate pond and leachate treatment plant
SS02 / DS02	709580	8631014	North of leachate ponds
SS03 / DS03	709788	8630614	South east of leachate treatment ponds, north east of Stage 2 landfills
SS04 / DS04	709252	8630601	North of Stage 3/4 cells, directly east of GW15-3



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<Office Location> Tel. <xx xxxx xxxx>

Date
23/02/2022

Size
A3

Scale
1:4,500

0 25 50 75 100Meters

SITE LAYOUT & WATER MONITORING SITE LOCATIONS

CITY OF DARWIN
SHOAL BAY WASTE MANAGEMENT FACILITY
ENVIRONMNETAL MANAGEMENT PLAN

FIGURE 3-5



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Darwin, Northern Territory

Date
23/02/2022

Size
A3

Scale
1:4,500

0 25 50 75 100Meters

SOIL AND DEPOSITIONAL MONITORING SITES

CITY OF DARWIN
SHOAL BAY WASTE MANAGEMENT FACILITY
ENVIRONMNETAL MANAGEMENT PLAN

FIGURE 3-6

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3.3 Sampling Frequency

EPL188-03 stipulates sampling frequencies and analysis for each sampling location provided in **Appendix B**. The specific sites sampled each month vary concurrent with seasonal changes in rainfall, surface water flows and groundwater levels. The availability of sites for sampling throughout the year (i.e., availability of water to sample) confirmed in previous annual reviews (Cardno, 2020, Cardno, 2021) is summarised as follows:

- All leachate sites can be sampled throughout the year;
- The GW Sump can usually be sampled throughout the wet season, between the months of September and May;
- The surface water sites SW12, SW13 and SW14 are sediment dams that hold water throughout the wet season and well into the dry season i.e., is usually only dry from June to September;
- The surface water sitesSW15, SW16, SWStg1&2 and SWStg5 only have water and can be sampled immediately after heavy rainfall at the peak of the wet season i.e., January and February;
- During the dry season, most of the shallow 3.0 m deep bores, and a large number of the 12 m deep bores are dry i.e., groundwater levels drop below the bottom of the bore;
- The established deep bores GW4-30, GW16-30 and GW12-30 are known to contain water throughout the year, with standing water levels (SWLs) of up to 12 m bgl at the end of the dry season (at GW12-30) and within 6.0 m of the ground surface during the wet season. GW4-30, located close to the swamp northeast of the SBWMF, is often artesian throughout the wet season and only drops to a maximum 3.0 m bgl during the dry season.
- In addition to the three deep bores mentioned above, the following bores also contain groundwater throughout the dry season and can be sampled:
  - GW-5-12;
  - GW6-12;
  - GW7-12;
  - GW8-12; and
  - GW16-12.
- Newly installed well clusters GW17 and GW18 west of the leachate treatment ponds have been sampled through this monitoring period without becoming dry.

Sampling is undertaken during the first week of every month, representative of water quality for the previous month, i.e., sampling during the first week of November represents October.

3.4 Parameters measured

Analysis suites prescribed by EPL-188-03 and laid out in SWMP are provided in **Appendix B**. In addition to the aforementioned sampling suites, monthly sampling of groundwater and surface water sites as per EPA304-01 for initial 12 months (April 2021 to March 2022) are detailed in **Table 3-5** below. **Table 3-6** provides which parameter suite was analysed during each monitoring round during the annual monitoring period.

Table 3-5 EPA304-01 Monthly Sampling Analysis

New Monitoring Locations	Analysis Details
GW18-3 GW18-12 GW18-30 GW17-3 GW17-12 SW15 SW16	The following parameters are assessed in new groundwater and surface water sampling locations: *In situ field parameters* ▪ Temperature ▪ Dissolved oxygen (DO) ▪ Electrical conductivity (EC) ▪ Total dissolved solids (TDS) ▪ Salinity ▪ pH ▪ Oxidation-reduction potential (ORP) ▪ Turbidity

New Monitoring Locations	Analysis Details
	Laboratory Testing ▪ Ammonium of nitrogen (NH_4) ▪ Chemical oxygen demand (COD) ▪ Total dissolved solids (TDS) ▪ Total organic carbon (TOC) ▪ Major Ions (Sodium, Potassium, Magnesium, alkalinity, chloride, sulfate) ▪ Explosives - TNT and RDX ▪ PFAS ▪ Glyphosate ▪ Nutrients (nitrogen compounds) ▪ Dissolved heavy metals (NEPM suite 15 metals plus Fe, CrVI) ▪ Faecal coliforms and E. coli ▪ Polychlorinated biphenyls (PCBs) ▪ Organochlorine pesticides (OCP) ▪ Organophosphate pesticides (OPP) ▪ Volatile organic compounds (VOCs) ▪ Total recoverable hydrocarbons (TRH) ▪ Benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN) ▪ Polycyclic aromatic hydrocarbons (PAHs) ▪ Phenolic compounds ▪ Volatile fatty acids (VFAs) ▪ Absorbable organic halide (AOX)

Table 3-6 Water Quality Analysis Schedule 2022 – March 2022

Monitoring Event	Monitoring Schedule	Analysis Suite
July 2021	EPL188-03 and EPA304-01	Quarterly
August 2021	EPL188-03 and EPA304-01	Monthly
September 2021	EPL188-03 and EPA304-01	Monthly
October 2021	EPL188-03 and EPA304-01	Quarterly
November 2021	EPL188-03 and EPA304-01	Monthly
December 2021	EPL188-03 and EPA304-01	Monthly (*annual schedule included due to delayed start to 2022 sampling campaign)
January 2022	EPL188-03 and EPA304-01	Monthly (*in lieu of Annual sampling in late January)
February 2022	EPL188-03 and EPA304-01	Monthly
March 2022	EPL188-03 and EPA304-01	Monthly
April 2022	EPL188-03 and EPA304-01	Quarterly
May 2022	EPL188-03	Monthly
June 2022	EPL188-03	Monthly

3.5 Assessment Criteria

Assessment Criteria relevant to water and leachate have remained consistent with the below details during this monitoring review period.

3.5.1 Water Quality

Surface water trigger values prescribed by Attachment 3 of EPL188-03 (**Appendix B**) have been informed by the following guidelines:

- *Darwin Harbour Water Objectives (Shoal Bay upper area marine ambient water quality*) trigger values;
- *Australian and New Zealand Guidelines (ANZG) for Fresh and Marine Water Quality* (2018) default guideline values (DGVs) for protection of 90% of marine ecosystems. These criteria aim to better assess the potential risk to surrounding environmental receptors; and
- *PFAS National Environmental Management Plan v2.0* (HEPA, 2020), 90% species protection – highly disturbed systems in interim marine water (PFOS – 2 µg/L and PFOA – 632 µg/L)

The aforementioned guidelines currently reference freshwater values in lieu of interim marine guidelines, using the nationally agreed process under the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* where PFOS and PFOA are the only PFAS species with guidelines values for aquatic ecosystems.

Pursuant to EPL 188-03, if at the time of review, groundwater, surface water and/or leachate quality issues have been identified (i.e., trigger levels are reached) then these issues will be raised formally with the CEO and NT EPA, provided that:

- Trigger levels have been exceeded over three consecutive monitoring events;
- A trigger level is exceeded greater than or equal to two times the trigger value; or
- A trigger level is exceeded at a median value over six consecutive monitoring events.

3.5.2 Emissions

Emission values have been compared against the emission limits stipulated in Attachment 7 of EPL188-03.

4 Results

4.1 Rainfall and Site Conditions

The availability of water for sampling at a number of groundwater and surface water sites is dependent on rainfall described in Section 2.3 Surface only water flows in stormwater drains across the Site during and immediately after rainfall although surface water catchments such as 'SW12,13,14' and 'GW Sump' hold water for long periods.

Figure 4-1 illustrates monthly rainfalls from July 2020 to June 2021, collected from the nearest BoM station with consistent, reliable rainfall data (Darwin Airport Station No. 014015). The average annual rainfall for this station is 1,723.1 mm.

Based on historical data and *SBWMF Annual Monitoring Review, 1 July 2020 – 30 June 2021* (Cardno 2021) it is evident that this monitoring period has experienced more typical water levels consistent with the previous wet season.



Figure 4-1 Average Monthly Rainfall, July 2021 – June 2022 (Source: Darwin Airport BoM Station, Site Number 014015)

4.2 Field Observations

4.2.1 Groundwater

Groundwater at SBWMF is recharged via direct infiltration of rainfall and/or runoff making groundwater levels in the shallow aquifer highly reactive to rainfall totals.

Dry or inaccessible wells (due to flooding, maintenance and/or overgrown vegetation) and SWLs of groundwater bores sampled during each monitoring event of this reporting period are provided below in **Table 4-1**.

Table 4-1 Standing Water Levels of Bores Sampled

Monitoring Event	Dry or Inaccessible Groundwater Bore	Standing Water Levels (mbgl)
July 2021	GW1-3, GW12-3, GW12-12, GW13-2, GW15-3, GW16-3, GW17-3, GW18-3, GW18-12, GW2-3, GW3-3, GW5-3, GW4-3, GW4-12, GW4-30, WW1, WW13, GW19	Min: 0.87 at GW7-12 Max: 13.4 at GW13-12
August 2021	GW10-12, GW10-3, GW11-12, GW1-12, GW11-3, GW12-12, GW12-3, GW1-3, GW13-12, GW15-12, GW15-3, GW16-12, GW16-3, GW16-30, GW2-3, GW3-12, GW3-3, GW4-3, GW5-12, GW5-3, GW7-3, GW9-12, WW5, WW7, WW9, GW19	Min: 2.16 at GW7-12 Max: 14.2 at GW12-30
September 2021	GW10-12, GW10-3, GW11-12, GW1-12, GW11-3, GW12-12, GW12-3, GW1-3, GW13-12, GW15-12, GW15-3, GW16-12, GW16-3, GW16-30, GW17-3, GW2-3, GW3-12, GW3-3, GW4-3, GW5-12, GW5-3, GW7-3, GW9-12, WW5, WW7, WW9, GW19	Min: 1.67 at GW7-12 Max: 12.21 at GW13-12
October 2021	WW1, WW13, GW1-3, GW1-12, GW9-12, GW15-12, GW3-3, GW4-3, GW4-12, GW17-3, GW18-3, GW18-12, GW13-3, GW12-3, GW10-3, GW10-12, GW11-3, GW11-12, GW19	Min: 1.18 at GW2-3 Max: 11.59 at GW13-12
November 2021	WW1, WW13, GW10-3, GW10-12, GW11-3, GW15-3, GW3-3, GW4-3	Min: 0.97 at GW7-12 Max: 11.02 at GW9-12
December 2021	GW11-12, GW19	Min: 0.3 at GW8-3 Max: 9.87 at GW13-12
January 2022	WW1, WW13, GW1-3, GW1-12, GW9-12, GW15-12, GW3-3, GW4-3, GW4-12, GW17-3, GW17-12. GW18-3, GW13-3, GW12-3, GW10-3, GW10-12, GW11-3, GW11-12, GW19	Min: -0.42 at GW8-12 Max: 4.70 at WW13
February 2022	WW1, WW13, GW10-3, GW10-12, GW11-3, GW15-3, GW3-3, GW4-3, GW19	Min: -0.27 at GW8-12 Max: 5.68 at GW13-12
March 2022	GW11-12, GW19	Min: 0.73 at GW14-12 Max: 7.33 at GW13-12
April 2022	WW1, GW10-3, GW11-3, GW12-3, GW13-3, GW16-3, GW4-3, GW4-12, GW4-30, GW5-3, GW5-12, GW7-3, GW7-12, GW19	Min: 1.04 at GW8-12 Max: 8.35 at GW13-12
May 2022	WW1, WW13, GW1-3, GW1-12, GW9-12, GW15-12, GW3-3, GW4-3, GW4-12, GW17-3, GW17-12. GW18-3, GW13-3, GW12-3, GW10-3, GW10-12, GW11-3, GW11-12, GW19	Min: 1.89 at GW14-12 Max: 9.12 at GW13-12
June 2022	Awaiting results at time of reporting	

4.2.2 Surface Water and Leachate

Surface only water flows in stormwater drains across the Site during and immediately after rainfall although surface water catchments such as ‘SW12,13,14’ and ‘GW Sump’ hold water for long periods. The ‘wheel wash’ site receives vehicle wash-down water sourced from the Darwin reticulated water supply and is not dependent on rainfall.

Surface water and leachate sites sampled during this reporting are provided below in **Table 4-2.**

Table 4-2 Water and Leachate Locations Sampled

Monitoring Event	Surface Water Sites Sampled	Leachate Sites Sampled
July 2021	*	DW2, DW3, LMP02, LP02
August 2021	SW12, SW13. SW14,	*

September 2021	SW12, SW13. SW14,	*
October 2021	GW SUMP, SW12, SW13	LP02
November 2021	SW12, SW13. SW14,	LP02
December 2021	SW12, SW13, SW14, SW15, SW STG1&2, SW STG5, GWILP, GW SUMP	DW2, DW3, LP02, LMP02, TC SUMP
January 2022	GWSUMP, SW12, SW13, SW14, SW15, SWSTG1&2	*
February 2022	GWSUMP, SW12, SW13, SW14,	*
March 2022	GWSUMP, SW12, SW13, SW14, SWSTG1&2	*
April 2022	GWSUMP, SW12, SW13, SW14, SWSTG1&2, GWILP	LP01
May 2022	SW12, SW13. SW14	*
June 2022	Awaiting results at time of reporting	
*Dry, inaccessible, or not required during monthly sampling		

4.3 Emissions Monitoring

As per the Environmental Protection License 188-03 condition 49, the following BeneVap emission monitoring, as detailed in the Attachment 7 of the license, was conducted:

- Assured Environmental (AE) conducted source emissions monitoring from the mobile BeneVap Leachate Treatment Facility (BV150) located at the existing leachate treatment ponds from 7 to 9 February 2022.
- Assured Environmental (AE) conducted source emissions monitoring from the mobile BeneVap Leachate Treatment Facility (BV300) located at the existing leachate treatment ponds from 4 to 9 February 2022

Detailed emission results and comparison of these results with the prescribed emission limits is provided **Appendix A**

Both monitoring events concluded that all measured parameters were within the emissions limits outlined in Attachment 7 of EPL188-03 (Assured Environmental, 2022).

4.4 Laboratory Results

All Tabulated analytical results for groundwater, surface water, leachate and floodplain sediment sampled for this monitoring period are provided in **Appendix C**, laboratory certificates are provided in **Appendix D**. Exceedances of assessment criteria are summarised in the sections below.

4.4.1 Surface, Stormwater Trigger Level Exceedances

Table 4-3 to **Table 4-10** below present all exceedances of the adopted trigger values described in **Section 3.5 "Assessment Criteria".** The results highlighted in yellow indicate when the surface water trigger value was exceeded on three or more consecutive occasions as per EPL188-03 Condition 56.1. Results with an asterisk (*) indicate when the results are greater than or equal to two times the trigger value as per Condition 56.2.

Note that only trigger value exceedances are listed in the tables below. Where a concentration is not listed for a site or month and does not appear in the table, either the concentration was below the trigger value, the Site was not sampled because it was dry or limited suites of analytes were assessed during that month. Refer to **Section 4.2** above for the Sites that were sampled during the reporting period.

4.4.1.1 Ammonia

Ammonia concentrations above adopted assessment criteria (20 µg/L) were observed at several surface water sampling locations provided in **Exceedances of** ammonia occurred in the sediment dams receiving runoff from the Stage 3, 4 and 5 landfills (SW12, SW13, SW14, SW STG5) and the sump collecting water from green waste processing

area (GW SUMP). Exceedances also occurred in stormwater runoff from the Stage 1 and 2 landfills (SW STG1&2)

Stormwater and surface impacts from leachate are indicated by consistently elevated ammonia concentrations up to 230 times the adopted trigger value

The water inception point for the existing leachate treatment ponds (GWILP) exhibited ammonia concentrations consistent with untreated leachate indicating direct contamination

Table 4-3. Findings are summarised as follows:

> Exceedances of ammonia occurred in the sediment dams receiving runoff from the Stage 3, 4 and 5 landfills (SW12, SW13, SW14, SW STG5) and the sump collecting water from green waste processing

area (GW SUMP). Exceedances also occurred in stormwater runoff from the Stage 1 and 2 landfills (SW STG1&2)

- Stormwater and surface impacts from leachate are indicated by consistently elevated ammonia concentrations up to 230 times the adopted trigger value
- The water inception point for the existing leachate treatment ponds (GWILP) exhibited ammonia concentrations consistent with untreated leachate indicating direct contamination

Table 4-3 Exceedances of Ammonia concentrations above 20 µg/L

Location	Ammonia concentration (µg/L)						
	Oct	Nov	Dec	Jan	Feb	Mar	Apr
GW SUMP	1,800*	2,00*	770*	1,000*	4,600*	1,800*	810*
SW12	1,300*	480*	210*	540*	200*	360*	120*
SW13	1,100*	2,700*	210*	910*	160*	240*	120*
SW14		220*	40*	40*		70*	40*
SW15				80*			
GWILP			770,000*				680,000*
SW STG1&2			110*	200*		710*	
SW STG5			270*				

Notes

- The results highlighted in yellow indicate when the trigger value was exceeded on three or more consecutive occasions as per Condition 56.1 of EPL188-03.
- Results with an asterisk (*) indicate when the surface water results are greater than or equal to two times the trigger value as per Condition 56.2 of EPL188-03.

4.4.1.2 Nitrogen

Total Nitrogen concentrations above adopted assessment criteria (300 µg/L) were observed at several surface water sampling locations provided in **Table 4-4**. Findings are summarised as follows:

- Exceedances of Nitrogen occurred in the sediment dams receiving runoff from the Stage 3, 4 and 5 landfills (SW12, SW13, SW14, SW STG5), stormwater from green waste processing area (GW SUMP) and stormwater runoff from the new processing area west of the existing treatment ponds (SW15). Exceedances also occurred in stormwater runoff from water from the Stage 1, 2 and 6 landfills (SWStg1&2)
- The water inception point for the existing leachate treatment ponds (GWILP) exhibited nitrogen concentrations consistent with untreated leachate indicating direct contamination.

Table 4-4 Exceedances of Nitrogen (Total) concentrations above 300 µg/L

Location	Nitrogen (Total) concentration (µg/L)						
	Oct	Nov	Dec	Jan	Feb	Mar	Apr
GW SUMP	16,900*	2,300*	6,400*	7,010*	19,000*		7,100*
SW12	12,100*	5,300*	3,500*	3,700*	1,160*	1,900*	2,450*
SW13	10,800*	7,400*	4,100*	29,200*	1,450*	2,800*	750*
SW14		4,800*	1,630*	1,120*	990*	1,130*	10,000*
SW15				3,380*		1,640*	

Location	Nitrogen (Total) concentration (µg/L)			
GWILP	730,000*			32,000*
SW STG1&2	1,610*	2,870*		2,180*
SW STG5	2,260*			

Notes

- The results highlighted in yellow indicate when the trigger value was exceeded on three or more consecutive occasions as per Condition 56.1 of EPL188-03.
- Results with an asterisk (*) indicate when the surface water results are greater than or equal to two times the trigger value as per Condition 56.2 of EPL188-03.

4.4.1.3 Oxides of Nitrogen

Oxides of Nitrogen (NO_X) concentrations above adopted assessment criteria (20 µg/L) were observed at generally the same water sampling locations as other nutrients provided in **Table 4-5**. Findings are summarised as follows:

> Exceedances of NOx occurred in the sediment dams receiving runoff from the Stage 3, 4 and 5 landfills (SW12, SW13, SW14, SW STG5), stormwater from green waste processing area (GW SUMP) and stormwater runoff from water from the Stage 1, 2 and 6 landfills (SW STG5 SWStg1&2)

> The water inception point for the existing leachate treatment ponds (GWILP) exhibited NO_X concentrations consistent with untreated leachate indicating direct contamination.

Table 4-5 Exceedances of NO_X concentrations above 20 µg/L

Location	NO_X concentration (µg/L)						
	Oct	Nov	Dec	Jan	Feb	Mar	Apr
GW SUMP	8,110*		1,060*	310*			
SW12	7,110*	3,840*	1,230*	1,280*	460*	80*	450*
SW13	5,010*	5,650*	1,730*	1,240*	450*	2,400*	450*
SW14		4,000*	430*	130*	90*	230*	1,470*
SW15				590*			
GWILP							3,250*
SW STG1&2			300*	879*		640*	80*
SW STG5			560*				

Notes

- The results highlighted in yellow indicate when the trigger value was exceeded on three or more consecutive occasions as per Condition 56.1 of EPL188-03.
- Results with an asterisk (*) indicate when the surface water results are greater than or equal to two times the trigger value as per Condition 56.2 of EPL188-03.

4.4.1.4 Total Phosphorus

Total Phosphorus concentrations above adopted assessment criteria (30 µg/L) were observed at generally the same water sampling locations as other nutrients with less prevalence as nitrogen compounds. **Table 4-6** shows locations and months these exceedances occurred. Findings are summarised as follows:

> Exceedances of total phosphorus occurred in the sediment dams receiving runoff from the Stage 3, 4, and 5 landfills (SW12, SW13, SW14) stormwater from green waste processing area (GW SUMP) and the stormwater runoff from water from the Stage 1, 2 and 6 landfills (SWStg1&2)

> The water inception point for the existing leachate treatment ponds (GWILP) exceeded the adopted the trigger value consistent with other nutrients.

Table 4-6 Exceedances of Total Phosphorus concentrations above 30 µg/L

Location	Total Phosphorus concentration (µg/L)						
	Oct	Nov	Dec	Jan	Feb	Mar	Apr
GW SUMP	2,000*	1,000*	460*	730*	2,100*	650*	910*
SW12	40				40		
SW13					40	60*	
SW14							110*
GWILP			2,800*				490*
SW STG1&2							
SW STG5			50				

Notes

- The results highlighted in yellow indicate when the trigger value was exceeded on three or more consecutive occasions as per Condition 56.1 of EPL188-03.
- Results with an asterisk (*) indicate when the surface water results are greater than or equal to two times the trigger value as per Condition 56.2 of EPL188-03.

4.4.1.5 Reactive Phosphorus

Filterable Reactive Phosphorus (FRP) concentrations above adopted assessment criteria (10 µg/L) were observed at generally the same water sampling locations as total phosphorus with the exception of stormwater runoff from water from the Stage 1, 2 and 6 landfills (SWStg1&2). **Table 4-7** shows locations and months these exceedances occurred.

Table 4-7 Exceedances of FRP concentrations above 10 µg/L

Location	FRP concentration (µg/L)						
	Oct	Nov	Dec	Jan	Feb	Mar	Apr
GW SUMP	1,400*	550*	370*	90*	490*	520*	100*
SW12		70*					
SW14		20*					
GWILP			2,800*				590*

Notes

- The results highlighted in yellow indicate when the trigger value was exceeded on three or more consecutive occasions as per Condition 56.1 of EPL188-03.
- Results with an asterisk (*) indicate when the surface water results are greater than or equal to two times the trigger value as per Condition 56.2 of EPL188-03.

4.4.1.6 Total Suspended Solids

Total Suspended Solids (TSS) concentrations in exceedance of the adopted trigger value occurred across the Site with the most exceedances occurring in correlation with rainfall data detailed in **Section 4.1**.

Table 4-8 Exceedances of TSS concentrations above 10 mg/L

Location	TSS concentration (mg/L)						
	Oct	Nov	Dec	Jan	Feb	Mar	Apr
GW SUMP	140*	95*	230*	94*	36*	58*	120*
SW12	160*	36*	140*	22*	60*	25*	
SW13	110*	29*	370*	26*	81*	42*	
SW14			130*	44*		42*	130*
SW15			15	16			
GWILP			33*				
SW STG1&2			12	15		120*	
SW STG5			480*				

Notes

- The results highlighted in yellow indicate when the trigger value was exceeded on three or more consecutive occasions as per Condition 56.1 of EPL188-03. Results with an asterisk (*) indicate when the surface water results are greater than or equal to two times the trigger value as per Condition 56.2 of EPL188-03.

4.4.1.7 Copper

Recorded Copper concentrations exceeding the trigger value (3 µg/L) for 90% species protection are provided in **Table 4-9** below and summarised as follows:

> Copper concentrations have been recorded two times the trigger value during October, February, March and April's sampling events.

> Exceedances occurring over three consecutive events were recorded in the surface water in one of the sediment dams receiving runoff from the Stage 3 and 4 landfills (SW12, SW13) and stormwater from green waste processing area (GW SUMP)

Table 4-9 Exceedances in Copper concentrations above 3 µg/L

Location	Copper concentration (µg/L)						
	Oct	Nov	Dec	Jan	Feb	Mar	Apr
GW SUMP	7*	5	5		10*	7*	14*
SW12	11*			5	5	5	
SW13	7*				5	8*	
SW14						6*	11*

Notes

- The results highlighted in yellow indicate when the trigger value was exceeded on three or more consecutive occasions as per Condition 56.1 of EPL188-03.
- Results with an asterisk (*) indicate when the surface water results are greater than or equal to two times the trigger value as per Condition 56.2 of EPL188-03.

4.4.1.8 Lead

Lead concentrations in stormwater and surface water samples exceeded the adopted trigger value of 6.6 µg/L in the drainage from the green waste processing area during February and April. Samples from surface water runoff (and potentially seepage) from the Stage 3 and 4 landfill cells exceeded the adopted trigger value for lead during March and April.

These exceedances did not occur over three consecutive monitoring events for the same sampling locations.

4.4.1.9 Zinc

Zinc concentrations recorded above adopted assessment criteria of 0.0023mg/L were observed at a small number of surface water monitoring locations at the Site provided in **Table 4-10** below. Findings are summarised as follows:

- Zinc concentrations exceeded the relevant trigger value in surface water north of the Stage 3 and 4 landfills (SW12) and in the ground water sump receiving from the green waste processing area south of Stage 5 during October and over three consecutive events from February to April.
- The inception point for the surface water of the leachate treatment ponds (GWILP) exceeded the relevant trigger value for Zinc during December and April.

Table 4-10 Exceedances in Zinc concentrations above 23 µg/L

Location	Zinc concentration (µg/L)						
	Oct	Nov	Dec	Jan	Feb	Mar	Apr
GW SUMP	39				38	24	69*
SW12	39						
SW14						25	40
GWILP			220*				210*

Notes

- The results highlighted in yellow indicate when the trigger value was exceeded on three or more consecutive occasions as per Condition 56.1 of EPL188-03.
- Results with an asterisk (*) indicate when the surface water results are greater than or equal to two times the trigger value as per Condition 56.2 of EPL188-03.

4.4.1.10 PFAS Assessment

No stormwater and surface water monitoring locations exceeded the HEPA (2020) guideline value for 90% species protection for highly disturbed systems in interim marine water (PFOS – 2 µg/L and PFOA – 632 µg/L), only marginally exceeding the LOR (**Appendix C**)

This is consistent with historical observations of PFOS and PFOA concentrations at SBWMF.

4.4.2 Soil Chemistry

Soil sampling locations detailed in **Section 3.2.4** did not produce any metal concentrations above the Health Investigation Levels (HILs) for Commercial/Industrial land use, PFAS HILs for Commercial/Industrial land use or ecological soil guidelines for direct and indirect exposure (**Appendix C**). Results are summarised as follows:

- Metals Aluminium, Chromium, Copper, Lead, Lithium, Nickel and Zinc recorded concentrations above the limit of reporting (LOR) by laboratory analysis;
- No PFAS compounds were recorded above the LOR by laboratory analysis;

4.4.3 Dust Depositional Monitoring

A dust deposition chemistry summary table is provided in **Appendix C** and summarised as follows:

- Copper was the only metal recorded above the LOR in dust samples. This is attributed to the copper sulphate preservative necessary for sample collection as per the SWMP methodologies.
- There were no detectable levels of metals or PFAS substances in any samples for all sampling locations.

4.5 Quality Assurance / Quality Control

All quality control/quality assurance procedures outlined in Section 3 and respective SOP's (**Appendix E**) were followed during field sampling as part of each monitoring event while all analysis was completed within holding times.

At each monitoring event relative percent difference (RPD) was calculated for primary, duplicate and triplicate samples where 30% RPD values infer precise data. Where the RPD was above 30%, the primary result was only used in further assessment if RPD was within 5 times the LOR and therefore remained acceptable. RPD tables are provided to CoD following each monthly and quarterly monitoring event.

The QA/QC review concluded that there are no significant systematic errors in the data collection process and therefore, the dataset used for the assessment is considered valid and complete.

4.6 Discussion of Results

Based on the results of contaminants measured in surface water and groundwater during the reporting period (in particular nutrients and metals), impacts from the migration of leachate in groundwater and surface water flowing from the Site are occurring to the west and northwest of the Stage 3, 4 and 5 landfills (SW12, SW13, SW14, SW STG5) and in stormwater runoff from water from the Stage 1, 2 and 6 landfills (SWStg1&2). Exceedances generally occurred most often and at the highest concentrations in stormwater and surface water from green waste processing area captured in the green waste sump (GW SUMP)

Assured Environmental found that no compounds including PFAS found in air emissions from the BV 150 and BV300 exceeded the regulatory limits prescribed in the EPL188 and furthermore pose no risk (AE, 2022).

Soil chemistry was consistent with potentially naturally elevated levels of metals found in the ground water and did not produce any metal concentrations above the Health Investigation Levels (HILs) for Commercial/Industrial land use, PFAS HILs for Commercial/Industrial land use or ecological soil guidelines for direct and indirect exposure.

Dust sample chemistry did not reach detection limits for any metals or PFAS compounds with the exception of copper which is introduced by sample preservation methods and not attributable to dust on site. Dust deposition results may not be definitive as they rely on very small volumes of material for chemistry analysis.

5 Historic Water Quality Trends

Key exceedances reported during this reporting period discussed above in Section 4 are overall consistent with previous data sets and historical water quality trends. The long-term trends of contaminants are briefly summarised and illustrated in the charts below. It is noted that no long-term increase in contaminants is evident.

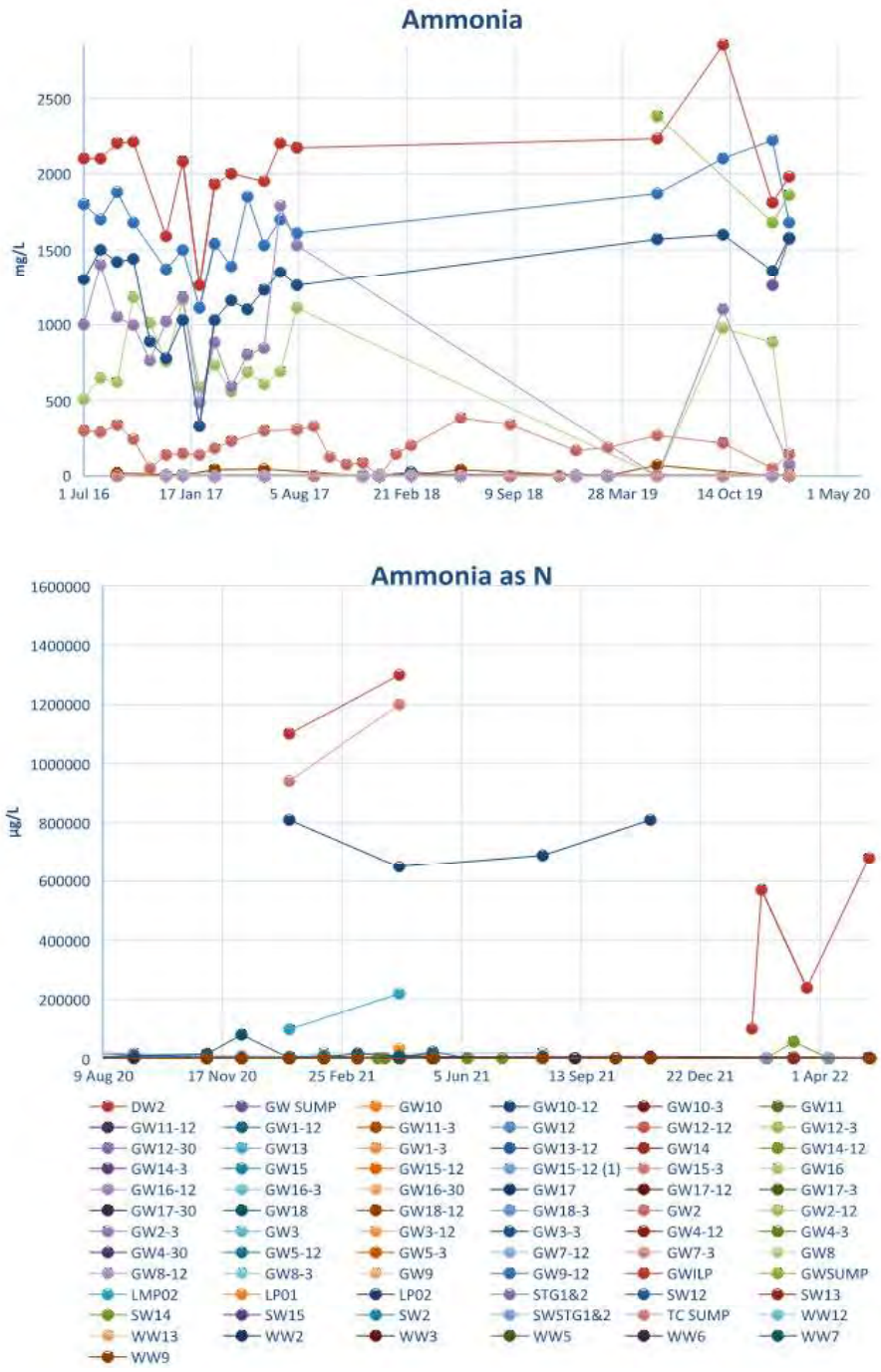


Figure 5-1 Ammonia Concentrations since July 2016

Seen in **Figure 5-1 Error! Reference source not found.**ammonia experiences spikes in Ammonia concentrations during the wet season months. These spikes do not provide for a long-term trend of increased ammonia, which have been recorded in leachate sumps and more recently in the contaminated GWILP which would depend on the varying types of wastes and not the efficacy of the Site's leachate treatment practices.

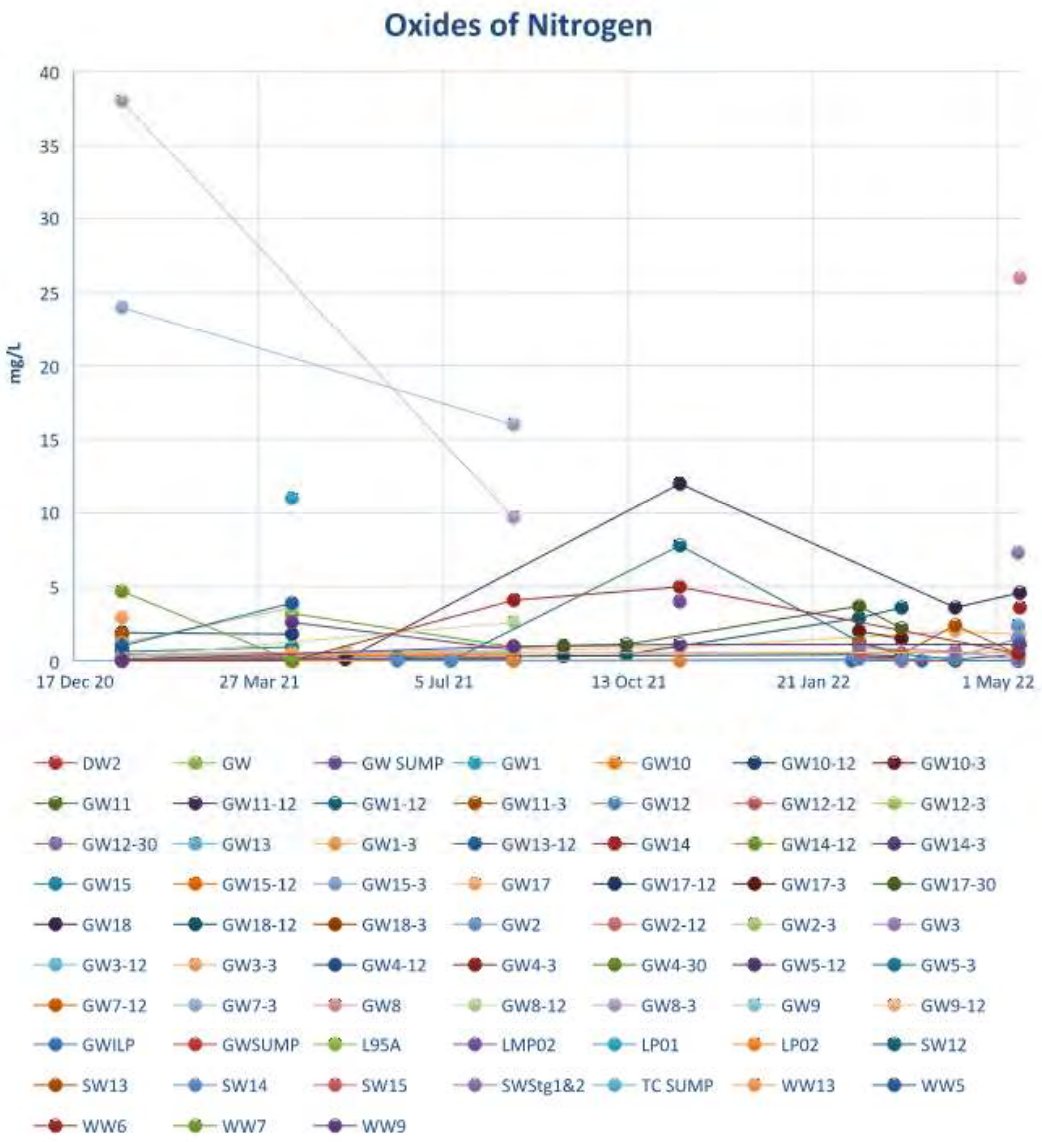


Figure 5-2 Historical NOx concentrations since December 2020

Illustrated above in **Figure 5-2** NOx has remained at consistent levels in stormwater and surface waters since spiking during the wet season months.

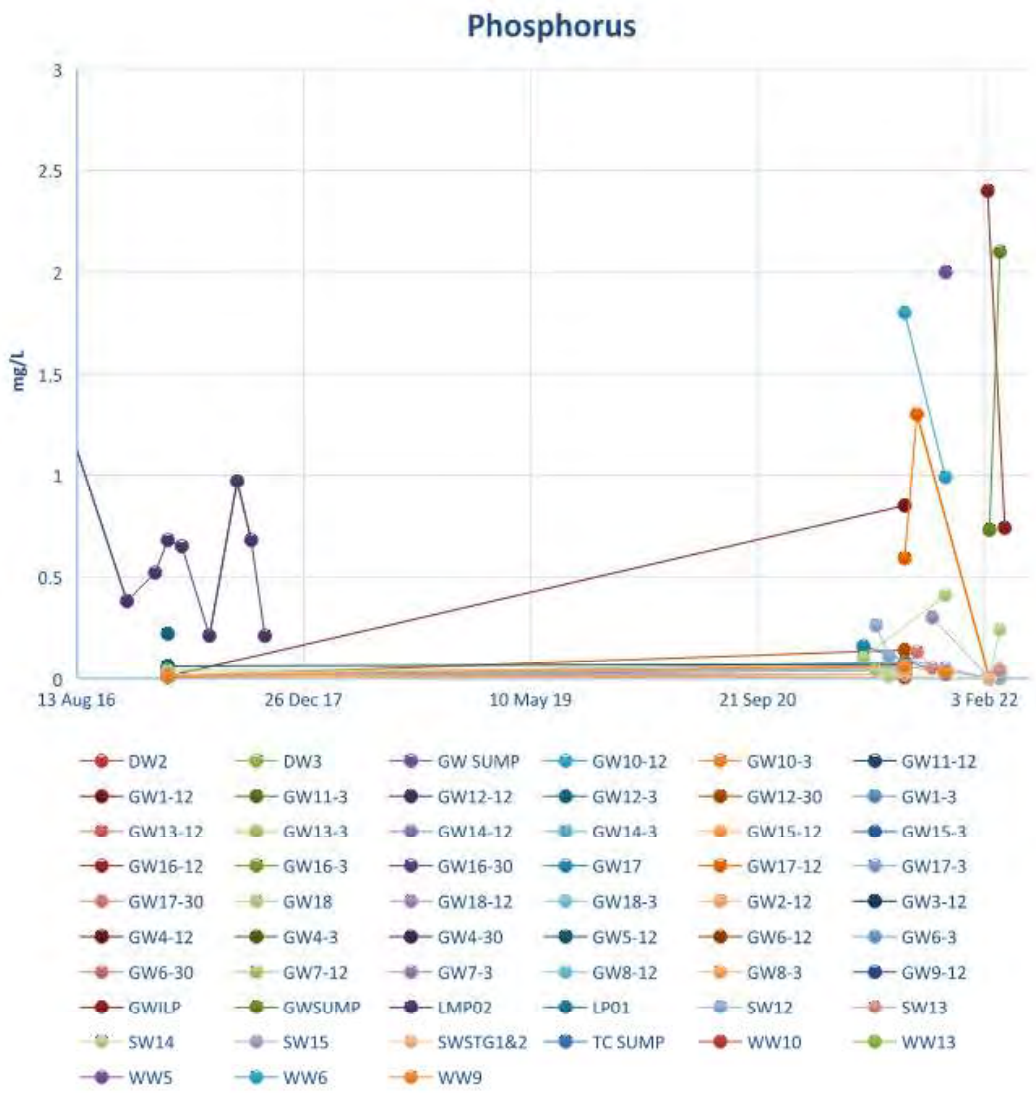


Figure 5-3 Historical phosphorus concentrations since July 2016

Figure 5-3 illustrates a large gap in monitoring of total phosphorus concentrations since 2017/18 monitoring events, until the amended EPL188 was implemented during 2021, thus preventing assessment of long-term trends. Obvious recent spikes in sediment dams receiving runoff from the Stage 3, 4, 5 and 6 landfills and stormwater from green waste processing area have been previously discussed in **Section 4.4.1**

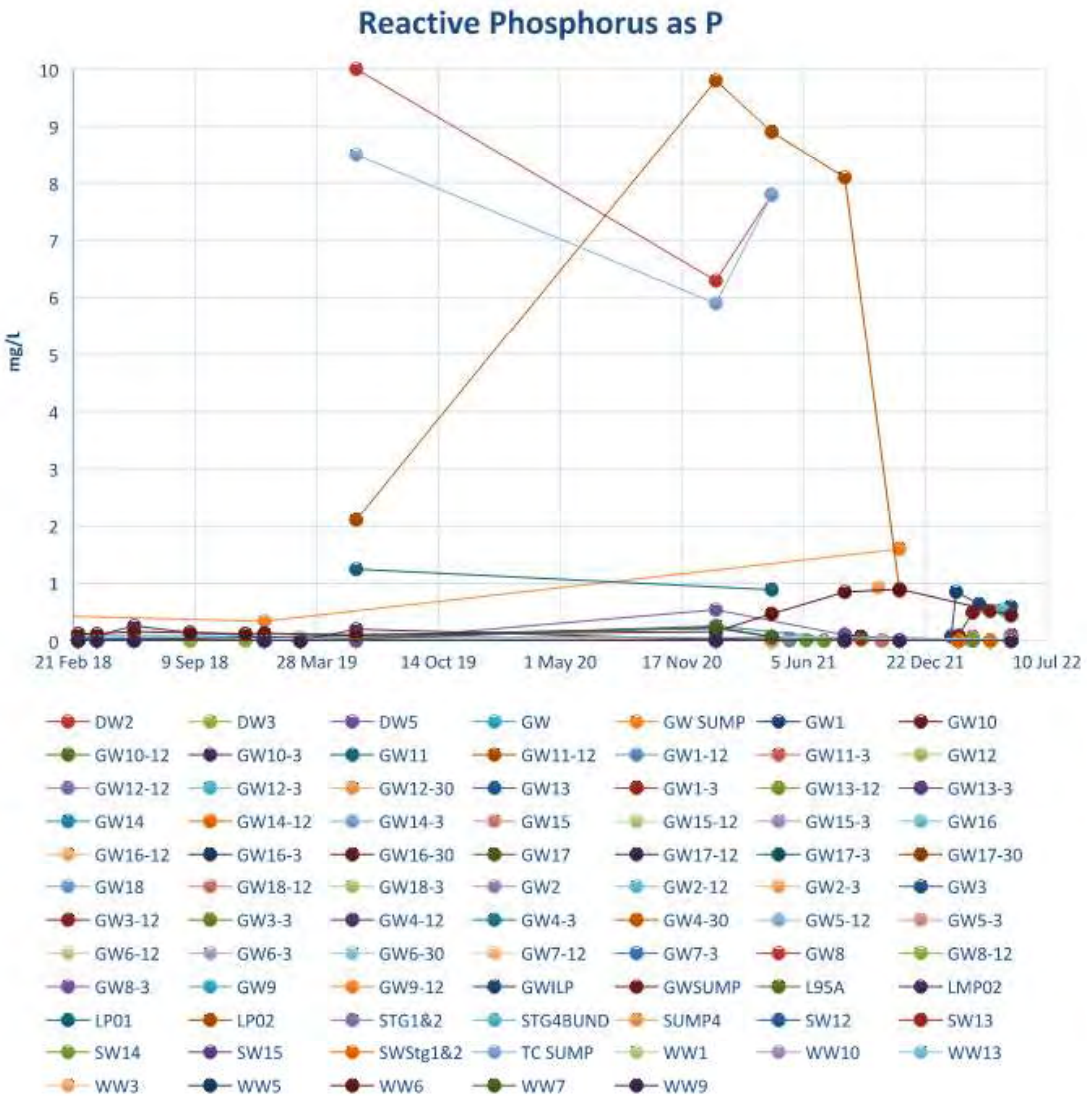


Figure 5-4 Historical reactive phosphorus concentrations since February 2018

Highly elevated levels of reactive phosphorus in previous years have been recorded in samples collected from leachate sumps which can depend on the varying types of wastes and rainfall events. Seen in **Figure 5-4** there has been an increase in reactive phosphorus in the sump receiving water from the green waste processing area between 2020 and 2022 which has since declined in more recent months.

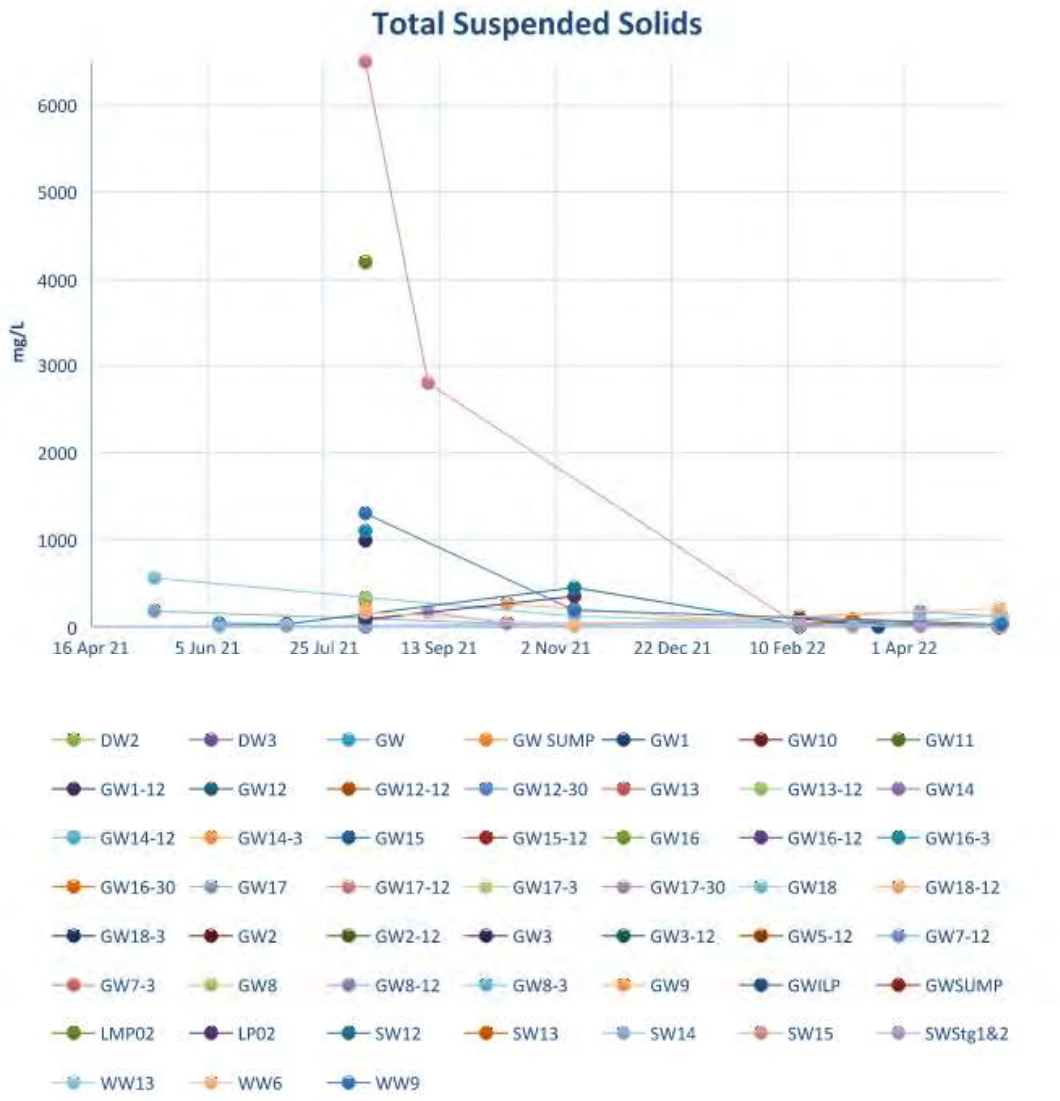


Figure 5-5 Historical TSS concentrations since 2021

TSS has not been analysed prior to implementing the amended EPL188 in 2021. Over this time spikes have been recorded during wet season months in sediment dams receiving runoff from the Stage 3, 4, 5 and 6 landfills and stormwater from green waste processing area. These areas are exposed soil areas and receive heavy vehicle traffic providing suspended solids loads in correlation with rainfall events.

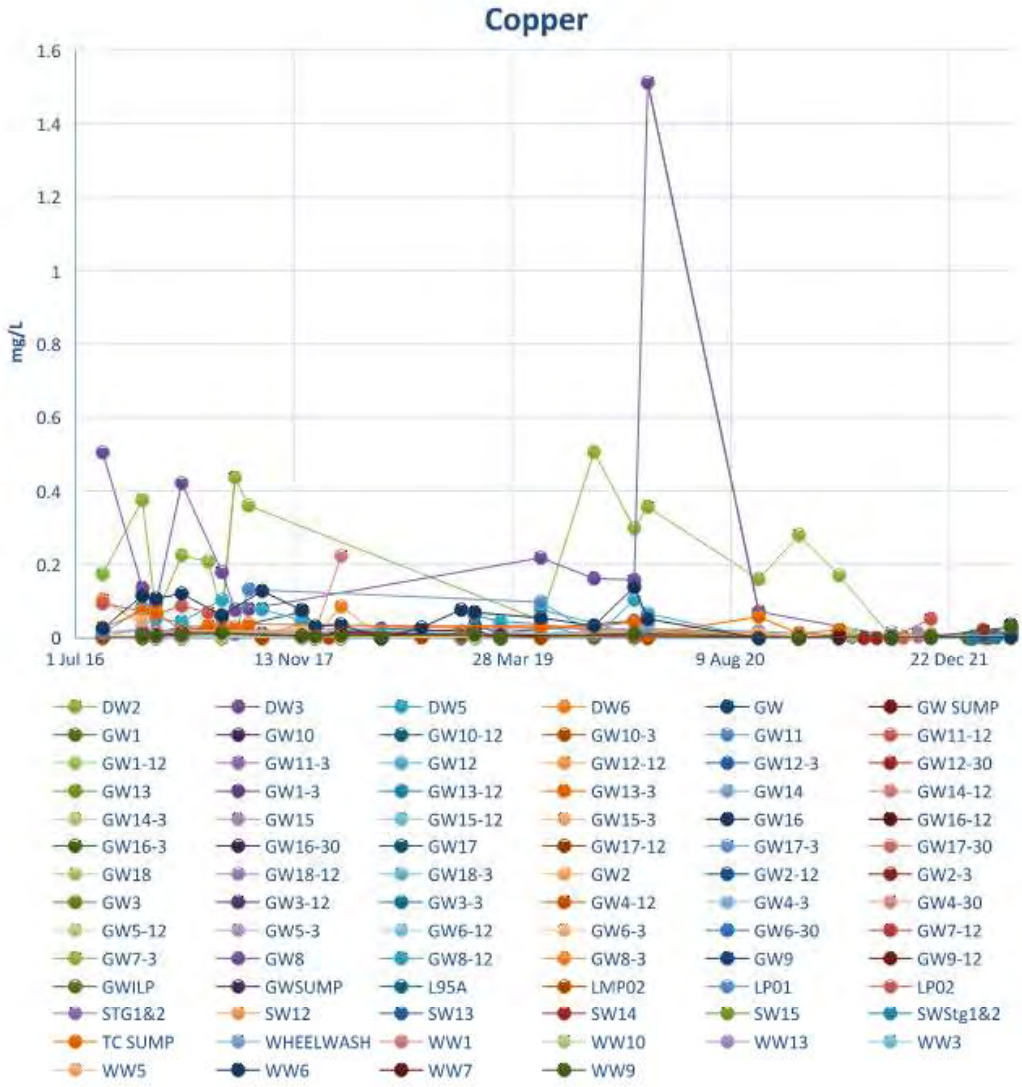


Figure 5-6 Historical copper concentrations since July 2016

Copper continues to record overall consistent concentrations across the Site as illustrated in **Figure 5-6Error! Reference source not found.** above. No long-term increasing trends in copper concentrations at SBWMF have been observed.

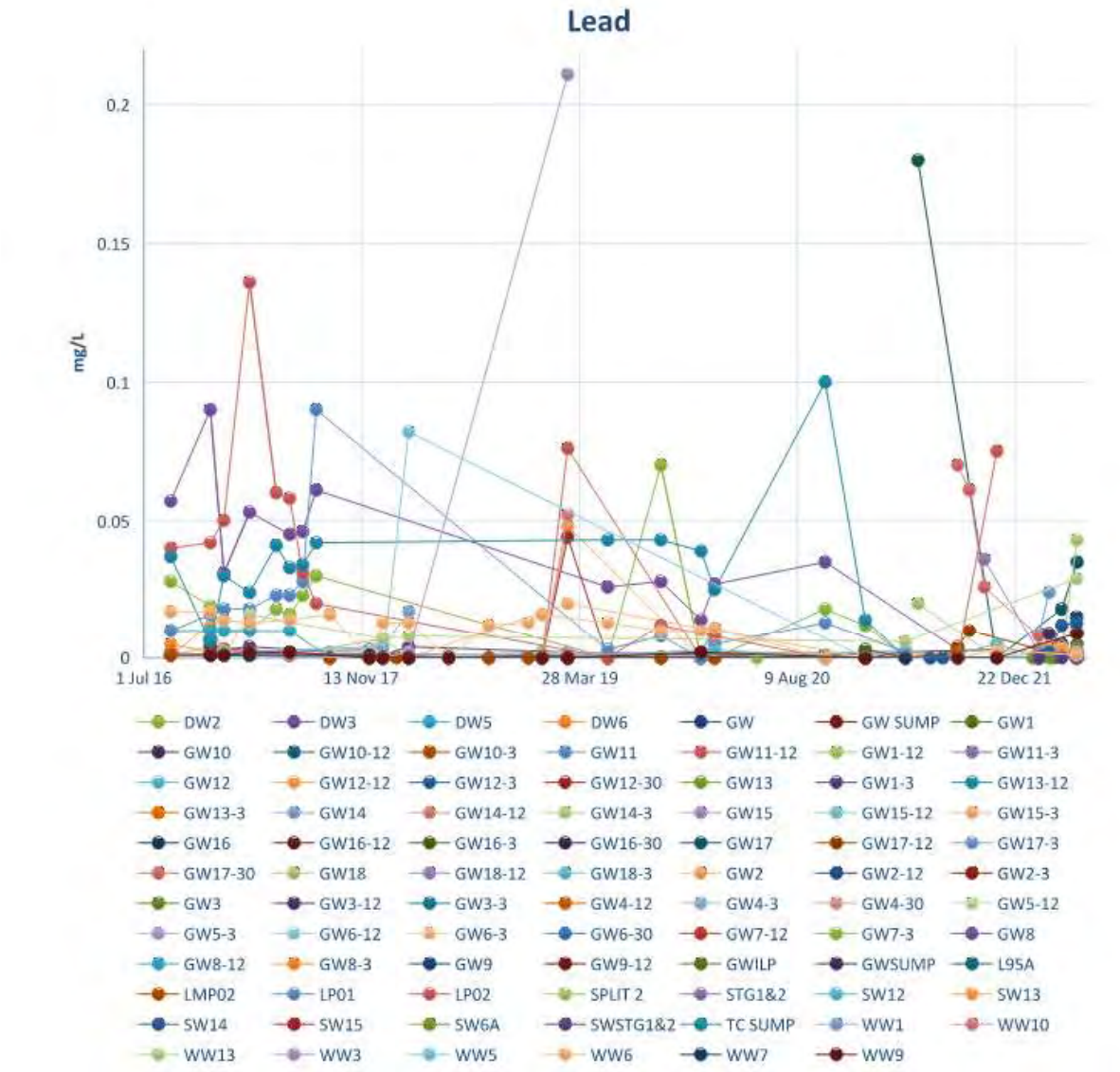


Figure 5-7 Historical lead concentrations since July 2016

Lead continues to record overall elevated concentrations across the Site illustrated in in **Figure 5-7** above. However, is noted as being more prevalent in sampling sites receiving water from the green waste processing area in during this annual monitoring period.

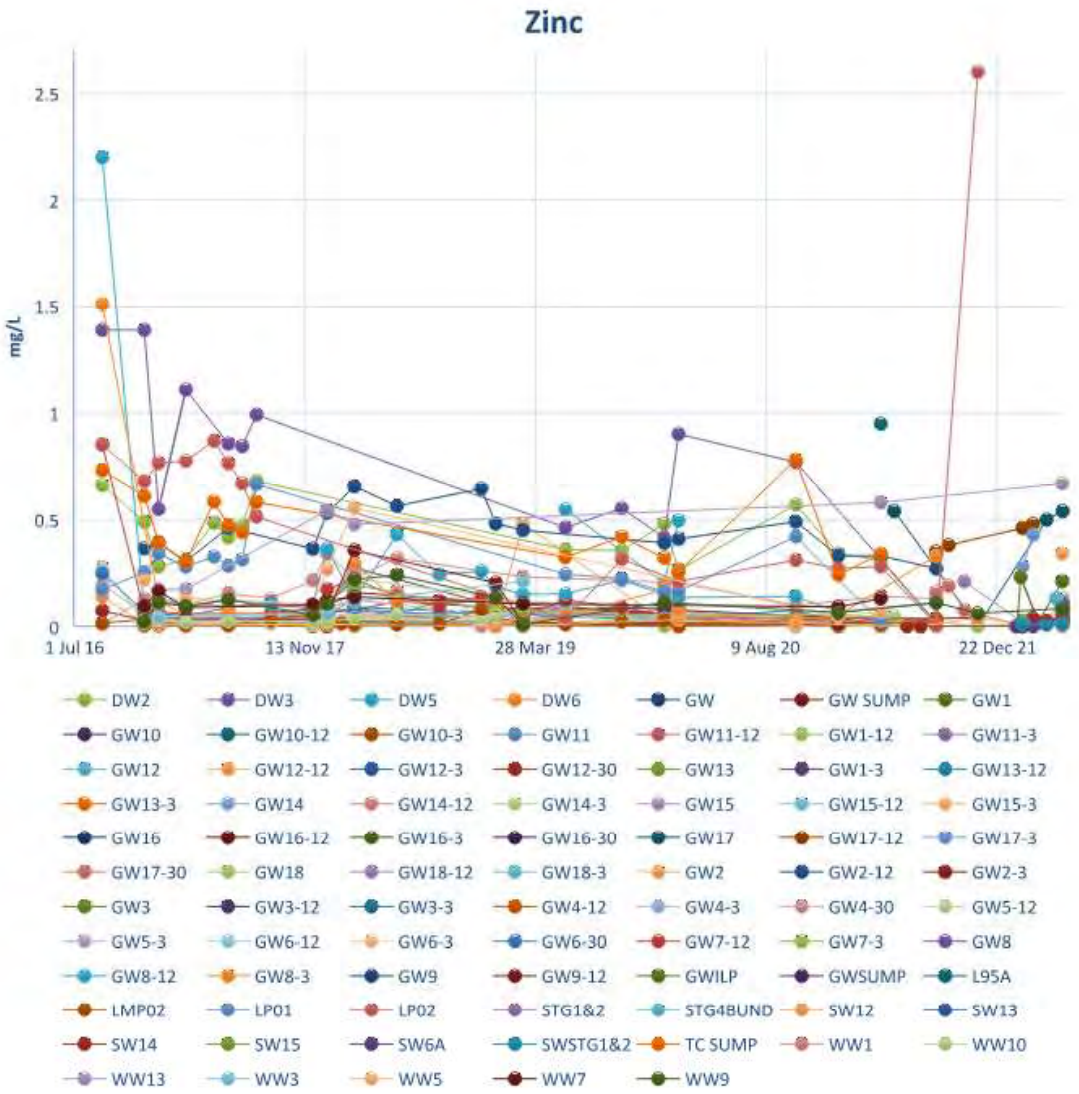


Figure 5-8 Historical zinc concentrations since July 2016

Illustrated above in **Figure 5-8**, nickel has recorded consistent concentrations in water sampled at the SBWMF over the long-term and is not increasing.

6 Conclusions and Recommendations

Cardno has been conducting groundwater, surface water, leachate, soil and dust deposition monitoring at the Shoal Bay Waste Management Facility operated by City of Darwin and reviewed all monitoring activities for the period 1 July 2021 to 30 June 2022, in accordance with the Site's environmental protection license EPL 188 – 03 pursuant to the *NT Waste Management and Pollution Control Act* (WMPC Act).

As per EPL188-03 all analytical results have been assessed against the adopted criteria in accordance with the Site's Licence conditions. Seasonal variation in rainfall restricted access and/or dried up sampling locations preventing all required sites from being sampled and varying month to month.

During this reporting period analysis suites and sampling frequencies have been implemented comply with the EPL188-03 and Soil & Water Monitoring Plan developed by EcOz (EcOz, 2021). Due to delays in 2022 monitoring activities, annual monitoring suites were captured in late January and included in the previous quarterly monitoring review. EPL188-03 also stipulates the development of a surface water, sediment and biological monitoring plan for the adjacent Mickett Creek and Buffalo Creek environments which serve to assess offsite impacts which is due to be implemented during the second half of 2022 once suitability of sampling locations (i.e., floodplain sediment sampling locations discussed in this review) are confirmed.

Analytical results and the hydraulic gradient of the Site detailed in Section 2.3 of this report indicates the migration of leachate in groundwater and surface water flowing from the Site are occurring north west of the Stage 3 and 4 landfills; between Stage 2 and 3 landfills; and most prevalent southwest of Stage 5 landfill in the green waste processing area's water sump.

There were trigger value exceedances in several nutrients and metals from the storm and surface water sampling locations, however, trigger values derived from the Darwin Harbour Water Quality Objective may be considered too conservative to apply to SBWMF inland surface water monitoring locations and more suitable to the sampling locations to be implemented as part of the offsite surface water, sediment and biological monitoring plan. Once offsite monitoring is implemented results should be compared to elevated concentrations of contaminants on site to provide a basis to assess any correlations and review trigger levels for the SMWMF if required.

Given the consistent widespread nature of metal exceedances across the Site, the soil and groundwater are potentially naturally elevated in some metals. Monitoring of existing and/or installing of new upgradient monitoring bores would allow for a broader assessment of the area and evaluation of the contribution of SBWMF.

Long-term trends of those contaminants prescribed by the relevant guidelines and adopted trigger values for the Site, have not shown evidence that they are increasing over time, as detailed in **Section 5**.

7 References

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3. HEPA, 2020, *PFAS National Environmental Management Plan v2.0*
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8. Australian Government Department of the Environment and Energy (DoEE) (2018). PFAS National Environmental Management Plan. January 2018, Report prepared by the Heads of EPAs Australia and New Zealand (HEPA), Australia.
9. Cardno 2021, *Annual Monitoring Review, Shoal Bay Waste Management Facility Water Quality Monitoring 1 July 2019 – 30 June 2020,* Report prepared by Cardno for City of Darwin.
10. EcOz 2021, *Soil and Water Monitoring Plan - Shoal Bay Waste Management Facility*, 7 April 2021, Prepared for City of Darwin.
11. Assured Environmental, 2022, *SOURCE EMISSIONS MONITORING – SHOAL BAY BENEVAP 300,* prepared for Beneterra
12. Assured Environmental, 2022, *SOURCE EMISSIONS MONITORING – SHOAL BAY BENEVAP 150,* prepared for Beneterra

APPENDIX

A

EMISSIONS MONITORING REPORTS

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FEBRUARY 2022

SOURCE EMISSIONS MONITORING – SHOAL BAY BENEVAP 150

CLIENT: BENETERRA
PROJECT ID: 14107
DATE: 4/04/2022 RELEASE: R_0

DOCUMENT CONTROL PAGE

Project Title: Source Emissions Monitoring – Shoal Bay Benevap 150

Project Reference ID: 14107

Report Prepared by:

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Report Author: Alex Forsyth

Report Reviewer: Timon Berger

Table 1: History of Revisions

Revision	Date	Issued to	Changes
R_0	4/04/2022	N. Sharma	Formal report release
DRAFT_0	30/03/2022	N. Sharma	Draft release for comment.

ACCREDITED FOR COMPLIANCE TO ISO/IEC 17025 (TESTING)

The results of the tests, calibrations and/or measurements included in this document is traceable to Australian/national standards.

Accreditation number: 19703

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EXECUTIVE SUMMARY

Assured Environmental (AE) conducted source emissions monitoring from the mobile BeneVap Leachate Treatment Facility (BV150) located at the Shoal Bay Waste Facility in Darwin, Northern Territory from 7th to 9th February 2022.

A summary of results and comparison against compliance levels is presented in Table 2 below from the testing conducted on the single release point on the BV150 unit.

In comparison to the emission limits outlined in EPL188-03 – Attachment 7, all measured parameters were within those limits specified. Results are reported at dry, 273.15°K and 101.325 kPa (STP).

Table 2: Summary of measured parameters

Parameter		Result BV150	Emission limit	Unit	Reference
Average source temperature		87	-	°C	-
Flue gas water vapour content		59	-	vol-%	-
Carbon dioxide concentration		11.0	-	vol-%	STP - dry
Oxygen concentration		6.2	-	vol-%	STP - dry
Flue gas molecular weight - dry		1.3	-	kg/Nm^3	STP - dry
Flue gas velocity		3.4	-	m/sec	STP - dry
Flue gas volume flow		17.7	-	Nm^3/min	STP - dry
Oxides of nitrogen (as NO_2)		121	350	mg/Nm^3	STP - dry
- emission rate		2.1	-	g/min	
Carbon monoxide		71	125	mg/Nm^3	STP - dry
- emission rate		1.25	-	g/min	
Total heavy metals		0.078	1.0	mg/Nm^3	STP - dry
- emission rate		0.0014	-	g/min	
Cadmium		0.00088	0.2	mg/Nm^3	STP - dry
- emission rate		1.5E-05	-	g/min	
Mercury		0.00011	0.2	mg/Nm^3	STP - dry
- emission rate		1.9E-06	-	g/min	
Fluorine (as HF)	<	2.3	50	mg/Nm^3	STP - dry
- emission rate	<	0.039	-	g/min	
Hydrogen chloride	<	2.1	100	mg/Nm^3	STP - dry
- emission rate	<	0.035	-	g/min	
Chlorine	<	2.1	200	mg/Nm^3	STP - dry
- emission rate	<	0.035	-	g/min	
Ammonia (NH3) - total		1,602	-	mg/Nm^3	STP - dry
- emission rate		28	-	g/min	
Ammonia (NH3) - in condensate		1,170	-	mg/Nm^3	STP - dry
- emission rate		20	-	g/min	
Ammonia (NH3) - gaseous		431	-	mg/Nm^3	STP - dry
- emission rate		7.5	-	g/min	
Hydrogen sulfide	<	1.1	5	mg/Nm^3	STP - dry
- emission rate	<	0.02	-	g/min	
Sulfur dioxide		5.8	-	mg/Nm^3	STP - dry
- emission rate		0.11	-	g/min	
Sulfuric acid mist (as H_2SO_4)		9.2	100	mg/Nm^3	STP - dry
- emission rate		0.17	-	g/min	
Total VOCs (as n-propane)	<	0.6	40	mg/Nm^3	STP - dry
- emission rate	<	0.01	-	g/min	
Average odour		8,996	-	ou	STP - wet
- emission rate		385,554	-	ou-m^3/min	
Dioxins & Furans (i-TEQ)		0.0093	0.1	ng/Nm^3	STP - dry
- emission rate		1.6E-10	-	g/min	
PCBs (i-TEQ)		0.0024	-	ng/Nm^3	STP - dry
- emission rate		4.3E-11	-	g/min	

Table 3: Summary of PFAS results

Parameter		Result ng/Nm³		Emission Rate g/min	Reference
Per- and polyfluoroalkyl substances					
Perfluorobutanesulfonic acid		**2,098**		**3.6E-05**	**STP**
Perfluoropentanesulfonic acid		**28.4**		**4.9E-07**	**STP**
Perfluorohexanesulfonic acid		**217**		**3.8E-06**	**STP**
Perfluoroheptanesulfonic acid		**10.3**		**1.8E-07**	**STP**
Perfluorooctanesulfonic acid PFOS		**174**		**3.0E-06**	**STP**
Perfluorodecanesulfonic acid	<	2.9	<	5.1E-08	STP
Perfluorobutanoic acid		**52**		**9.1E-07**	**STP**
Perfluoropentanoic acid		**159**		**2.8E-06**	**STP**
Perfluorohexanoic acid		**508**		**8.8E-06**	**STP**
Perfluoroheptanoic acid		**66.0**		**1.1E-06**	**STP**
Perfluorooctanoic acid PFOA		**237**		**4.1E-06**	**STP**
Perfluorononanoic acid		**8.2**		**1.4E-07**	**STP**
Perfluorodecanoic acid		**8.3**		**1.4E-07**	**STP**
Perfluoroundecanoic acid	<	7.3	<	1.3E-07	STP
Perfluorododecanoic acid	<	7.3	<	1.3E-07	STP
Perfluorotridecanoic acid	<	7.3	<	1.3E-07	STP
Perfluorotetradecanoic acid	<	36.5	<	6.3E-07	STP
4:2 FTS	<	1.5	<	2.5E-08	STP
6:2 FTS		**125**		**2.2E-06**	**STP**
8:2 FTS		**9.1**		**1.6E-07**	**STP**
10:2 FTS	<	2.9	<	5.1E-08	STP
Perfluorooctane sulfonamide		**15.2**		**2.6E-07**	**STP**
N-Methyl perfluorooctane sulfonamide	<	7.3	<	1.3E-07	STP
N-Ethyl perfluorooctanesulfonamide	<	7.3	<	1.3E-07	STP
N-Me perfluorooctanesulfonamidoethanol		**131**		**2.3E-06**	**STP**
N-Et perfluorooctanesulfonamidoethanol	<	88.6	<	1.5E-06	STP
MePerfluorooctanesulf-amido acetic acid		**12.0**		**2.1E-07**	**STP**
EtPerfluorooctanesulf-amido acetic acid		**9.1**		**1.6E-07**	**STP**

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1 INTRODUCTION

Assured Environmental (AE) was appointed by BeneTerra to sample and analyse source emissions from the BeneVap Leachate Treatment system. Sampling was conducted by AE from 7th to 9th February 2022 during typical site operations.

AE was responsible for the collection and analysis of samples, unless otherwise indicated. The samples were recovered and stored in the appropriate manner until their return to the laboratory where the samples were prepared and analysed according to the methodologies listed below in this report.

2 METHODOLGY & EQUIPMENT

2.1 Sampling methodology

All sampling and analysis was carried out in accordance with the listed requirements in Table 4. Any specific comments about the sampling and analysis have been documented where required.

Table 4: Test methods

Parameter	Reference Test Method	Test Method (NSW)	NATA accreditation	Analysis by
Sample location	AS4323.1	TM-1	Yes	1
Velocity & flow rate	USEPA Method 2	TM-2	Yes	1
Stack gas density	USEPA Method 3	TM-23	Yes	1
Oxygen	USEPA Method 3A	TM-25	Yes	1
Carbon dioxide	USEPA Method 3A	TM-24	Yes	1
Water vapour content	USEPA Method 4	TM-22	Yes	1
Sulphur dioxide	USEPA Method 6	TM-4	Yes	1
Oxides of nitrogen (as NO_2)	USEPA Method 7E	TM-11	Yes	1
Sulfuric acid mists	USEPA Method 8	TM-3[a]	Yes	1
Carbon monoxide	USEPA Method 10	TM-32	Yes	1
Hydrogen sulfide	USEPA Method 15	TM-5	Yes	1
Total VOCs	USEPA Method 18	TM-34	Yes	2
Hydrogen chloride	USEPA Method 26A	TM-8	Yes	2
Chlorine	USEPA Method 26A	TM-7	Yes	2
Fluoride (as HF)	USEPA Method 13B	TM-9	Yes	2
Heavy metals	USEPA Method 29	TM-12/13/14	Yes	2
PFAS – suite	USEPA SW846 Method 0010	Mod TM-18	No	3
Dioxins & furans	USEPA SW846 Method 0010	TM-18	Yes	4
Polychlorinated biphenyls	USEPA SW846 Method 0010	TM-18	Yes	2
Ammonia	Modified USEPA Method 26	Mod TM-4[b]	Yes	2
Odour	AS4323.3	OM-7	Yes	1

Table 5: Analysis performed by

Note	Company	Work performed	NATA ID	Report Number
1	Assured Environmental	Sampling & analysis	19703	14107
2	Envirolab Services	Sample analysis	2901	288920
4	National Measurement Inst.	PCDD/F & PCB analysis	198	DAU22_062

[a] EPL188-03 lists the test method for sulfuric acid mists as TM-13, this does not correspond to the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales* listed method (TM-3).

[b] EPL188-03 lists the test method for ammonia as TM-3. A closer representation of the sampling technique is a Modified TM-4 sample train. See the description of the sampling technique in Table 6 below.

Table 6: Sampling comments

Note	Comment
Sample location	Sample location is compliant but non ideal as per AS4323.1. The sample location is greater than two, but less than six diameters downstream from a disturbance. The temperature and velocity survey showed that the sample position was in compliance to items (a) to (f) as per AS4323.1.
Calibrations	Analyser calibration performed in the laboratory prior to conducting field work and post field work in AE lab.
H_2S	A sample of exhaust gas was passed through a buffer solution to remove any potential SO_2 present before being captured in a specialised gas sampling bag. Analysis for H_2S was performed using GC-FPD within 30 hours of collection.
Heavy metals	Type 1 substances: Antimony, Arsenic, Cadmium, Lead Mercury. Type 2 substances: Beryllium, Chromium, Cobalt, Manganese, Nickel, Selenium, Tin, Vanadium.
PFAS	A modified version of the USEPA SW846 Method 0010 sample train was employed to sample for Per- and poly-fluoroalkyl substances (PFAS) material in the flue gas emission. Refer to section 2.2 for further information.
Ammonia	The ammonia sampling was performed using a modified constant flow sampling train. A condensate removal trap was placed in front of the collection trap containing the absorbing solution to separate condensing ammonia from gaseous ammonia passing through the initial dropout and into the collection solution (0.1N H_2SO_4). Both the condensate captured in the trap and the sorbent solution are analysed for ammonia individually. Ammonia results are reported in the condensate and gaseous phase separately and as total NH_3. Samples are analysed using a Discrete Analyser.
Odour	Due to the high levels of moisture in the emission the odour samples bags were diluted beyond the suggested limit in AS4323.3. This is required to avoid condensation forming in the sample bags.

2.2 Per- and poly-fluoroalkyl substances sample methodology

Suitable sampling methods for Per- and poly-fluoroalkyl substances (PFAS) in air have received considerably less attention than in other media such as water and soil matrices. As such Assured Environmental has developed a sampling method based on modifications of the promulgated USEPA SW846 Method 0010 sample train. This method includes consideration for both semi-volatile and particulate bound PFAS. It is recognised that the US EPA has recently introduced Other Test Method (OTM) – 45 and although many of the elements included in this method are consistent with the method developed by AE. It is also noted that posting of an OTM by USEPA is neither an endorsement by EPA regarding the validity of the test method nor a regulatory approval of the test method, rather to promote discussion of developing emerging methodologies prior to full endorsement. In this case the AE method was employed, which is summarised below.

The basis of the sample train is;

- Gaseous and particulate pollutants are withdrawn from an emission source at an isokinetic sampling rate and are collected in a multi-component sampling train. The sample train contains a high-efficiency glass fibre filter and a packed bed of porous adsorbent resin. The filter is used to collect organic-laden particulate materials and the porous polymeric resin to adsorb semi-volatile organic species. Semi-volatile species are defined as compounds with boiling points greater than 100°C. The impingers downstream of the resin trap are loaded with water to knock-out any water vapour prior to metering the gas. These impingers are not routinely analysed for S-VOCs.

The modifications made to this sample train in order to target PFAS materials included;

- Sorbent material is XAD-2 and XAD-4.
- The resin traps are spiked with a surrogate standard to test for retention. A known quantity of standard is injected into the trap during preparation, the trap is then shipped, sampled and returned to the laboratory for analysis. The analysis includes detecting the injected standard, which provides a measure of the recovery efficiency. Factors that may affect the recovery efficiency include, sample transport and handling procedures, sampling temperatures (the resin must be chilled during sampling and maintained below 20°C) and sample preparation at the laboratory, including the extraction of the sample from the resin.
- Condensate remove trap prior to resin traps.
- Impingers downstream of the resin trap are loaded with a sodium solution and is intended to be a breakthrough detector. Following the sampling, the impinger contents are measured and placed in a sample bottle for shipment to the laboratory. The final impinger of the sample train is then analysed separately to the filter, resin trap and front half methanol rinse so as to provide a measure of possible breakthrough. The intent of this sample train component is to provide a measure of breakthrough from the primary sampling components. Where no detections of PFAS material is made in this sample component, the limit of detection is not added to the sample result.
- Following the sampling onsite, all sample train components that have been in contact with the sample are rinsed thoroughly with methanol and stored in a sample container to be analysed as part of the sample.
- Sample train component material. According to documented water and soil PFAS sampling procedures, the use of glass, Teflon and stainless steel should be avoided and the use of polypropylene (PE) is recommended. PE is not considered to be conducive to source emissions sampling due to the temperatures of the flue gas. PE or HDPE cannot be used in the probe or filter box due to its low melting point, instead, all sampling components upstream of the resin trap was constructed of glass. Following sampling, all glassware was thoroughly rinsed with methanol at least three times to quantitatively recovery any possible PFAS material deposited on this surface.

For the analysis, the samples are extracted using a solvent desorption technique, with the filter and front half methanol rinse extract combined prior to analysis for the PFAS species. The XAD resin trap is then analysed in isolation as is the condensate downstream of the trap to gain an understanding of where the PFAS is captured within the sample train. The analysis is performed using LC/MS/MS instruments, with each analysis performed using the surrogate spikes to determine sample specific recoveries.

2.2.1 PFAS blank corrections

A full field blank sample has not been performed for this round of sampling. The stock reagents are largely unchanged from the previous round of sampling (13633), therefore the results of this previous blank are utilised for this round. A field blank is performed by the sample train being constructed as normal, however no sample is passed through it. It is then cleaned and recovered following the standard recovery procedures and the filter, resin trap and rinsate kept and analysed along with the sample.

The following details the procedures used to correct for detections of PFAS species in the blank samples.

- Where the blank result is a non-detection, no adjustment to the sample result is made.
- Where the blank result returns a positive detection, but is less than half of the sample result, the blank value is subtracted from the sample result and reported as a positive detection.
- Where the blank value returns a positive detection, and is exceeding half of the sample result, no adjustments are made to the sample result, but it is reported as a non-detection.

2.3 Sample Location

The images and figures below show the sample location and site details.



Figure 1: BeneVap treatment system stack

Table 7: Sample location summary

Sample location	BeneVap Treatment System
Stack Shape	CIRCULAR
Stack Diameter (m)	0.60
Stack Cross Section Area (m^2)	0.28
Distance to upstream disturbance (m)	1.3
Diameters (D)	2.2
Distance to downstream disturbance (m)	0.7
Diameters (D)	1.1
Total traverse point factors	1.15 , 1.05 , 1.21
Port size (mm)	100
Port Thread Type	BSP
Number of traverses	2
Number of points per traverse	6
Total number of traverse points	12
Flow & temperature compliance check	YES

2.4 Test equipment

The sampling equipment was transported to site and specifically setup at the test location. Sampling was performed using heated probes and filters, with a constant flow and isokinetic sample console.

Equipment used during the course of the testing is sourced from Apex Instruments and Testo, industry leaders in the supply of source testing equipment.

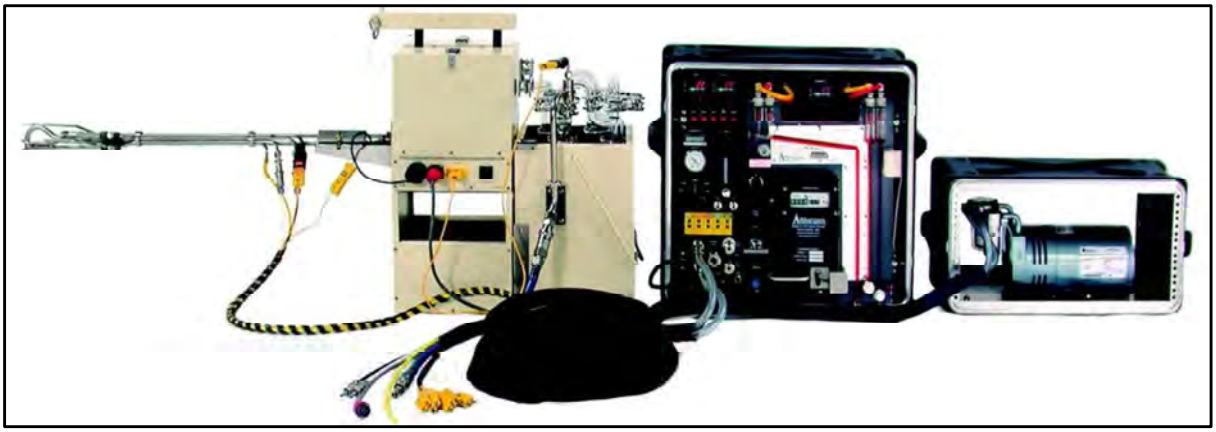


Figure 2: Manual sample equipment



Figure 3: Combustion gas analyser

3 MEASUREMENT UNCERTAINTY

There is an inherent uncertainty associated with any scientific measurement, including stack emissions monitoring. The measurement uncertainty can be controlled with strict adherence to the reference methodology along with utilising appropriate calibration standards with corresponding acceptable uncertainty reports.

Many source sampling methods do not outline exact procedures for establishing direct measurement uncertainty. In the absence of a defined procedure, the uncertainty budgets presented are based on estimations using ISO-GUM method.

Each individual source and test may have a unique associated uncertainty, due largely to the stack sample location in relation to the positioning requirements of AS4323.1.

Table 8: Sample specific uncertainty budgets

Parameter	Reference method	Limit of measurement	Unit of measure	Uncertainty ± %
Flue gas velocity	USEPA Method 2	3	m/sec	20
Oxygen	USEPA Method 3A	0.3	%-vol	5.0
Carbon dioxide	USEPA Method 3A	0.3	%-vol	8.0
Water vapour content	USEPA Method 4	0.5	%-vol	5.0
Sulphur dioxide	USEPA Method 6	2.0	mg/sample	15
Oxides of nitrogen (as NO_2)	USEPA Method 7E	2.1	mg/sample	15
Sulfuric acid mists	USEPA Method 8	2.0	mg/sample	15
Carbon monoxide	USEPA Method 10	1.5	mg/sample	15
Hydrogen sulfide	USEPA Method 15	1.0	mg/sample	20
Total VOCs	USEPA Method 18	1.0	mg/sample	20
Hydrogen chloride	USEPA Method 26A	1.0	mg/sample	15
Chlorine	USEPA Method 26A	1.0	mg/sample	15
Fluoride (as HF)	USEPA Method 13B	1.0	mg/sample	15
Heavy metals	USEPA Method 29	0.3 to 50	µg/sample	10
PFAS – suite	USEPA SW846 Method 0010	1 to 50	ng/sample	25
Dioxins & furans	USEPA SW846 Method 0010	1	pg/sample	15
Polychlorinated biphenyls	USEPA SW846 Method 0010	20	pg/sample	15
Ammonia	Modified USEPA Method 26	1	mg/sample	25
Odour	AS4323.3	100	ou	30

4 QUALITY ASSURANCE & QUALITY CONTROL (QA/QC)

AE operates within a quality system based upon the requirements of ISO17025. Our quality system defines specific procedures and methodologies to ensure any project undertaken by AE is conducted with the highest level of quality given the specific confines of each project. The overall objective of our QA/QC procedures is to representatively sample and accurately analyse components in the gas streams and therefore report valid measurements of emission concentrations.

To ensure representativeness of field work, our quality procedures target:

1. Correct sampling locations
2. Sample time
3. Frequency of samples and
4. Method selection & adherence

To ensure representativeness of lab work, our quality procedures target:

1. Sample preservation
2. Chain of custody (COC)
3. Sample preparation and
4. Analytical techniques

AE maintains strict quality assurance throughout all its sampling programs, covering on-site 'field work' and the analytical phase of our projects. Our QA program covers the calibration of all sampling and analytical apparatus where applicable and the use of spikes, replicate sample and reference standards. The test methodologies used for this project are outlined in section 2 of this document. Field test data has been recorded and calculated using direct entry into Microsoft Excel spreadsheets following the procedures of the appropriate test methods. Determination of emission concentrations has been performed using the same Microsoft Excel spreadsheets which are partially supplied as an attachment to this report. More detailed information can be supplied upon request.

QA/QC checks for this project will use validation techniques and criteria appropriate to the type of data and the purpose of the measurement to approve the test report. Records of all data will be maintained. Complete chain of custody (COC) procedures have been followed to document the entire custodial history of each sample. The COC forms also served as a laboratory sheet detailing sample ID and analysis requirements.

Table 9: Sampling data QA/QC checklist

Sampling Data QA/QC Checklist	Comment
Use of appropriate test methods	Yes
'Normal' operation of the process being tested	Yes – as instructed by client
Use of properly operating and calibrated test equipment	Yes
Use of high purity reagents	Yes
Performance of leak checks post sample (at least)	Yes

Table 10: Laboratory data QA/QC checklist

Laboratory Data QA/QC Checklist	Comment
Use of appropriate analytical methods	Yes
Use of properly operating and calibrated analytical equipment	Yes
Precision and accuracy comparable to that achieved in similar projects	Yes
Accurate reporting	Yes

Table 11: Olfactometer QA data

Item	Comment
Methodology	AS/NZ4323.3:2001 "determination of odour concentration by dynamic olfactometry".
Sample Media	Odour samples collected into Nalophan™ sample bags
Sample identification	All samples are labelled uniquely immediately following collection according to Assured Environmental identification procedure. Each sample has the following recorded: project ID, sample number, location, date, time, dilution and any deviations to AS/NZ4323.3.
Timing	All measurements were conducted within 30 hours of sampling as specified by AS/NZ4323.3
Traceability	All panel results are traceable to reference standards held by Assured Environmental
Analysis conditions	Room temperature maintained at 22 °C ± 3 °C
Odour panel location	7/142 Tennyson Memorial Avenue Tennyson, Qld. 4105
Reference odourant	40 ppm n-butanol
Odour panel threshold	100 ou

4.1 PFAS quality control

The recoveries of surrogate standards from the sampling and analysis are presented in the table below. The expected QC recovery for measurements in the ppb to ppt levels is in the range of 60 to 120%. The results are not corrected for the recovery efficiency.

Table 12: PFAS surrogate recovery (%)

Surrogate	PFAS	
	Filter	Trap
Field surrogate		
Surrogate $^{13}C_8$ PFOS	99	85
Surrogate $^{13}C_2$ PFOA	105	100

Analysis of the final bubbler containing a sodium borate solution was performed separately to the front of the sampling train in order to assess the potential for breakthrough. The results of this analysis are provided below.

Table 13: Breakthrough analysis

Perfluorinated surfactants	Abbreviation	Breakthrough analysis (ng/sample)
Perfluorobutanesulfonic acid	PFBS	< 0.14
Perfluoropentanesulfonic acid	PFPeS	< 0.1
Perfluorohexanesulfonic acid	PFHxS	< 0.1
Perfluoroheptanesulfonic acid	PFHpS	< 0.1
Perfluorooctanesulfonic acid PFOS	PFOS	< 0.1
Perfluorodecanesulfonic acid	PFDS	< 0.3
Perfluorobutanoic acid	PFBA	< 0.3
Perfluoropentanoic acid	PFPeA	< 0.3
Perfluorohexanoic acid	PFHxA	< 0.1
Perfluoroheptanoic acid	PFHpA	< 0.1
Perfluorooctanoic acid PFOA	PFOA	**0.2** (0.1 % of total)
Perfluorononanoic acid	PFNA	< 0.1
Perfluorodecanoic acid	PFDA	< 0.7
Perfluoroundecanoic acid	PFUdA	< 0.7
Perfluorododecanoic acid	PFDoA	< 0.7
Perfluorotridecanoic acid	PFTrDA	< 0.7
Perfluorotetradecanoic acid	PFTeDA	< 3.6
4:2 FTS	4:2 FTS	< 0.1
6:2 FTS	6:2 FTS	< 0.1
8:2 FTS	8:2 FTS	< 0.3
10:2 FTS	10:2 FTS	< 0.3
Perfluorooctane sulfonamide	FOSA	< 0.7
N-Methyl perfluorooctanesulfonamide	N-MeFOSA	< 0.7
N-Ethyl perfluorooctanesulfonamide	n-EtFOSA	< 0.7
N-Me perfluorooctanesulfonamidoethanol	n-MeFOSE	< 7.2
N-Et perfluorooctanesulfonamidoethanol	n-EtFOSE	< 36.16
MePerfluorooctanesulf-amidoacetic acid	N-MeFOSAA	< 0.3
EtPerfluorooctanesulf-amidoacetic acid	N-EtFOSAA	< 0.3

Based on the breakthrough analysis, PFOA experienced a 0.1 % breakthrough into the final stages of the sample train. This level detected is not considered to have significantly impacted the result. These positive results in the breakthrough section are included in the reported total.

Analysis of the field sample blank (project 13633) showed that only a small amount of PFOA was detectable in the methanol/XAD resin. The table below shows the results of the blank analysis.

Table 14: Field blank analysis

	Blank analysis		
Perfluorinated surfactants - PFAS suite	**Front half ng/sample**	**Resin Traps ng/sample**	**Breakthrough ng/sample**
Perfluorobutanesulfonic acid	< 0.2	< 0.2	< 0.2
Perfluoropentane sulfonic acid (PFPeS)	< 0.2	< 0.2	< 0.2
Perfluorohexane sulfonate (PFHxS)	< 0.2	< 0.2	< 0.2
Perfluoroheptane sulfonate (PFHpS)	< 0.2	< 0.2	< 0.2
Perfluorooctane sulfonate (PFOS)	< 0.2	< 0.2	< 0.2
Perfluorodecanesulfonic acid (PFDS)	< 0.4	< 0.4	< 0.4
Perfluorobutanoic acid	< 0.4	< 0.4	< 0.4
Perfluoropentanoic acid (PFPeA)	< 0.4	< 0.4	< 0.4
Perfluorohexanoic acid (PFHxA)	< 0.2	< 0.2	< 0.2
Perfluoroheptanoic acid (PFHpA)	< 0.2	< 0.2	< 0.2
Perfluorooctanoic acid (PFOA)	< 0.2	**2.3**	< 0.2
Perfluorononanoic acid (PFNA)	< 0.2	< 0.2	< 0.2
Perfluorodecanoic acid	< 1.0	< 1.0	< 1.0
Perfluoroundecanoic acid (PFUnA)	< 1.0	< 1.0	< 1.0
Perfluorododecanoic acid (PFDoA)	< 1.0	< 1.0	< 1.0
Perfluorotridecanoic acid (PFTrDA)	< 1.0	< 1.0	< 1.0
Perfluorotetradecanoic acid (PFTeDA)	< 5.0	< 5.0	< 5.0
4:2 Flurotelomersulphonate	< 0.2	< 0.2	< 0.2
6:2 Fluorotelomersulphonate	< 0.2	< 0.2	< 0.2
8:2 Fluorotelomersulphonate	< 0.4	< 0.4	< 0.4
10:2 Fluorotelomersulphonate	< 0.4	< 0.4	< 0.4
Perfluorooctane sulfonamide	< 1.0	< 1.0	< 1.0
N-Methyl-heptadecafluorooctane sulphonamide	< 1.0	< 1.0	< 1.0
N-Ethyl-heptadecafluorooctane sulphonamide	< 1.0	< 1.0	< 1.0
N-Me perfluorooctanesulfonamid oethanol	< 1.0	< 1.0	< 1.0
N-Et perfluorooctanesulfonamid oethanol	< 50	< 50	< 50
N-Methylperfluorooctane sulphonamidoacetic acid	< 0.4	< 0.4	< 0.4
N-Ethyl-perfluorooctane sulphonamidoacetic acid	< 0.4	< 0.4	< 0.4

4.2 Dioxins and furans QA

During sample analysis, the laboratory uses $^{13}C_{12}$ labelled dioxin, furan and PCB surrogates to test sample recovery efficiency and possible sample matrix interference.

During this analysis, the laboratory surrogate recovery for all dioxin, furan and PCB congeners was within acceptable ranges.

5 DEFINITIONS

The following terms and abbreviations may be used in this report:

Table 15: Definitions

Symbol	Definition
<	The analytes tested for was not detected; the value stated is the reportable limit of detection
Am^3	Gas volume in cubic metres at measured conditions
AS	Australian Standard
BH	Back half of sample train (filter holder and impingers) (referred to during sample recovery)
°C	Degrees Celsius
CARB	California Air Resources Board methods
dscm	dry standard cubic meters
FH	Front half of sample train (probe and filter holder) (referred to during sample recovery)
g	Grams
Heavy metals	Sum of Antimony, Arsenic, Beryllium, Cadmium, Chromium, Cobalt, Lead, Manganese, Nickle, Selenium, Tin, Vanadium & Mercury. Also known as Type 1 and Type 2 hazardous substances. Total heavy metals refers only to those metals found in the sample and does not include limit of detection values.
kg	Kilograms
Lower range	The sum of a list of a particular group of compounds, where only those individual congeners/compounds that are detectable in the sample have been included in the total. Results below the limit of detection have not been included. Unless otherwise indicated, the lower range is reported for dioxins & furans, PCBs, heavy metals and PFAS analysis suites.
m	Metres
m^3	actual gas volume in cubic metres as measured
mbar	Millibars
mg	Milligrams (10^{-3} grams)
min	Minute
ml	Millilitres
mmH_2O	Millimetres of water
Mole	SI unit that measures the amount of substance
N/A	Not applicable
ng	Nanograms (10^{-9} grams)
Nm^3	Gas volume in dry cubic metres at standard temperature and pressure (0°C and 101.3 kPa)
NMI	National Measurement Institute
NM VOC	Non methane volatile organic compound
NR	Not required on this occasion
ou	Odour unit
PM	Particulate matter
ppb	Parts per billion
ppm	Parts per million
sec	Second
Sm^3	Gas volume in dry cubic metres at standard temperature and pressure (0°C and 101.3 kPa) and corrected to a standardised value (e.g. 15% O_2)
STP	Standard temperature and pressure (0°C and 101.3 kPa) & dry
USEPA	United States Environmental Protection Authority

6 RESULTS

Table 16: Sample information – PFAS

Site		Shaolbay Landfill
Sample Location		BV150
Reference Method		USEPA Method 0010 - ISOKINETIC
Run ID		8
Test Parameter		PFAS
Test Date	dd/mm/yyyy	7/02/2022
Start Time	hh:mm	12:21
End Time	hh:mm	15:30
Average Stack Temperature	°C	87
Absolute Stack Pressure	mb	1005
Moisture Content	% v/v	60.8
Dry Gas Density	kg/Nm^3	1.34
Dry Gas Molecular Weight	g/g-mole	30.0
Sample Volume (dry gas meter)	Nm^3	1.38
Stack Gas Velocity	m/sec	3.5
Actual Stack Flow Rate	m^3/min	59
Dry Standard Stack Flow Rate	Nm^3/min	17
Percent Isokinetic Rate	%	102

		standard conditions	
Pollutant PFAS species	Licence limit ng/Nm^3	Concentration ng/Nm^3	Emission Rate g/min
Perfluorobutanesulfonic acid	-	2,098	3.64E-05
Perfluoropentanesulfonic acid	-	28.4	4.93E-07
Perfluorohexanesulfonic acid	-	217	3.77E-06
Perfluoroheptanesulfonic acid	-	10.3	1.79E-07
Perfluorooctanesulfonic acid PFOS	-	174	3.02E-06
Perfluorodecanesulfonic acid	-	< 2.9	< 5.07E-08
Perfluorobutanoic acid	-	52	9.09E-07
Perfluoropentanoic acid	-	159	2.76E-06
Perfluorohexanoic acid	-	508	8.82E-06
Perfluoroheptanoic acid	-	66.0	1.15E-06
Perfluorooctanoic acid PFOA	-	237	4.12E-06
Perfluorononanoic acid	-	8.2	1.42E-07
Perfluorodecanoic acid	-	8.3	1.43E-07
Perfluoroundecanoic acid	-	< 7.3	< 1.27E-07
Perfluorododecanoic acid	-	< 7.3	< 1.27E-07
Perfluorotridecanoic acid	-	< 7.3	< 1.27E-07
Perfluorotetradecanoic acid	-	< 36.5	< 6.34E-07
4:2 FTS	-	< 1.5	< 2.54E-08
6:2 FTS	-	125	2.17E-06
8:2 FTS	-	9.1	1.58E-07
10:2 FTS	-	< 2.9	< 5.07E-08
Perfluorooctane sulfonamide	-	15.2	2.64E-07
N-Methyl perfluorooctane sulfonamide	-	< 7.3	< 1.27E-07
N-Ethyl perfluorooctanesulfonamide	-	< 7.3	< 1.27E-07
N-Me perfluorooctanesulfonamidoethanol	-	131	2.27E-06
N-Et perfluorooctanesulfonamidoethanol	-	< 88.6	< 1.54E-06
MePerfluorooctanesulf-amido acetic acid	-	12.0	2.08E-07
EtPerfluorooctanesulf-amido acetic acid	-	9.1	1.58E-07
TOTAL			
Sum of positive detections	-	3,868	6.72E-05

Table 17: Sample information – Odour

Site		Shaolbay Landfill
Sample Location		BV150
Reference Method		AS4323.3 - CONSTANT FLOW
Run ID		9
Test Parameter		Odour
Test Date	dd/mm/yyyy	9/02/2022
Start Time	hh:mm	9:40
End Time	hh:mm	9:47
Average Stack Temperature	°C	88
Absolute Stack Pressure	mb	1005
Moisture Content	% v/v	58.8
Dry Gas Density	kg/Nm^3	1.34
Dry Gas Molecular Weight	g/g-mole	30.0
Sample Volume (dry gas meter)	Nm^3	-
Stack Gas Velocity	m/sec	3.4
Actual Stack Flow Rate	m^3/min	57
Dry Standard Stack Flow Rate	Nm^3/min	18
Percent Isokinetic Rate	%	N/A

Pollutant	Licence limit	standard conditions Concentration	Emission Rate
Odour	ou	ou	ou.m^3/min
Odour Sample 1	-	8,030	344,152
Odour Sample 2	-	9,962	426,955
Average Odour	-	8,996	385,554

Table 18: Sample information – Hydrogen sulfide

Site		Shaolbay Landfill
Sample Location		BV150
Reference Method		AS4323.3 - CONSTANT FLOW
Run ID		9
Test Parameter		Odour
Test Date	dd/mm/yyyy	9/02/2022
Start Time	hh:mm	9:55
End Time	hh:mm	10:00
Average Stack Temperature	°C	88
Absolute Stack Pressure	mb	1005
Moisture Content	% v/v	58.8
Dry Gas Density	kg/Nm^3	1.34
Dry Gas Molecular Weight	g/g-mole	30.0
Sample Volume (dry gas meter)	Nm^3	-
Stack Gas Velocity	m/sec	3.4
Actual Stack Flow Rate	m^3/min	57
Dry Standard Stack Flow Rate	Nm^3/min	18
Percent Isokinetic Rate	%	N/A

Pollutant	Licence limit	standard conditions Concentration	Emission Rate
Odour	mg/Nm^3	mg/Nm^3	g/min
Hydrogen sulfide	5	< 1.4	< 0.02

Table 19: Sample information – Oxides of Sulfur

Site		Shaolbay Landfill
Sample Location		BV150
Reference Method		USEPA Method 8 - ISOKINETIC
Run ID		5
Test Parameter		Sox
Test Date	dd/mm/yyyy	7/02/2022
Start Time	hh:mm	8:38
End Time	hh:mm	9:44
Average Stack Temperature	°C	87
Absolute Stack Pressure	mb	1005
Moisture Content	% v/v	57.7
Dry Gas Density	kg/Nm^3	1.34
Dry Gas Molecular Weight	g/g-mole	30.0
Sample Volume (dry gas meter)	Nm^3	0.50
Stack Gas Velocity	m/sec	3.5
Actual Stack Flow Rate	m^3/min	59
Dry Standard Stack Flow Rate	Nm^3/min	19
Percent Isokinetic Rate	%	102

Pollutant	Licence limit	standard conditions Concentration	Emission Rate
Sox	mg/Nm^3	mg/Nm^3	g/min
SO2	-	5.8	0.11
SO3 (as H2SO4)	100	9.2	0.17

Table 20: Sample information – Acid gases

Site		Shaolbay Landfill
Sample Location		BV150
Reference Method		USEPA Method 26A - ISOKINETIC
Run ID		3
Test Parameter		Acid Gases
Test Date	dd/mm/yyyy	8/02/2022
Start Time	hh:mm	7:40
End Time	hh:mm	8:45
Average Stack Temperature	°C	88
Absolute Stack Pressure	mb	1005
Moisture Content	% v/v	61.6
Dry Gas Density	kg/Nm^3	1.34
Dry Gas Molecular Weight	g/g-mole	30.0
Sample Volume (dry gas meter)	Nm^3	0.48
Stack Gas Velocity	m/sec	3.5
Actual Stack Flow Rate	m^3/min	59
Dry Standard Stack Flow Rate	Nm^3/min	17
Percent Isokinetic Rate	%	108

Pollutant	Licence limit	standard conditions Concentration	Emission Rate
Acid Gases	mg/Nm^3	mg/Nm^3	g/min
HCl	100	< 2.1	< 0.04
Cl2	200	< 2.1	< 0.04

Table 21: Sample information – Heavy metals

Site		Shaolbay Landfill	
Sample Location		BV150	
Reference Method		USEPA Method 29 - ISOKINETIC	
Run ID		2	
Test Parameter		Metals	
Test Date	dd/mm/yyyy	7/02/2022	
Start Time	hh:mm	12:20	
End Time	hh:mm	14:25	
Average Stack Temperature	°C	88	
Absolute Stack Pressure	mb	1005	
Moisture Content	% v/v	58.9	
Dry Gas Density	kg/Nm^3	1.34	
Dry Gas Molecular Weight	g/g-mole	30.0	
Sample Volume (dry gas meter)	Nm^3	0.91	
Stack Gas Velocity	m/sec	3.4	
Actual Stack Flow Rate	m^3/min	57	
Dry Standard Stack Flow Rate	Nm^3/min	18	
Percent Isokinetic Rate	%	98	
Pollutant	Licence limit	standard conditions Concentration	Emission Rate
Metals	$\mu g/Nm^3$	$\mu g/Nm^3$	g/min
Antimony	-	< 6.2	< 1.1E-04
Arsenic	-	11.0	1.9E-04
Beryllium	-	< 0.5	< 8.2E-06
Cadmium	200	0.9	1.5E-05
Chromium	-	19.8	3.5E-04
Cobalt	-	2.2	3.9E-05
Lead	-	25	4.5E-04
Manganese	-	5.6	9.9E-05
Nickel	-	13	2.3E-04
Selenium	-	< 6.2	< 1.1E-04
Tin	-	< 16	< 2.9E-04
Vanadium	-	< 10.4	< 1.8E-04
Mercury	200	0.1	1.9E-06
Total Heavy Metals (lower bound)	1,000	78	1.4E-03

Table 22: Sample information – Volatile organic compounds

Site		Shaolbay Landfill
Sample Location		BV150
Reference Method		USEPA Method 18 - CONSTANT FLOW
Run ID		6
Test Parameter		VOCs
Test Date	dd/mm/yyyy	8/02/2022
Start Time	hh:mm	8:00
End Time	hh:mm	9:00
Average Stack Temperature	°C	88
Absolute Stack Pressure	mb	1005
Moisture Content	% v/v	58.8
Dry Gas Density	kg/Nm^3	1.34
Dry Gas Molecular Weight	g/g-mole	30.0
Sample Volume (dry gas meter)	Nm^3	0.04
Stack Gas Velocity	m/sec	3.4
Actual Stack Flow Rate	m^3/min	57
Dry Standard Stack Flow Rate	Nm^3/min	18
Percent Isokinetic Rate	%	N/A

Pollutant	Licence limit	standard conditions Concentration	Emission Rate
Total (non-methane) VOCs	mg/Nm^3	mg/Nm^3	g/min
Total VOCs - as n-hexane	-	< 1.2	< 0.02
Total VOCs - as n-propane	40	< 0.6	< 0.01

Table 23: Sample information – Ammonia

Site		Shaolbay Landfill
Sample Location		BV150
Reference Method		USEPA Method Mod 6 - CONSTANT FLOW
Run ID		7
Test Parameter		NH3
Test Date	dd/mm/yyyy	7/02/2022
Start Time	hh:mm	12:25
End Time	hh:mm	13:25
Average Stack Temperature	°C	87
Absolute Stack Pressure	mb	1005
Moisture Content	% v/v	60.8
Dry Gas Density	kg/Nm^3	1.34
Dry Gas Molecular Weight	g/g-mole	30.0
Sample Volume (dry gas meter)	Nm^3	0.04
Stack Gas Velocity	m/sec	3.5
Actual Stack Flow Rate	m^3/min	59
Dry Standard Stack Flow Rate	Nm^3/min	17
Percent Isokinetic Rate	%	N/A

Pollutant	Licence limit	standard conditions Concentration	Emission Rate
NH3	mg/Nm^3	mg/Nm^3	g/min
Ammonia (NH3) - in condensate	-	1,170	20.3
Ammonia (NH3) - gaseous	-	431	7.5
Total Ammonia (as NH3)	-	1,602	27.8

Table 24: Sample information – Fluoride

Site		Shaolbay Landfill	
Sample Location		BV150	
Reference Method		USEPA Method 13B - ISOKINETIC	
Run ID		4	
Test Parameter		F	
Test Date	dd/mm/yyyy	7/02/2022	
Start Time	hh:mm	8:39	
End Time	hh:mm	9:42	
Average Stack Temperature	°C	87	
Absolute Stack Pressure	mb	1005	
Moisture Content	% v/v	59.2	
Dry Gas Density	kg/Nm^3	1.34	
Dry Gas Molecular Weight	g/g-mole	30.0	
Sample Volume (dry gas meter)	Nm^3	0.47	
Stack Gas Velocity	m/sec	3.3	
Actual Stack Flow Rate	m^3/min	57	
Dry Standard Stack Flow Rate	Nm^3/min	17	
Percent Isokinetic Rate	%	102	
		standard conditions	
Pollutant	Licence limit	Concentration	Emission Rate
F	mg/Nm^3	mg/Nm^3	g/min
Fluorine - (as total HF)	50	< 2.3	< 0.04

Table 25: Sample information – Combustion gases

Site		Shaolbay Landfill
Sample Location		BV150
Reference Method		USEPA Method 3A, 7E & 10
Run ID		Various
Test Parameter		O_2, CO_2, NOx, CO
Test Date	dd/mm/yyyy	7/02/2022
Start Time	hh:mm	8:38
End Time	hh:mm	8:45
Average Stack Temperature	°C	87
Absolute Stack Pressure	mb	1005
Moisture Content	% v/v	59.3
Dry Gas Density	kg/Nm^3	1.34
Dry Gas Molecular Weight	g/g-mole	30.0
Stack Gas Velocity	m/sec	3.4
Actual Stack Flow Rate	m^3/min	58
Dry Standard Stack Flow Rate	Nm^3/min	18

Pollutant O2, CO2, NOx, CO	Licence limit STP	standard conditions Concentration STP	Emission Rate g/min
Oxygen (% v/v)	-	6.2	-
Carbon dioxide (% v/v)	-	11.0	-
Carbon monoxide (mg/m^3)	125	71	1.2
Oxides of nitrogen (mg/m^3)	350	121	2.1

Table 26: Sample information – Dioxins & furans

Site		Shaolbay Landfill	
Sample Location		BV150	
Reference Method		USEPA Method 23 - ISOKINETIC	
Run ID		1	
Test Parameter		DF & PCB	
Test Date	dd/mm/yyyy	8/02/2022	
Start Time	hh:mm	7:40	
End Time	hh:mm	14:30	
Average Stack Temperature	°C	88	
Absolute Stack Pressure	mb	1005	
Moisture Content	% v/v	58.8	
Dry Gas Density	kg/Nm^3	1.34	
Dry Gas Molecular Weight	g/g-mole	30.0	
Sample Volume (dry gas meter)	Nm^3	2.63	
Stack Gas Velocity	m/sec	3.4	
Actual Stack Flow Rate	m^3/min	57	
Dry Standard Stack Flow Rate	Nm^3/min	18	
Percent Isokinetic Rate	%	96	
Pollutant	Licence limit	standard conditions Concentration	Emission Rate
DF & PCB	ng/Nm^3	ng/Nm^3	g/min
2378 TCDF	-	0.012	2.1E-10
Total TCDF isomers	-	0.15	2.6E-09
2378 TCDD	-	0.0046	8.0E-11
Total TCDD isomers	-	0.076	1.3E-09
12378 PeCDF	-	0.0028	4.9E-11
23478 PeCDF	-	0.0042	7.4E-11
Total PeCDF isomers	-	0.049	8.7E-10
12378 PeCDD	-	< 0.0027	< 4.7E-11
Total PeCDD isomers	-	0.049	8.7E-10
123478 HxCDF	-	< 0.0023	< 4.0E-11
123678 HxCDF	-	< 0.0019	< 3.3E-11
234678 HxCDF	-	0.0012	2.1E-11
123789 HxCDF	-	< 0.00034	< 6.0E-12
Total HxCDF isomers	-	0.016	2.7E-10
123478 HxCDD	-	0.00099	1.7E-11
123678 HxCDD	-	0.0033	5.8E-11
123789 HxCDD	-	0.0022	3.8E-11
Total HxCDD isomers	-	0.053	9.4E-10
1234678 HpCDF	-	0.0032	5.6E-11
1234789 HpCDF	-	0.00053	9.4E-12
Total HpCDF isomers	-	0.0065	1.1E-10
1234678 HpCDD	-	0.038	6.7E-10
Total HpCDD isomers	-	0.072	1.3E-09
OCDF	-	0.0016	2.8E-11
OCDD	-	0.17	2.9E-09
Sum of congeners Sum of positive detections	-	0.64	1.1E-08
Total I-TEQ Sum of positive detections	0.1	0.0093	1.6E-10

Table 27: Sample information – PCBs

PCBs (USEPA Method 23)				
PCBs		Licence limit ng/Nm³	standard conditions Concentration ng/Nm³	Emission Rate g/min
	PCB#77	-	0.88	1.5E-08
	PCB#81	-	0.037	6.5E-10
	PCB#126	-	0.019	3.4E-10
	PCB#169	-	< 0.0023	< 4.0E-11
	PCB#105	-	3.4	6.0E-08
	PCB#114	-	0.21	3.7E-09
	PCB#118	-	8.0	1.4E-07
	PCB#123	-	0.11	2.0E-09
	PCB#156	-	1.0	1.7E-08
	PCB#157	-	0.22	3.9E-09
	PCB#167	-	0.33	5.8E-09
	PCB#189	-	0.033	5.8E-10
	Sum of PCB Congeners Sum of positive detections	-	14.2	2.5E-07
	Total TEQ Sum of positive detections	-	0.0024	4.3E-11

7 APPENDIX

Attachment 7 Emissions Monitoring Program

Substance	Units	Emission Limit^	Frequency	Test Method^
Sample Plane Criteria	-	-	During commissioning and Two months after commissioning and Four months after commissioning then Quarterly (January, April, July and October)	TM-1
Oxides of Nitrogen (NO_x) (as NO_2)	mg/m^3	350		TM-11
Hydrogen Chloride	mg/m^3	100		TM-8
Carbon Monoxide	mg/m^3	125		TM-32
Carbon Dioxide	mg/m^3	-		TM-24
Fluorine compounds (as Hydrogen Fluoride)	mg/m^3	50		TM-9
Sulphuric acid mists	mg/m^3	100		TM-13
Dioxins and Furans	ng/m^3	0.1		TM-18
Type 1 and Type 2 substances in aggregate. antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, manganese, mercury, nickel, selenium, tin or vanadium or any compound containing one or more of those elements.	mg/m^3	1		TM-12 and TM-13 and TM-14
Cadmium (Cd) and cadmium compounds	mg/m^3	0.2		TM-14
Mercury (Hg) and mercury compounds	mg/m^3	0.2		TM-14
Volatile Organic Compounds (VOCs), as n-propane [1]	mg/m^3	40		TM-34 [1]
Chlorine (Cl_2)	mg/m^3	200		TM-7
Hydrogen Sulphide (H_2S) [2]	mg/m^3	5		TM-5 [2]
PFAS (Analysis on a minimum of 28 PFAS compounds using LC-MS/MS)	µg/L	- *		-
Ammonia – N [3]	mg/m^3	-		TM-3 [3]
Odour [4]	-	-		OM-7 [4]
Polychlorinated Biphenyls	mg/m^3	-		-
Sulphur Dioxide	mg/m^3	-		TM-4

* - No limit currently set. If further revisions of the PFAS NEPM include an emission limit then the new limit will apply.

^ - Based on the New South Wales Environmental Operations (Clean Air) Regulations 2010.

[1] - The prescribed method, TM-34, will be used with modification. A moisture removal trap will be placed in front of the solid sorbent media to prevent water from entering the media. Both the condensate captured in the trap and the sorbent media will be analysed for VOCs and the results will be combined and reported.

[2] - The prescribed method, TM-5, will be used with modification. A sample of exhaust gas will be passed through a buffer solution to remove any potential SO_2 present before being captured in a specialised gas sampling bag.

[3] - The prescribed method TM-3 will be used with modification. A moisture removal trap will be placed in front of the media to prevent water from entering the tube.

[4] - The odour samples bags will be diluted beyond the suggested limit in OM-7 (AS4323.3). This is required to avoid condensation forming in the sample bags.

Attachment 7 for EPL188-03 Page **1** of **1**

Figure 4: Excerpt from EPL188-03 – Attachment 7

ASSURED ENVIRONMENTAL PTY LTD

Your environmental compliance partner



FEBRUARY 2022

SOURCE EMISSIONS MONITORING – SHOAL BAY BENEVAP 300

CLIENT: BENETERRA
PROJECT ID: 14107
DATE: 4/04/2022 RELEASE: R_0

DOCUMENT CONTROL PAGE

Project Title: Source Emissions Monitoring – Shoal Bay BeneVap 300

Project Reference ID: 14107

Report Prepared by:

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Report Reviewer: Timon Berger

Table 1: History of Revisions

Revision	Date	Issued to	Changes
R_0	4/04/2022	N. Sharma	Formal report release
DRAFT_0	30/03/2022	N. Sharma	Draft release for comment

ACCREDITED FOR COMPLIANCE TO ISO/IEC 17025 (TESTING)

The results of the tests, calibrations and/or measurements included in this document is traceable to Australian/national standards.

Accreditation number: 19703

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EXECUTIVE SUMMARY

Assured Environmental (AE) conducted source emissions monitoring from the mobile BeneVap Leachate Treatment Facility (BV300) located at the Shoal Bay Waste Facility in Darwin, Northern Territory from 4th to 9th February 2022.

A summary of results and comparison against compliance levels is presented in Table 2 and Table 3 below from the testing conducted on both release points on the BV300 unit.

In comparison to the emission limits outlined in EPL188-03 – Attachment 7, all measured concentrations were within those limits specified. Results are reported at dry, 273.15°K and 101.325 kPa (STP).

Table 2: Summary of measured parameters – Stack 1

Parameter		Result BV300_1	Emission limit	Unit	Reference
Average source temperature		87	-	°C	-
Flue gas water vapour content		61	-	vol-%	-
Carbon dioxide concentration		11.5	-	vol-%	STP - dry
Oxygen concentration		5.5	-	vol-%	STP - dry
Flue gas molecular weight - dry		1.3	-	kg/Nm^3	STP - dry
Flue gas velocity		3.3	-	m/sec	STP - dry
Flue gas volume flow		15.9	-	Nm^3/min	STP - dry
Oxides of nitrogen (as NO_2)		135	350	mg/Nm^3	STP - dry
- emission rate		2.1	-	g/min	
Carbon monoxide		75	125	mg/Nm^3	STP - dry
- emission rate		1.20	-	g/min	
Total heavy metals		0.074	1.0	mg/Nm^3	STP - dry
- emission rate		0.0012	-	g/min	
Cadmium		0.0011	0.2	mg/Nm^3	STP - dry
- emission rate		1.7E-05	-	g/min	
Mercury		0.00094	0.2	mg/Nm^3	STP - dry
- emission rate		1.5E-05	-	g/min	
Fluorine (as HF)	<	2.3	50	mg/Nm^3	STP - dry
- emission rate	<	0.037	-	g/min	
Hydrogen chloride	<	2.2	100	mg/Nm^3	STP - dry
- emission rate	<	0.034	-	g/min	
Chlorine	<	2.2	200	mg/Nm^3	STP - dry
- emission rate	<	0.034	-	g/min	
Ammonia (total)		1,849	-	mg/Nm^3	STP - dry
- emission rate		28	-	g/min	
Ammonia (NH3) - in condensate		1,658	-	mg/Nm^3	STP - dry
- emission rate		25	-	g/min	
Ammonia (NH3) - gaseous		190	-	mg/Nm^3	STP - dry
- emission rate		2.8	-	g/min	
Hydrogen sulfide	<	1.1	5	mg/Nm^3	STP - dry
- emission rate	<	0.02	-	g/min	
Sulfur dioxide		25.6	-	mg/Nm^3	STP - dry
- emission rate		0.43	-	g/min	
Sulfuric acid mist (as H_2SO_4)		9.6	100	mg/Nm^3	STP - dry
- emission rate		0.16	-	g/min	
Total VOCs (as n-propane)	<	0.7	40	mg/Nm^3	STP - dry
- emission rate	<	0.01	-	g/min	
Average odour		10,039	-	ou	STP - wet
- emission rate		393,371	-	ou-m^3/min	
Dioxins & Furans (i-TEQ)		0.0080	0.1	ng/Nm^3	STP - dry
- emission rate		1.2E-10	-	g/min	
PCBs (i-TEQ)		0.0024	-	ng/Nm^3	STP - dry
- emission rate		3.7E-11	-	g/min	

Table 3: Summary of measured parameters – Stack 2

Parameter		Result BV300_2	Emission limit	Unit	Reference
Average source temperature		87	-	°C	-
Flue gas water vapour content		63	-	vol-%	-
Carbon dioxide concentration		11.9	-	vol-%	STP - dry
Oxygen concentration		4.7	-	vol-%	STP - dry
Flue gas molecular weight - dry		1.3	-	kg/Nm^3	STP - dry
Flue gas velocity		3.0	-	m/sec	STP - dry
Flue gas volume flow		14.0	-	Nm^3/min	STP - dry
Oxides of nitrogen (as NO_2)		141	350	mg/Nm^3	STP - dry
- emission rate		2.0	-	g/min	
Carbon monoxide		99	125	mg/Nm^3	STP - dry
- emission rate		1.3	-	g/min	
Total heavy metals		0.071	1.0	mg/Nm^3	STP - dry
- emission rate		9.3E-04	-	g/min	
Cadmium		0.00082	0.2	mg/Nm^3	STP - dry
- emission rate		1.1E-05	-	g/min	
Mercury		0.0027	0.2	mg/Nm^3	STP - dry
- emission rate		3.5E-05	-	g/min	
Fluorine (as HF)	<	2.7	50	mg/Nm^3	STP - dry
- emission rate	<	0.036	-	g/min	
Hydrogen chloride	<	2.5	100	mg/Nm^3	STP - dry
- emission rate	<	0.034	-	g/min	
Chlorine	<	2.5	200	mg/Nm^3	STP - dry
- emission rate	<	0.034	-	g/min	
Ammonia (total)		1,969	-	mg/Nm^3	STP - dry
- emission rate		25	-	g/min	
Ammonia (NH3) - in condensate		1,682	-	mg/Nm^3	STP - dry
- emission rate		22	-	g/min	
Ammonia (NH3) - gaseous		287	-	mg/Nm^3	STP - dry
- emission rate		3.7	-	g/min	
Hydrogen sulfide	<	1.1	5	mg/Nm^3	STP - dry
- emission rate	<	0.014	-	g/min	
Sulfur dioxide		25.8	-	mg/Nm^3	STP - dry
- emission rate		0.373	-	g/min	
Sulfuric acid mist (as H_2SO_4)		12.6	100	mg/Nm^3	STP - dry
- emission rate		0.182	-	g/min	
Total VOCs (as n-propane)	<	0.6	40	mg/Nm^3	STP - dry
- emission rate	<	0.010	-	g/min	
Average odour		9,856	-	ou	STP - wet
- emission rate		343,121	-	ou-m^3/min	
Dioxins & Furans (i-TEQ)		0.016	0.1	ng/Nm^3	STP - dry
- emission rate		2.4E-10	-	g/min	
PCBs (i-TEQ)		0.0028	-	ng/Nm^3	STP - dry
- emission rate		4.3E-11	-	g/min	

Table 4: Summary of PFAS results – Stack 1

Parameter		Result ng/Nm³		Emission Rate g/min	Reference
Per- and polyfluoroalkyl substances		**BV300_1**			
Perfluorobutanesulfonic acid		**878**		**1.3E-05**	**STP**
Perfluoropentanesulfonic acid		**11.3**		**1.7E-07**	**STP**
Perfluorohexanesulfonic acid		**112**		**1.7E-06**	**STP**
Perfluoroheptanesulfonic acid		**5.0**		**7.4E-08**	**STP**
Perfluorooctanesulfonic acid PFOS		**89**		**1.3E-06**	**STP**
Perfluorodecanesulfonic acid	<	3.2	<	4.8E-08	STP
Perfluorobutanoic acid		**39**		**5.8E-07**	**STP**
Perfluoropentanoic acid		**136**		**2.0E-06**	**STP**
Perfluorohexanoic acid		**332**		**5.0E-06**	**STP**
Perfluoroheptanoic acid		**51.8**		**7.8E-07**	**STP**
Perfluorooctanoic acid PFOA		**172**		**2.6E-06**	**STP**
Perfluorononanoic acid		**4.5**		**6.7E-08**	**STP**
Perfluorodecanoic acid	<	8.1	<	1.2E-07	STP
Perfluoroundecanoic acid	<	8.1	<	1.2E-07	STP
Perfluorododecanoic acid	<	8.1	<	1.2E-07	STP
Perfluorotridecanoic acid	<	8.1	<	1.2E-07	STP
Perfluorotetradecanoic acid	<	40.3	<	6.0E-07	STP
4:2 FTS	<	1.6	<	2.4E-08	STP
6:2 FTS		**77.5**		**1.2E-06**	**STP**
8:2 FTS		**5.2**		**7.8E-08**	**STP**
10:2 FTS	<	3.2	<	4.8E-08	STP
Perfluorooctane sulfonamide		**19.2**		**2.9E-07**	**STP**
N-Methyl perfluorooctane sulfonamide		**11.2**		**1.7E-07**	**STP**
N-Ethyl perfluorooctane sulfonamide	<	8.1	<	1.2E-07	STP
N-Me perfluorooctanesulfonamido ethanol		**152**		**2.3E-06**	**STP**
N-Et perfluorooctanesulfonamido ethanol	<	98	<	1.5E-06	STP
MePerfluorooctanesulf-amido acetic acid		**7.6**		**1.1E-07**	**STP**
EtPerfluorooctanesulf-amido acetic acid		**6.0**		**9.0E-08**	**STP**

Table 5: Summary of PFAS results – Stack 2

Parameter	Result ng/Nm³	Emission Rate g/min	Reference
Per- and polyfluoroalkyl substances	**BV300_2**		
Perfluorobutanesulfonic acid	**1,081**	**1.4E-05**	**STP**
Perfluoropentanesulfonic acid	**15.5**	**2.0E-07**	**STP**
Perfluorohexanesulfonic acid	**126**	**1.6E-06**	**STP**
Perfluoroheptanesulfonic acid	**6.5**	**8.5E-08**	**STP**
Perfluorooctanesulfonic acid PFOS	**99.3**	**1.3E-06**	**STP**
Perfluorodecanesulfonic acid	< 3.6	< 4.7E-08	STP
Perfluorobutanoic acid	**50**	**6.5E-07**	STP
Perfluoropentanoic acid	**143**	**1.9E-06**	**STP**
Perfluorohexanoic acid	**384**	**5.0E-06**	**STP**
Perfluoroheptanoic acid	**60.4**	**7.8E-07**	**STP**
Perfluorooctanoic acid PFOA	**189**	**2.5E-06**	**STP**
Perfluorononanoic acid	**7.4**	**9.6E-08**	**STP**
Perfluorodecanoic acid	**10.9**	**1.4E-07**	**STP**
Perfluoroundecanoic acid	**11.8**	**1.5E-07**	**STP**
Perfluorododecanoic acid	**10.9**	**1.4E-07**	**STP**
Perfluorotridecanoic acid	**14.5**	**1.9E-07**	**STP**
Perfluorotetradecanoic acid	< 45.5	< 5.9E-07	STP
4:2 FTS	< 1.8	< 2.4E-08	STP
6:2 FTS	**101**	**1.3E-06**	**STP**
8:2 FTS	**6.1**	**7.9E-08**	**STP**
10:2 FTS	< 3.6	< 4.7E-08	STP
Perfluorooctane sulfonamide	**17.2**	**2.2E-07**	**STP**
N-Methyl perfluorooctane sulfonamide	**12.7**	**1.6E-07**	**STP**
N-Ethyl perfluorooctane sulfonamide	< 9.1	< 1.2E-07	STP
N-Me perfluorooctanesulfonamido ethanol	**172**	**2.2E-06**	**STP**
N-Et perfluorooctanesulfonamido ethanol	< 110	< 1.4E-06	STP
MePerfluorooctanesulf-amido acetic acid	**8.6**	**1.1E-07**	**STP**
EtPerfluorooctanesulf-amido acetic acid	**7.7**	**1.0E-07**	**STP**

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1 INTRODUCTION

BeneTerra's mobile BeneVap leachate treatment plant was transported to Darwin and setup at the Shoal Bay Waste Management facility. It is understood that the process was relatively stable for the duration of the testing period.

Assured Environmental (AE) was appointed by BeneTerra to sample and analyse source emissions from the BeneVap Leachate Treatment system. Sampling was conducted by AE from 4th to 9th February 2022 during typical site operations.

AE was responsible for the collection and analysis of samples, unless otherwise indicated. The samples were recovered and stored in the appropriate manner until their return to the laboratory where the samples were prepared and analysed according to the methodologies listed below in this report.

2 METHODOLGY & EQUIPMENT

2.1 Sampling methodology

All sampling and analysis was carried out in accordance with the listed requirements in Table 6. Any specific comments about the sampling and analysis have been documented where required.

Table 6: Test methods

Parameter	Reference Test Method	Test Method (NSW)	NATA accreditation	Analysis by
Sample location	AS4323.1	TM-1	Yes	1
Velocity & flow rate	USEPA Method 2	TM-2	Yes	1
Stack gas density	USEPA Method 3	TM-23	Yes	1
Oxygen	USEPA Method 3A	TM-25	Yes	1
Carbon dioxide	USEPA Method 3A	TM-24	Yes	1
Water vapour content	USEPA Method 4	TM-22	Yes	1
Sulphur dioxide	USEPA Method 6	TM-4	Yes	1
Oxides of nitrogen (as NO_2)	USEPA Method 7E	TM-11	Yes	1
Sulfuric acid mists	USEPA Method 8	TM-3[a]	Yes	1
Carbon monoxide	USEPA Method 10	TM-32	Yes	1
Hydrogen sulfide	USEPA Method 15	TM-5	Yes	1
Total VOCs	USEPA Method 18	TM-34	Yes	2
Hydrogen chloride	USEPA Method 26A	TM-8	Yes	2
Chlorine	USEPA Method 26A	TM-7	Yes	2
Fluoride (as HF)	USEPA Method 13B	TM-9	Yes	2
Heavy metals	USEPA Method 29	TM-12/13/14	Yes	2
PFAS – suite	USEPA SW846 Method 0010	Mod TM-18	No	3
Dioxins & furans	USEPA SW846 Method 0010	TM-18	Yes	4
Polychlorinated biphenyls	USEPA SW846 Method 0010	TM-18	Yes	2
Ammonia	Modified USEPA Method 26	Mod TM-4[b]	Yes	2
Odour	AS4323.3	OM-7	Yes	1

Table 7: Analysis performed by

Note	Company	Work performed	NATA ID	Report Number
1	Assured Environmental	Sampling & analysis	19703	14107
2	Envirolab Services	Sample analysis	2901	288920
4	National Measurement Inst.	PCDD/F & PCB analysis	198	DAU22_062

[a] EPL188-03 lists the test method for sulfuric acid mists as TM-13, this does not correspond to the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales* listed method (TM-3).

[b] EPL188-03 lists the test method for ammonia as TM-3. A closer representation of the sampling technique is a Modified TM-4 sample train. See the description of the sampling technique in Table 8 below.

Table 8: Sampling comments

Note	Comment
Sample location	Sample location is compliant but non ideal as per AS4323.1. The sample location is greater than two, but less than six diameters downstream from a disturbance. The temperature and velocity survey showed that the sample position was in compliance to items (a) to (f) as per AS4323.1.
Calibrations	Analyser calibration performed in the laboratory prior to conducting field work and post field work in AE lab.
H_2S	A sample of exhaust gas was passed through a buffer solution to remove any potential SO_2 present before being captured in a specialised gas sampling bag. Analysis for H_2S was performed using GC-FPD within 30 hours of collection.
Heavy metals	Type 1 substances: Antimony, Arsenic, Cadmium, Lead Mercury. Type 2 substances: Beryllium, Chromium, Cobalt, Manganese, Nickel, Selenium, Tin, Vanadium.
PFAS	A modified version of the USEPA SW846 Method 0010 sample train was employed to sample for Per- and poly-fluoroalkyl substances (PFAS) material in the flue gas emission. Refer to section 2.2 for further information.
Ammonia	The ammonia sampling was performed using a modified constant flow sampling train. A condensate removal trap was placed in front of the collection trap containing the absorbing solution to separate condensing ammonia from gaseous ammonia passing through the initial dropout and into the collection solution (0.1N H_2SO_4). Both the condensate captured in the trap and the sorbent solution are analysed for ammonia individually. Ammonia results are reported in the condensate and gaseous phase separately and as total NH_3. Samples are analysed using a Discrete Analyser.
Odour	Due to the high levels of moisture in the emission the odour samples bags were diluted beyond the suggested limit in AS4323.3. This is required to avoid condensation forming in the sample bags.

2.2 Per- and poly-fluoroalkyl substances sample methodology

Suitable sampling methods for Per- and poly-fluoroalkyl substances (PFAS) in air have received considerably less attention than in other media such as water and soil matrices. As such Assured Environmental has developed a sampling method based on modifications of the promulgated USEPA SW846 Method 0010 sample train. This method includes consideration for both semi-volatile and particulate bound PFAS. It is recognised that the US EPA has recently introduced Other Test Method (OTM) – 45 and although many of the elements included in this method are consistent with the method developed by AE. It is also noted that posting of an OTM by USEPA is neither an endorsement by EPA regarding the validity of the test method nor a regulatory approval of the test method, rather to promote discussion of developing emerging methodologies prior to full endorsement. In this case the AE method was employed, which is summarised below.

The basis of the sample train is;

- Gaseous and particulate pollutants are withdrawn from an emission source at an isokinetic sampling rate and are collected in a multi-component sampling train. The sample train contains a high-efficiency glass fibre filter and a packed bed of porous adsorbent resin. The filter is used to collect organic-laden particulate materials and the porous polymeric resin to adsorb semi-volatile organic species. Semi-volatile species are defined as compounds with boiling points greater than 100°C. The impingers downstream of the resin trap are loaded with water to knock-out any water vapour prior to metering the gas. These impingers are not routinely analysed for S-VOCs.

The modifications made to this sample train in order to target PFAS materials included;

- Sorbent material is XAD-2 and XAD-4.
- The resin traps are spiked with a surrogate standard to test for retention. A known quantity of standard is injected into the trap during preparation, the trap is then shipped, sampled and returned to the laboratory for analysis. The analysis includes detecting the injected standard, which provides a measure of the recovery efficiency. Factors that may affect the recovery efficiency include, sample transport and handling procedures, sampling temperatures (the resin must be chilled during sampling and maintained below 20°C) and sample preparation at the laboratory, including the extraction of the sample from the resin.
- Condensate remove trap prior to resin traps.
- Impingers downstream of the resin trap are loaded with a sodium solution and is intended to be a breakthrough detector. Following the sampling, the impinger contents are measured and placed in a sample bottle for shipment to the laboratory. The final impinger of the sample train is then analysed separately to the filter, resin trap and front half methanol rinse so as to provide a measure of possible breakthrough. The intent of this sample train component is to provide a measure of breakthrough from the primary sampling components. Where no detections of PFAS material is made in this sample component, the limit of detection is not added to the sample result.
- Following the sampling onsite, all sample train components that have been in contact with the sample are rinsed thoroughly with methanol and stored in a sample container to be analysed as part of the sample.
- Sample train component material. According to documented water and soil PFAS sampling procedures, the use of glass, Teflon and stainless steel should be avoided and the use of polypropylene (PE) is recommended. PE is not considered to be conducive to source emissions sampling due to the temperatures of the flue gas. PE or HDPE cannot be used in the probe or filter box due to its low melting point, instead, all sampling components upstream of the resin trap was constructed of glass. Following sampling, all glassware was thoroughly rinsed with methanol at least three times to quantitatively recovery any possible PFAS material deposited on this surface.

For the analysis, the samples are extracted using a solvent desorption technique, with the filter and front half methanol rinse extract combined prior to analysis for the PFAS species. The XAD resin trap is then analysed in isolation as is the condensate downstream of the trap to gain an understanding of where the PFAS is captured within the sample train. The analysis is performed using LC/MS/MS instruments, with each analysis performed using the surrogate spikes to determine sample specific recoveries.

2.2.1 PFAS blank corrections

A full field blank sample has not been performed for this round of sampling. The stock reagents are largely unchanged from the previous round of sampling (13633), therefore the results of this previous blank are utilised for this round. A field blank is performed by the sample train being constructed as normal, however no sample is passed through it. It is then cleaned and recovered following the standard recovery procedures and the filter, resin trap and rinsate kept and analysed along with the sample.

The following details the procedures used to correct for detections of PFAS species in the blank samples.

- Where the blank result is a non-detection, no adjustment to the sample result is made.
- Where the blank result returns a positive detection, but is less than half of the sample result, the blank value is subtracted from the sample result and reported as a positive detection.
- Where the blank value returns a positive detection, and is exceeding half of the sample result, no adjustments are made to the sample result, but it is reported as a non-detection.

2.3 Sample Location

The images and figures below show the sample location and site details.



Figure 1: BeneVap treatment system stacks

Table 9: Sample location summary

Sample location	BeneVap Treatment System
Stack Shape	CIRCULAR
Stack Diameter (m)	0.59
Stack Cross Section Area (m^2)	0.27
Distance to upstream disturbance (m)	1.4
Diameters (D)	2.4
Distance to downstream disturbance (m)	0.7
Diameters (D)	1.2
Total traverse point factors	1.15 , 1.05 , 1.21
Port size (mm)	100
Port Thread Type	BSP
Number of traverses	2
Number of points per traverse	6
Total number of traverse points	12
Flow & temperature compliance check	YES

2.4 Test equipment

The sampling equipment was transported to site and specifically setup at the test location. Sampling was performed using heated probes and filters, with a constant flow and isokinetic sample console.

Equipment used during the course of the testing is sourced from Apex Instruments and Testo, industry leaders in the supply of source testing equipment.

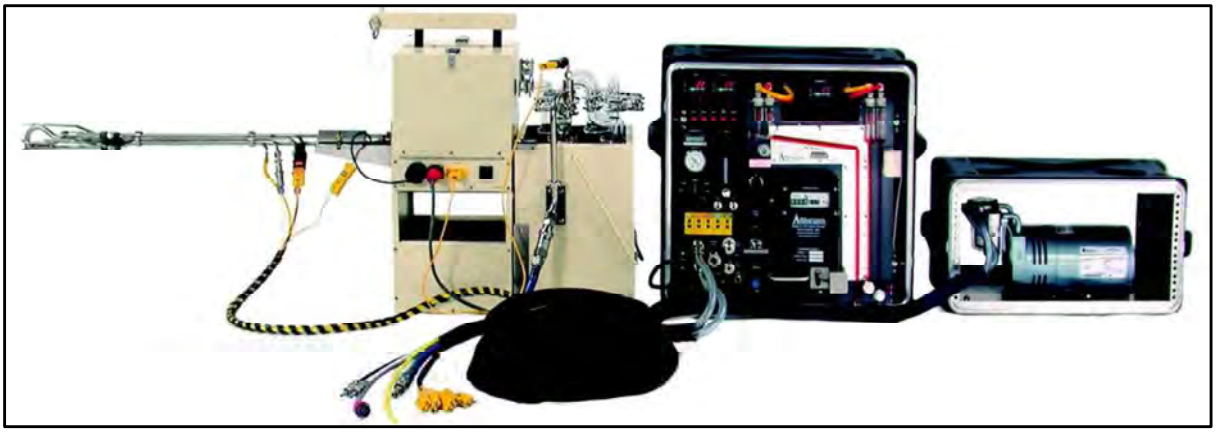


Figure 2: Manual sampling equipment



Figure 3: Combustion gas analyser

3 MEASUREMENT UNCERTAINTY

There is an inherent uncertainty associated with any scientific measurement, including stack emissions monitoring. The measurement uncertainty can be controlled with strict adherence to the reference methodology along with utilising appropriate calibration standards with corresponding acceptable uncertainty reports.

Many source sampling methods do not outline exact procedures for establishing direct measurement uncertainty. In the absence of a defined procedure, the uncertainty budgets presented are based on estimations using ISO-GUM method.

Each individual source and test may have a unique associated uncertainty, due largely to the stack sample location in relation to the positioning requirements of AS4323.1.

Table 10: Sample specific uncertainty budgets

Parameter	Reference method	Limit of measurement	Unit of measure	Uncertainty ± %
Flue gas velocity	USEPA Method 2	3	m/sec	20
Oxygen	USEPA Method 3A	0.3	%-vol	5.0
Carbon dioxide	USEPA Method 3A	0.3	%-vol	8.0
Water vapour content	USEPA Method 4	0.5	%-vol	5.0
Sulphur dioxide	USEPA Method 6	2.0	mg/sample	15
Oxides of nitrogen (as NO_2)	USEPA Method 7E	2.1	mg/sample	15
Sulfuric acid mists	USEPA Method 8	2.0	mg/sample	15
Carbon monoxide	USEPA Method 10	1.5	mg/sample	15
Hydrogen sulfide	USEPA Method 15	1.0	mg/sample	20
Total VOCs	USEPA Method 18	1.0	mg/sample	20
Hydrogen chloride	USEPA Method 26A	1.0	mg/sample	15
Chlorine	USEPA Method 26A	1.0	mg/sample	15
Fluoride (as HF)	USEPA Method 13B	1.0	mg/sample	15
Heavy metals	USEPA Method 29	0.3 to 50	µg/sample	10
PFAS – suite	USEPA SW846 Method 0010	1 to 50	ng/sample	25
Dioxins & furans	USEPA SW846 Method 0010	1	pg/sample	15
Polychlorinated biphenyls	USEPA SW846 Method 0010	20	pg/sample	15
Ammonia	Modified USEPA Method 26	1	mg/sample	25
Odour	AS4323.3	100	ou	30

4 QUALITY ASSURANCE & QUALITY CONTROL (QA/QC)

AE operates within a quality system based upon the requirements of ISO17025. Our quality system defines specific procedures and methodologies to ensure any project undertaken by AE is conducted with the highest level of quality given the specific confines of each project. The overall objective of our QA/QC procedures is to representatively sample and accurately analyse components in the gas streams and therefore report valid measurements of emission concentrations.

To ensure representativeness of field work, our quality procedures target:

1. Correct sampling locations
2. Sample time
3. Frequency of samples and
4. Method selection & adherence

To ensure representativeness of lab work, our quality procedures target:

1. Sample preservation
2. Chain of custody (COC)
3. Sample preparation and
4. Analytical techniques

AE maintains strict quality assurance throughout all its sampling programs, covering on-site 'field work' and the analytical phase of our projects. Our QA program covers the calibration of all sampling and analytical apparatus where applicable and the use of spikes, replicate sample and reference standards. The test methodologies used for this project are outlined in section 2 of this document. Field test data has been recorded and calculated using direct entry into Microsoft Excel spreadsheets following the procedures of the appropriate test methods. Determination of emission concentrations has been performed using the same Microsoft Excel spreadsheets which are partially supplied as an attachment to this report. More detailed information can be supplied upon request.

QA/QC checks for this project will use validation techniques and criteria appropriate to the type of data and the purpose of the measurement to approve the test report. Records of all data will be maintained. Complete chain of custody (COC) procedures have been followed to document the entire custodial history of each sample. The COC forms also served as a laboratory sheet detailing sample ID and analysis requirements.

Table 11: Sampling data QA/QC checklist

Sampling Data QA/QC Checklist	Comment
Use of appropriate test methods	Yes
'Normal' operation of the process being tested	Yes – as instructed by client
Use of properly operating and calibrated test equipment	Yes
Use of high purity reagents	Yes
Performance of leak checks post sample (at least)	Yes

Table 12: Laboratory data QA/QC checklist

Laboratory Data QA/QC Checklist	Comment
Use of appropriate analytical methods	Yes
Use of properly operating and calibrated analytical equipment	Yes
Precision and accuracy comparable to that achieved in similar projects	Yes
Accurate reporting	Yes

Table 13: Olfactometer QA data

Item	Comment
Methodology	AS/NZ4323.3:2001 "determination of odour concentration by dynamic olfactometry".
Sample Media	Odour samples collected into Nalophan™ sample bags
Sample identification	All samples are labelled uniquely immediately following collection according to Assured Environmental identification procedure. Each sample has the following recorded: project ID, sample number, location, date, time, dilution and any deviations to AS/NZ4323.3.
Timing	All measurements were conducted within 30 hours of sampling as specified by AS/NZ4323.3
Traceability	All panel results are traceable to reference standards held by Assured Environmental
Analysis conditions	Room temperature maintained at 22 °C ± 3 °C
Odour panel location	7/142 Tennyson Memorial Avenue Tennyson, Qld. 4105
Reference odourant	40 ppm n-butanol
Odour panel threshold	100 ou

4.1 PFAS quality control

The recoveries of surrogate standards from the sampling and analysis are presented in the table below. The expected QC recovery for measurements in the ppb to ppt levels is in the range of 60 to 120%. The results are not corrected for the recovery efficiency.

Table 14: PFAS surrogate recovery (%)

Surrogate	PFAS	
	Filter	Trap
Field surrogate		
Surrogate $^{13}C_8$ PFOS	102	120
Surrogate $^{13}C_2$ PFOA	99	110

Analysis of the final bubbler containing a sodium borate solution was performed separately to the front of the sampling train in order to assess the potential for breakthrough. The results of this analysis are provided below.

Table 15: Breakthrough analysis

Perfluorinated surfactants	Abbreviation	Breakthrough analysis (ng/sample)	
		BV300_1	BV300_2
Perfluorobutanesulfonic acid	PFBS	< 0.2	< 0.2
Perfluoropentanesulfonic acid	PFPeS	< 0.2	< 0.2
Perfluorohexanesulfonic acid	PFHxS	< 0.2	< 0.2
Perfluoroheptanesulfonic acid	PFHpS	< 0.2	< 0.2
Perfluorooctanesulfonic acid PFOS	PFOS	< 0.2	< 0.2
Perfluorodecanesulfonic acid	PFDS	< 0.3	< 0.4
Perfluorobutanoic acid	PFBA	< 0.3	< 0.4
Perfluoropentanoic acid	PFPeA	**0.8 (0.6 %)**	< 0.4
Perfluorohexanoic acid	PFHxA	**0.7 (0.2%)**	< 0.2
Perfluoroheptanoic acid	PFHpA	**1.6 (3%)**	**0.3 (0.5%)**
Perfluorooctanoic acid PFOA	PFOA	**0.5 (0.3%)**	**0.9 (0.5%)**
Perfluorononanoic acid	PFNA	< 0.2	**0.9 (14%)**
Perfluorodecanoic acid	PFDA	< 0.8	**0.9 (8%)**
Perfluoroundecanoic acid	PFUdA	< 0.8	< 0.9
Perfluorododecanoic acid	PFDoA	< 0.8	< 0.9
Perfluorotridecanoic acid	PFTrDA	< 0.8	< 0.9
Perfluorotetradecanoic acid	PFTeDA	< 4.0	< 4.5
4:2 FTS	4:2 FTS	< 0.2	< 0.2
6:2 FTS	6:2 FTS	< 0.2	< 0.2
8:2 FTS	8:2 FTS	< 0.3	< 0.4
10:2 FTS	10:2 FTS	< 0.3	< 0.4
Perfluorooctane sulfonamide	FOSA	< 0.8	< 0.9
N-Methyl perfluorooctanesulfonamide	N-MeFOSA	< 0.8	< 0.9
N-Ethyl perfluorooctanesulfonamide	n-EtFOSA	< 0.8	< 0.9
N-Me perfluorooctanesulfonamidoethanol	n-MeFOSE	< 8.0	< 9.0
N-Et perfluorooctanesulfonamidoethanol	n-EtFOSE	< 40	< 45
MePerfluorooctanesulf-amidoacetic acid	N-MeFOSAA	< 0.3	< 0.4
EtPerfluorooctanesulf-amidoacetic acid	N-EtFOSAA	< 0.3	< 0.4

The breakthrough analysis for BV_300 stack 1 and stack 2 detected trace levels of PFPeA, PFHxA, PFHpA, PFOA, PFNA and PFDA across the 2 samples. The levels in Stack 1 sample are reasonably low, whereas the Stack 2 breakthrough detected low levels, however due to

the low levels of these compounds detected in the sample, the percentage in the breakthrough is elevated.

Analysis of the field sample blank (project 13633) showed that only a small amount of PFOA was detectable in the methanol/XAD resin. The table below shows the results of the blank analysis.

Table 16: Field blank analysis

	Blank analysis		
Perfluorinated surfactants - PFAS suite	**Front half ng/sample**	**Resin Traps ng/sample**	**Breakthrough ng/sample**
Perfluorobutanesulfonic acid	< 0.2	< 0.2	< 0.2
Perfluoropentane sulfonic acid (PFPeS)	< 0.2	< 0.2	< 0.2
Perfluorohexane sulfonate (PFHxS)	< 0.2	< 0.2	< 0.2
Perfluoroheptane sulfonate (PFHpS)	< 0.2	< 0.2	< 0.2
Perfluorooctane sulfonate (PFOS)	< 0.2	< 0.2	< 0.2
Perfluorodecanesulfonic acid (PFDS)	< 0.4	< 0.4	< 0.4
Perfluorobutanoic acid	< 0.4	< 0.4	< 0.4
Perfluoropentanoic acid (PFPeA)	< 0.4	< 0.4	< 0.4
Perfluorohexanoic acid (PFHxA)	< 0.2	< 0.2	< 0.2
Perfluoroheptanoic acid (PFHpA)	< 0.2	< 0.2	< 0.2
Perfluorooctanoic acid (PFOA)	< 0.2	**2.3**	< 0.2
Perfluorononanoic acid (PFNA)	< 0.2	< 0.2	< 0.2
Perfluorodecanoic acid	< 1.0	< 1.0	< 1.0
Perfluoroundecanoic acid (PFUnA)	< 1.0	< 1.0	< 1.0
Perfluorododecanoic acid (PFDoA)	< 1.0	< 1.0	< 1.0
Perfluorotridecanoic acid (PFTrDA)	< 1.0	< 1.0	< 1.0
Perfluorotetradecanoic acid (PFTeDA)	< 5.0	< 5.0	< 5.0
4:2 Flurotelomersulphonate	< 0.2	< 0.2	< 0.2
6:2 Fluorotelomersulphonate	< 0.2	< 0.2	< 0.2
8:2 Fluorotelomersulphonate	< 0.4	< 0.4	< 0.4
10:2 Fluorotelomersulphonate	< 0.4	< 0.4	< 0.4
Perfluorooctane sulfonamide	< 1.0	< 1.0	< 1.0
N-Methyl-heptadecafluorooctane sulphonamide	< 1.0	< 1.0	< 1.0
N-Ethyl-heptadecafluorooctane sulphonamide	< 1.0	< 1.0	< 1.0
N-Me perfluorooctanesulfonamid oethanol	< 1.0	< 1.0	< 1.0
N-Et perfluorooctanesulfonamid oethanol	< 50	< 50	< 50
N-Methylperfluorooctane sulphonamidoacetic acid	< 0.4	< 0.4	< 0.4
N-Ethyl-perfluorooctane sulphonamidoacetic acid	< 0.4	< 0.4	< 0.4

4.2 Dioxins and furans QA

During sample analysis, the laboratory uses $^{13}C_{12}$ labelled dioxin, furan and PCB surrogates to test sample recovery efficiency and possible sample matrix interference.

During this analysis, the laboratory surrogate recovery for dioxin, furan and PCB congeners all fell within method tolerances.

5 DEFINITIONS

The following terms and abbreviations may be used in this report:

Table 17: Definitions

Symbol	Definition
<	The analytes tested for was not detected; the value stated is the reportable limit of detection
Am^3	Gas volume in cubic metres at measured conditions
AS	Australian Standard
BH	Back half of sample train (filter holder and impingers) (referred to during sample recovery)
°C	Degrees Celsius
CARB	California Air Resources Board methods
dscm	dry standard cubic meters
FH	Front half of sample train (probe and filter holder) (referred to during sample recovery)
g	Grams
Heavy metals	Sum of Antimony, Arsenic, Beryllium, Cadmium, Chromium, Cobalt, Lead, Manganese, Nickle, Selenium, Tin, Vanadium & Mercury. Also known as Type 1 and Type 2 hazardous substances. Total heavy metals refers only to those metals found in the sample and does not include limit of detection values.
kg	Kilograms
Lower range	The sum of a list of a particular group of compounds, where only those individual congeners/compounds that are detectable in the sample have been included in the total. Results below the limit of detection have not been included. Unless otherwise indicated, the lower range is reported for dioxins & furans, PCBs, heavy metals and PFAS analysis suites.
m	Metres
m^3	actual gas volume in cubic metres as measured
mbar	Millibars
mg	Milligrams (10^{-3} grams)
min	Minute
ml	Millilitres
mmH_2O	Millimetres of water
Mole	SI unit that measures the amount of substance
N/A	Not applicable
ng	Nanograms (10^{-9} grams)
Nm^3	Gas volume in dry cubic metres at standard temperature and pressure (0°C and 101.3 kPa)
NMI	National Measurement Institute
NM VOC	Non methane volatile organic compound
NR	Not required on this occasion
ou	Odour unit
ppb	Parts per billion
ppm	Parts per million
sec	Second
Sm^3	Gas volume in dry cubic metres at standard temperature and pressure (0°C and 101.3 kPa) and corrected to a standardised value (e.g. 15% O_2)
STP	Standard temperature and pressure (0°C and 101.3 kPa) & dry
USEPA	United States Environmental Protection Authority

6 RESULTS

6.1 Stack 1 Results

Table 18: Sample information – PFAS

Site		Shaolbay Landfill
Sample Location		BV300_1
Reference Method		USEPA Method 0010 - ISOKINETIC
Run ID		19
Test Parameter		PFAS
Test Date	dd/mm/yyyy	6/02/2022
Start Time	hh:mm	8:50
End Time	hh:mm	11:55
Average Stack Temperature	°C	87
Absolute Stack Pressure	mb	1005
Moisture Content	% v/v	62.4
Dry Gas Density	kg/Nm^3	1.34
Dry Gas Molecular Weight	g/g-mole	30.1
Sample Volume (dry gas meter)	Nm^3	1.25
Stack Gas Velocity	m/sec	3.2
Actual Stack Flow Rate	m^3/min	53
Dry Standard Stack Flow Rate	Nm^3/min	15
Percent Isokinetic Rate	%	103

		standard conditions	
Pollutant	Licence limit	Concentration	Emission Rate
PFAS species	ng/Nm^3	ng/Nm^3	g/min
Perfluorobutanesulfonic acid	-	878	1.31E-05
Perfluoropentanesulfonic acid	-	11.3	1.70E-07
Perfluorohexanesulfonic acid	-	112	1.67E-06
Perfluoroheptanesulfonic acid	-	5.0	7.43E-08
Perfluorooctanesulfonic acid PFOS	-	89	1.33E-06
Perfluorodecanesulfonic acid	-	< 3.2	< 4.82E-08
Perfluorobutanoic acid	-	38.6	5.77E-07
Perfluoropentanoic acid	-	136.0	2.03E-06
Perfluorohexanoic acid	-	332	4.97E-06
Perfluoroheptanoic acid	-	51.8	7.75E-07
Perfluorooctanoic acid PFOA	-	172	2.57E-06
Perfluorononanoic acid	-	4.5	6.66E-08
Perfluorodecanoic acid	-	< 8.1	< 1.20E-07
Perfluoroundecanoic acid	-	< 8.1	< 1.20E-07
Perfluorododecanoic acid	-	< 8.1	< 1.20E-07
Perfluorotridecanoic acid	-	< 8.1	< 1.20E-07
Perfluorotetradecanoic acid	-	< 40.3	< 6.02E-07
4:2 FTS	-	< 1.6	< 2.41E-08
6:2 FTS	-	77.5	1.16E-06
8:2 FTS	-	5.2	7.83E-08
10:2 FTS	-	< 3.2	< 4.82E-08
Perfluorooctane sulfonamide	-	19.2	2.87E-07
N-Methyl perfluorooctane sulfonamide	-	11.2	1.68E-07
N-Ethyl perfluorooctane sulfonamide	-	< 8.1	< 1.20E-07
N-Me perfluorooctanesulfonamido ethanol	-	152	2.27E-06
N-Et perfluorooctanesulfonamido ethanol	-	< 98	< 1.46E-06
MePerfluorooctanesulf-amido acetic acid	-	7.6	1.14E-07
EtPerfluorooctanesulf-amido acetic acid	-	6.0	9.02E-08
TOTAL			
Sum of positive detections	-	2,108	3.15E-05

Table 19: Sample information – Odour

Site		Shaolbay Landfill
Sample Location		BV300_1
Reference Method		AS4323.3 - CONSTANT FLOW
Run ID		20
Test Parameter		Odour
Test Date	dd/mm/yyyy	9/02/2022
Start Time	hh:mm	8:35
End Time	hh:mm	8:42
Average Stack Temperature	°C	87
Absolute Stack Pressure	mb	1004
Moisture Content	% v/v	59.1
Dry Gas Density	kg/Nm^3	1.34
Dry Gas Molecular Weight	g/g-mole	30.0
Sample Volume (dry gas meter)	Nm^3	-
Stack Gas Velocity	m/sec	3.2
Actual Stack Flow Rate	m^3/min	52
Dry Standard Stack Flow Rate	Nm^3/min	16
Percent Isokinetic Rate	%	N/A

Pollutant	Licence limit	standard conditions Concentration	Emission Rate
Odour	ou	ou	ou.m^3/min
Odour Sample 1	-	8,984	352,032
Odour Sample 2	-	11,095	434,710
Average Odour	-	10,039	393,371

Table 20: Sample information – Hydrogen sulfide

Site		Shaolbay Landfill
Sample Location		BV300_1
Reference Method		USEPA Method 15 - CONSTANT FLOW
Run ID		20
Test Parameter		H2S
Test Date	dd/mm/yyyy	9/02/2022
Start Time	hh:mm	8:50
End Time	hh:mm	8:55
Average Stack Temperature	°C	87
Absolute Stack Pressure	mb	1004
Moisture Content	% v/v	59.1
Dry Gas Density	kg/Nm^3	1.34
Dry Gas Molecular Weight	g/g-mole	30.1
Sample Volume (dry gas meter)	Nm^3	-
Stack Gas Velocity	m/sec	3.2
Actual Stack Flow Rate	m^3/min	52
Dry Standard Stack Flow Rate	Nm^3/min	16
Percent Isokinetic Rate	%	N/A

Pollutant	Licence limit	standard conditions Concentration	Emission Rate
H2S	mg/Nm^3	mg/Nm^3	g/min
Hydrogen sulfide	5	< 1.1	< 0.02

Table 21: Sample information – Oxides of Sulfur

Site		Shaolbay Landfill
Sample Location		BV300_1
Reference Method		USEPA Method 8 - ISOKINETIC
Run ID		16
Test Parameter		Sox
Test Date	dd/mm/yyyy	4/02/2022
Start Time	hh:mm	13:10
End Time	hh:mm	14:15
Average Stack Temperature	°C	87
Absolute Stack Pressure	mb	1004
Moisture Content	% v/v	58.9
Dry Gas Density	kg/Nm^3	1.34
Dry Gas Molecular Weight	g/g-mole	30.0
Sample Volume (dry gas meter)	Nm^3	0.44
Stack Gas Velocity	m/sec	3.3
Actual Stack Flow Rate	m^3/min	54
Dry Standard Stack Flow Rate	Nm^3/min	17
Percent Isokinetic Rate	%	97

Pollutant	Licence limit	standard conditions Concentration	Emission Rate
Sox	mg/Nm^3	mg/Nm^3	g/min
SO2	-	25.6	0.43
SO3 (as H2SO4)	100	9.6	0.16

Table 22: Sample information – Acid gases

Site		Shaolbay Landfill
Sample Location		BV300_1
Reference Method		USEPA Method 26A - ISOKINETIC
Run ID		14
Test Parameter		HCl / Cl2
Test Date	dd/mm/yyyy	4/02/2022
Start Time	hh:mm	17:21
End Time	hh:mm	18:19
Average Stack Temperature	°C	87
Absolute Stack Pressure	mb	1002
Moisture Content	% v/v	62.4
Dry Gas Density	kg/Nm^3	1.34
Dry Gas Molecular Weight	g/g-mole	30.0
Sample Volume (dry gas meter)	Nm^3	0.46
Stack Gas Velocity	m/sec	3.3
Actual Stack Flow Rate	m^3/min	55
Dry Standard Stack Flow Rate	Nm^3/min	15
Percent Isokinetic Rate	%	109

Pollutant	Licence limit	standard conditions Concentration	Emission Rate
HCl / Cl2	mg/Nm^3	mg/Nm^3	g/min
HCl	100	< 2.2	< 0.03
Cl2	200	< 2.2	< 0.03

Table 23: Sample information – Heavy metals

Site		Shaolbay Landfill	
Sample Location		BV300_1	
Reference Method		USEPA Method 29 - ISOKINETIC	
Run ID		13	
Test Parameter		Metals	
Test Date	dd/mm/yyyy	6/02/2022	
Start Time	hh:mm	14:00	
End Time	hh:mm	16:11	
Average Stack Temperature	°C	87	
Absolute Stack Pressure	mb	1004	
Moisture Content	% v/v	59.1	
Dry Gas Density	kg/Nm^3	1.34	
Dry Gas Molecular Weight	g/g-mole	30.1	
Sample Volume (dry gas meter)	Nm^3	0.84	
Stack Gas Velocity	m/sec	3.2	
Actual Stack Flow Rate	m^3/min	52	
Dry Standard Stack Flow Rate	Nm^3/min	16	
Percent Isokinetic Rate	%	96	
Pollutant	Licence limit	standard conditions Concentration	Emission Rate
Metals	µg/Nm^3	µg/Nm^3	g/min
Antimony	-	< 6.8	< 1.1E-04
Arsenic	-	< 6.8	< 1.1E-04
Beryllium	-	< 0.5	< 8.1E-06
Cadmium	200	1.1	1.7E-05
Chromium	-	7.5	1.2E-04
Cobalt	-	0.8	1.3E-05
Lead	-	56	9.0E-04
Manganese	-	1.2	1.9E-05
Nickel	-	6.2	9.9E-05
Selenium	-	< 6.8	< 1.1E-04
Tin	-	< 17	< 2.7E-04
Vanadium	-	< 8.4	< 1.4E-04
Mercury	200	0.9	1.5E-05
Total Heavy Metals (lower bound)	1,000	74	1.2E-03

Table 24: Sample information – Volatile organic compounds

Site		Shaolbay Landfill	
Sample Location		BV300_1	
Reference Method		USEPA Method 18 - CONSTANT FLOW	
Run ID		17	
Test Parameter		VOC	
Test Date	dd/mm/yyyy	5/02/2022	
Start Time	hh:mm	10:40	
End Time	hh:mm	11:40	
Average Stack Temperature	°C	88	
Absolute Stack Pressure	mb	1004	
Moisture Content	% v/v	61.9	
Dry Gas Density	kg/Nm^3	1.34	
Dry Gas Molecular Weight	g/g-mole	30.1	
Sample Volume (dry gas meter)	Nm^3	0.04	
Stack Gas Velocity	m/sec	3.3	
Actual Stack Flow Rate	m^3/min	54	
Dry Standard Stack Flow Rate	Nm^3/min	16	
Percent Isokinetic Rate	%	N/A	
		standard conditions	
Pollutant	Licence limit	Concentration	Emission Rate
Total (non-methane) VOCs	mg/Nm^3	mg/Nm^3	g/min
Total VOCs - as n-hexane	-	< 1.3	< 0.02
Total VOCs - as n-propane	40	< 0.7	< 0.01

Table 25: Sample information – Ammonia

Site		Shaolbay Landfill	
Sample Location		BV300_1	
Reference Method		USEPA Method 6 - CONSTANT FLOW	
Run ID		18	
Test Parameter		NH3	
Test Date	dd/mm/yyyy	6/02/2021	
Start Time	hh:mm	10:30	
End Time	hh:mm	11:30	
Average Stack Temperature	°C	87	
Absolute Stack Pressure	mb	1005	
Moisture Content	% v/v	62.4	
Dry Gas Density	kg/Nm^3	1.34	
Dry Gas Molecular Weight	g/g-mole	30.1	
Sample Volume (dry gas meter)	Nm^3	0.04	
Stack Gas Velocity	m/sec	3.2	
Actual Stack Flow Rate	m^3/min	53	
Dry Standard Stack Flow Rate	Nm^3/min	15	
Percent Isokinetic Rate	%	N/A	
		standard conditions	
Pollutant	Licence limit	Concentration	Emission Rate
NH3	mg/Nm^3	mg/Nm^3	g/min
Ammonia (NH3) - in condensate	-	1,658	24.8
Ammonia (NH3) - gaseous	-	190	2.8
Total Ammonia (as NH3)	-	1,849	27.6

Table 26: Sample information – Fluoride

Site		Shaolbay Landfill
Sample Location		BV300_1
Reference Method		USEPA Method 13B - ISOKINETIC
Run ID		15
Test Parameter		F
Test Date	dd/mm/yyyy	4/02/2022
Start Time	hh:mm	15:15
End Time	hh:mm	16:22
Average Stack Temperature	°C	86
Absolute Stack Pressure	mb	1002
Moisture Content	% v/v	61.8
Dry Gas Density	kg/Nm^3	1.34
Dry Gas Molecular Weight	g/g-mole	30.0
Sample Volume (dry gas meter)	Nm^3	0.46
Stack Gas Velocity	m/sec	3.4
Actual Stack Flow Rate	m^3/min	55
Dry Standard Stack Flow Rate	Nm^3/min	16
Percent Isokinetic Rate	%	106

Pollutant	Licence limit	standard conditions Concentration	Emission Rate
F	mg/Nm^3	mg/Nm^3	g/min
Fluorine - (as total HF)	50	< 2.3	< 0.04

Table 27: Sample information – Combustion gases

Site		Shaolbay Landfill
Sample Location		BV300_1
Reference Method		USEPA Method 3A, 7E & 10
Run ID		Various
Test Parameter		O_2, CO_2, NOx, CO
Test Date	dd/mm/yyyy	4/02/2022
Start Time	hh:mm	13:10
End Time	hh:mm	18:19
Average Stack Temperature	°C	87
Absolute Stack Pressure	mb	1003
Moisture Content	% v/v	60.8
Dry Gas Density	kg/Nm^3	1.34
Dry Gas Molecular Weight	g/g-mole	30.1
Stack Gas Velocity	m/sec	3.3
Actual Stack Flow Rate	m^3/min	54
Dry Standard Stack Flow Rate	Nm^3/min	16

Pollutant O2, CO2, NOx, CO	Licence limit STP	standard conditions Concentration STP	Emission Rate g/min
Oxygen (% v/v)	-	5.5	-
Carbon dioxide (% v/v)	-	11.5	-
Carbon monoxide (mg/Nm^3)	125	75	1.2
Oxides of nitrogen (mg/Nm^3)	350	135	2.1

Table 28: Sample information – Dioxins & furans

Site		Shaolbay Landfill	
Sample Location		BV300_1	
Reference Method		USEPA Method 23 - ISOKINETIC	
Run ID		12	
Test Parameter		DF PCB	
Test Date	dd/mm/yyyy	5/02/2022	
Start Time	hh:mm	8:43	
End Time	hh:mm	15:16	
Average Stack Temperature	°C	88	
Absolute Stack Pressure	mb	1004	
Moisture Content	% v/v	61.9	
Dry Gas Density	kg/Nm^3	1.34	
Dry Gas Molecular Weight	g/g-mole	30.1	
Sample Volume (dry gas meter)	Nm^3	2.54	
Stack Gas Velocity	m/sec	3.3	
Actual Stack Flow Rate	m^3/min	54	
Dry Standard Stack Flow Rate	Nm^3/min	16	
Percent Isokinetic Rate	%	100	
Pollutant	Licence limit	standard conditions Concentration	Emission Rate
DF PCB	ng/Nm^3	ng/Nm^3	g/min
2378 TCDF	-	0.0063	9.8E-11
Total TCDF isomers	-	0.14	2.1E-09
2378 TCDD	-	0.0018	2.8E-11
Total TCDD isomers	-	0.047	7.3E-10
12378 PeCDF	-	0.0039	6.1E-11
23478 PeCDF	-	0.0051	7.9E-11
Total PeCDF isomers	-	0.071	1.1E-09
12378 PeCDD	-	0.0015	2.3E-11
Total PeCDD isomers	-	0.039	6.1E-10
123478 HxCDF	-	0.0036	5.6E-11
123678 HxCDF	-	0.0034	5.3E-11
234678 HxCDF	-	0.0019	3.0E-11
123789 HxCDF	-	< 0.00039	< 6.1E-12
Total HxCDF isomers	-	0.030	4.6E-10
123478 HxCDD	-	0.00075	1.2E-11
123678 HxCDD	-	0.0028	4.3E-11
123789 HxCDD	-	0.0018	2.8E-11
Total HxCDD isomers	-	0.047	7.3E-10
1234678 HpCDF	-	0.0055	8.6E-11
1234789 HpCDF	-	0.00091	1.4E-11
Total HpCDF isomers	-	0.011	1.7E-10
1234678 HpCDD	-	0.039	6.0E-10
Total HpCDD isomers	-	0.075	1.2E-09
OCDF	-	0.0019	3.0E-11
OCDD	-	0.18	2.8E-09
Sum of congeners Sum of positive detections	-	0.64	9.9E-09
Total I-TEQ Sum of positive detections	0.1	0.0080	1.2E-10

Table 29: Sample information – PCBs

PCBs (USEPA Method 23)				
PCBs		Licence limit	standard conditions Concentration	Emission Rate
		ng/Nm^3	ng/Nm^3	g/min
	PCB#77	-	0.88	1.4E-08
	PCB#81	-	0.039	6.1E-10
	PCB#126	-	0.018	2.8E-10
	PCB#169	-	< 0.00079	< 1.2E-11
	PCB#105	-	3.9	6.0E-08
	PCB#114	-	0.23	3.6E-09
	PCB#118	-	9.1	1.4E-07
	PCB#123	-	0.13	2.0E-09
	PCB#156	-	1.0	1.6E-08
	PCB#157	-	0.23	3.5E-09
	PCB#167	-	0.35	5.5E-09
	PCB#189	-	0.038	5.9E-10
	Sum of PCB Congeners Sum of positive detections	-	16	2.5E-07
	Total TEQ Sum of positive detections	-	0.0024	3.7E-11

6.2 Stack 2 Results

Table 30: Sample information – PFAS

Site		Shaolbay Landfill
Sample Location		BV300_2
Reference Method		USEPA Method 0010 - ISOKINETIC
Run ID		30
Test Parameter		PFAS
Test Date	dd/mm/yyyy	6/02/2022
Start Time	hh:mm	8:50
End Time	hh:mm	11:55
Average Stack Temperature	°C	88
Absolute Stack Pressure	mb	1005
Moisture Content	% v/v	62.0
Dry Gas Density	kg/Nm^3	1.34
Dry Gas Molecular Weight	g/g-mole	30.1
Sample Volume (dry gas meter)	Nm^3	1.11
Stack Gas Velocity	m/sec	2.8
Actual Stack Flow Rate	m^3/min	45
Dry Standard Stack Flow Rate	Nm^3/min	13
Percent Isokinetic Rate	%	107

Pollutant PFAS species	Licence limit ng/Nm^3	standard conditions Concentration ng/Nm^3	Emission Rate g/min
Perfluorobutanesulfonic acid	-	1,081	1.40E-05
Perfluoropentanesulfonic acid	-	15.5	2.01E-07
Perfluorohexanesulfonic acid	-	126	1.64E-06
Perfluoroheptanesulfonic acid	-	6.5	8.45E-08
Perfluorooctanesulfonic acid PFOS	-	99	1.29E-06
Perfluorodecanesulfonic acid	-	< 3.6	< 4.72E-08
Perfluorobutanoic acid	-	50	6.47E-07
Perfluoropentanoic acid	-	143	1.86E-06
Perfluorohexanoic acid	-	384	4.98E-06
Perfluoroheptanoic acid	-	60.4	7.84E-07
Perfluorooctanoic acid PFOA	-	189	2.45E-06
Perfluorononanoic acid	-	7.4	9.58E-08
Perfluorodecanoic acid	-	10.9	1.41E-07
Perfluoroundecanoic acid	-	11.8	1.52E-07
Perfluorododecanoic acid	-	10.9	1.41E-07
Perfluorotridecanoic acid	-	14.5	1.88E-07
Perfluorotetradecanoic acid	-	< 45.5	< 5.90E-07
4:2 FTS	-	< 1.8	< 2.36E-08
6:2 FTS	-	101	1.31E-06
8:2 FTS	-	6.1	7.94E-08
10:2 FTS	-	< 3.6	< 4.72E-08
Perfluorooctane sulfonamide	-	17.2	2.23E-07
N-Methyl perfluorooctane sulfonamide	-	12.7	1.64E-07
N-Ethyl perfluorooctane sulfonamide	-	< 9.1	< 1.18E-07
N-Me perfluorooctanesulfonamido ethanol	-	172	2.23E-06
N-Et perfluorooctanesulfonamido ethanol	-	< 110	< 1.43E-06
MePerfluorooctanesulf-amido acetic acid	-	8.6	1.12E-07
EtPerfluorooctanesulf-amido acetic acid	-	7.7	1.00E-07
TOTAL			
Sum of positive detections	-	2,535	3.29E-05

Table 31: Sample information – Odour

Site		Shaolbay Landfill
Sample Location		BV300_2
Reference Method		AS4323.3 - CONSTANT FLOW
Run ID		31
Test Parameter		Odour
Test Date	dd/mm/yyyy	9/02/2022
Start Time	hh:mm	9:17
End Time	hh:mm	9:24
Average Stack Temperature	°C	87
Absolute Stack Pressure	mb	1004
Moisture Content	% v/v	62.4
Dry Gas Density	kg/Nm^3	1.35
Dry Gas Molecular Weight	g/g-mole	30.3
Sample Volume (dry gas meter)	Nm^3	-
Stack Gas Velocity	m/sec	2.8
Actual Stack Flow Rate	m^3/min	46
Dry Standard Stack Flow Rate	Nm^3/min	13
Percent Isokinetic Rate	%	N/A

Pollutant	Licence limit	standard conditions Concentration	Emission Rate
Odour	ou	ou	ou.m^3/min
Odour Sample 1	-	10,725	373,393
Odour Sample 2	-	8,986	312,850
Average Odour	-	9,856	343,121

Table 32: Sample information – Hydrogen sulfide

Site		Shaolbay Landfill
Sample Location		BV300_2
Reference Method		USEPA Method 15 - CONSTANT FLOW
Run ID		32
Test Parameter		H2S
Test Date	dd/mm/yyyy	9/02/2022
Start Time	hh:mm	9:00
End Time	hh:mm	9:05
Average Stack Temperature	°C	87
Absolute Stack Pressure	mb	1004
Moisture Content	% v/v	62.4
Dry Gas Density	kg/Nm^3	1.35
Dry Gas Molecular Weight	g/g-mole	30.2
Sample Volume (dry gas meter)	Nm^3	-
Stack Gas Velocity	m/sec	2.8
Actual Stack Flow Rate	m^3/min	46
Dry Standard Stack Flow Rate	Nm^3/min	13
Percent Isokinetic Rate	%	N/A

Pollutant	Licence limit	standard conditions Concentration	Emission Rate
H2S	mg/Nm^3	mg/Nm^3	g/min
Hydrogen sulfide	5	< 1.1	< 0.01

Table 33: Sample information – Oxides of Sulfur

Site		Shaolbay Landfill
Sample Location		BV300_2
Reference Method		USEPA Method 8 - ISOKINETIC
Run ID		27
Test Parameter		Sox
Test Date	dd/mm/yyyy	4/02/2022
Start Time	hh:mm	13:09
End Time	hh:mm	14:14
Average Stack Temperature	°C	87
Absolute Stack Pressure	mb	1004
Moisture Content	% v/v	61.7
Dry Gas Density	kg/Nm^3	1.35
Dry Gas Molecular Weight	g/g-mole	30.1
Sample Volume (dry gas meter)	Nm^3	0.40
Stack Gas Velocity	m/sec	3.1
Actual Stack Flow Rate	m^3/min	50
Dry Standard Stack Flow Rate	Nm^3/min	14
Percent Isokinetic Rate	%	104

		standard conditions	
Pollutant	Licence limit	Concentration	Emission Rate
Sox	mg/Nm^3	mg/Nm^3	g/min
SO2	-	25.8	0.37
SO3 (as H2SO4)	100	12.6	0.18

Table 34: Sample information – Acid gases

Site		Shaolbay Landfill
Sample Location		BV300_2
Reference Method		USEPA Method 26A - ISOKINETIC
Run ID		25
Test Parameter		HCl / Cl2
Test Date	dd/mm/yyyy	4/02/2022
Start Time	hh:mm	17:20
End Time	hh:mm	18:19
Average Stack Temperature	°C	87
Absolute Stack Pressure	mb	1002
Moisture Content	% v/v	63.4
Dry Gas Density	kg/Nm^3	1.34
Dry Gas Molecular Weight	g/g-mole	30.0
Sample Volume (dry gas meter)	Nm^3	0.39
Stack Gas Velocity	m/sec	3.0
Actual Stack Flow Rate	m^3/min	49
Dry Standard Stack Flow Rate	Nm^3/min	13
Percent Isokinetic Rate	%	109

		standard conditions			
Pollutant	Licence limit		Concentration		Emission Rate
HCl / Cl2	mg/Nm^3		mg/Nm^3		g/min
HCl	100	<	2.5	<	0.03
Cl2	200	<	2.5	<	0.03

Table 35: Sample information – Heavy metals

Site		Shaolbay Landfill	
Sample Location		BV300_2	
Reference Method		USEPA Method 29 - ISOKINETIC	
Run ID		24	
Test Parameter		Metals	
Test Date	dd/mm/yyyy	6/02/2022	
Start Time	hh:mm	14:01	
End Time	hh:mm	16:12	
Average Stack Temperature	°C	87	
Absolute Stack Pressure	mb	1004	
Moisture Content	% v/v	62.4	
Dry Gas Density	kg/Nm^3	1.34	
Dry Gas Molecular Weight	g/g-mole	30.1	
Sample Volume (dry gas meter)	Nm^3	0.73	
Stack Gas Velocity	m/sec	2.8	
Actual Stack Flow Rate	m^3/min	46	
Dry Standard Stack Flow Rate	Nm^3/min	13	
Percent Isokinetic Rate	%	104	
		standard conditions	
Pollutant	Licence limit	Concentration	Emission Rate
Metals	µg/Nm^3	µg/Nm^3	g/min
Antimony	-	< 7.8	< 1.0E-04
Arsenic	-	< 8.8	< 1.2E-04
Beryllium	-	< 0.6	< 7.6E-06
Cadmium	200	0.8	1.1E-05
Chromium	-	12.4	1.6E-04
Cobalt	-	1.1	1.4E-05
Lead	-	41.2	5.4E-04
Manganese	-	2.7	3.6E-05
Nickel	-	9.9	1.3E-04
Selenium	-	< 8	< 1.0E-04
Tin	-	< 19	< 2.5E-04
Vanadium	-	< 9.7	< 1.3E-04
Mercury	200	2.7	3.5E-05
Total Heavy Metals (lower bound)	1,000	71	9.3E-04

Table 36: Sample information – Volatile organic compounds

Site		Shaolbay Landfill	
Sample Location		BV300_2	
Reference Method		USEPA Method 18 - CONSTANT FLOW	
Run ID		28	
Test Parameter		VOC	
Test Date	dd/mm/yyyy	5/02/2021	
Start Time	hh:mm	9:30	
End Time	hh:mm	10:30	
Average Stack Temperature	°C	88	
Absolute Stack Pressure	mb	1004	
Moisture Content	% v/v	63.0	
Dry Gas Density	kg/Nm^3	1.34	
Dry Gas Molecular Weight	g/g-mole	30.1	
Sample Volume (dry gas meter)	Nm^3	0.04	
Stack Gas Velocity	m/sec	3.4	
Actual Stack Flow Rate	m^3/min	55	
Dry Standard Stack Flow Rate	Nm^3/min	15	
Percent Isokinetic Rate	%	N/A	
		standard conditions	
Pollutant	Licence limit	Concentration	Emission Rate
Total (non-methane) VOCs	mg/Nm^3	mg/Nm^3	g/min
Total VOCs - as n-hexane	-	< 1.3	< 0.02
Total VOCs - as n-propane	40	< 0.6	< 0.01

Table 37: Sample information – Ammonia

Site		Shaolbay Landfill
Sample Location		BV300_2
Reference Method		USEPA Method 6 - CONSTANT FLOW
Run ID		29
Test Parameter		NH3
Test Date	dd/mm/yyyy	6/02/2021
Start Time	hh:mm	8:55
End Time	hh:mm	9:55
Average Stack Temperature	°C	88
Absolute Stack Pressure	mb	1005
Moisture Content	% v/v	62.5
Dry Gas Density	kg/Nm^3	1.34
Dry Gas Molecular Weight	g/g-mole	30.1
Sample Volume (dry gas meter)	Nm^3	0.04
Stack Gas Velocity	m/sec	2.8
Actual Stack Flow Rate	m^3/min	46
Dry Standard Stack Flow Rate	Nm^3/min	13
Percent Isokinetic Rate	%	N/A

Pollutant		Concentration standard conditions	Emission Rate standard conditions
NH3	mg/Nm^3	mg/Nm^3	g/min
Ammonia (NH3) - in condensate	-	1,682	21.6
Ammonia (NH3) - gaseous	-	287	3.7
Total Ammonia (as NH3)	-	1,969	25.3

Table 38: Sample information – Fluoride

Site		Shaolbay Landfill
Sample Location		BV300_2
Reference Method		USEPA Method 13B - ISOKINETIC
Run ID		26
Test Parameter		F
Test Date	dd/mm/yyyy	4/02/2022
Start Time	hh:mm	15:16
End Time	hh:mm	16:20
Average Stack Temperature	°C	87
Absolute Stack Pressure	mb	1002
Moisture Content	% v/v	63.0
Dry Gas Density	kg/Nm^3	1.34
Dry Gas Molecular Weight	g/g-mole	30.0
Sample Volume (dry gas meter)	Nm^3	0.39
Stack Gas Velocity	m/sec	2.9
Actual Stack Flow Rate	m^3/min	48
Dry Standard Stack Flow Rate	Nm^3/min	13
Percent Isokinetic Rate	%	108

Pollutant	Licence limit	standard conditions Concentration	Emission Rate
F	mg/Nm^3	mg/Nm^3	g/min
Fluorine - (as total HF)	50	< 2.7	< 0.04

Table 39: Sample information – Combustion gases

Site		Shaolbay Landfill	
Sample Location		BV300_2	
Reference Method		USEPA Method 3A, 7E & 10	
Run ID		Various	
Test Parameter		O_2, CO_2, NOx, CO	
Test Date	dd/mm/yyyy	4/02/2022	
Start Time	hh:mm	15:16	
End Time	hh:mm	15:30	
Average Stack Temperature	°C	87	
Absolute Stack Pressure	mb	1003	
Moisture Content	% v/v	62.7	
Dry Gas Density	kg/Nm^3	1.34	
Dry Gas Molecular Weight	g/g-mole	30.1	
Stack Gas Velocity	m/sec	3.0	
Actual Stack Flow Rate	m^3/min	50	
Dry Standard Stack Flow Rate	Nm^3/min	14	
Pollutant O2, CO2, NOx, CO	Licence limit STP	standard conditions Concentration STP	Emission Rate g/min
Oxygen (% v/v)	-	4.7	-
Carbon dioxide (% v/v)	-	11.9	-
Carbon monoxide (mg/Nm^3)	125	99	1.3
Oxides of nitrogen (mg/m^3)	350	141	2.0

Table 40: Sample information – Dioxins & furans

Site		Shaolbay Landfill
Sample Location		BV300_2
Reference Method		USEPA Method 23 - ISOKINETIC
Run ID		23
Test Parameter		DF PCB
Test Date	dd/mm/yyyy	5/02/2022
Start Time	hh:mm	8:44
End Time	hh:mm	15:30
Average Stack Temperature	°C	88
Absolute Stack Pressure	mb	1004
Moisture Content	% v/v	63.0
Dry Gas Density	kg/Nm^3	1.35
Dry Gas Molecular Weight	g/g-mole	30.1
Sample Volume (dry gas meter)	Nm^3	2.52
Stack Gas Velocity	m/sec	3.4
Actual Stack Flow Rate	m^3/min	55
Dry Standard Stack Flow Rate	Nm^3/min	15
Percent Isokinetic Rate	%	102

Pollutant	Licence limit	standard conditions Concentration	Emission Rate
DF PCB	ng/Nm^3	ng/Nm^3	g/min
2378 TCDF	-	0.010	1.5E-10
Total TCDF isomers	-	0.24	3.6E-09
2378 TCDD	-	0.0022	3.3E-11
Total TCDD isomers	-	0.068	1.0E-09
12378 PeCDF	-	0.010	1.6E-10
23478 PeCDF	-	0.013	2.0E-10
Total PeCDF isomers	-	0.17	2.6E-09
12378 PeCDD	-	0.0025	3.8E-11
Total PeCDD isomers	-	0.060	9.1E-10
123478 HxCDF	-	0.0095	1.5E-10
123678 HxCDF	-	0.0095	1.5E-10
234678 HxCDF	-	0.0056	8.5E-11
123789 HxCDF	-	0.00099	1.5E-11
Total HxCDF isomers	-	0.076	1.2E-09
123478 HxCDD	-	0.0013	2.0E-11
123678 HxCDD	-	0.0044	6.7E-11
123789 HxCDD	-	0.0029	4.4E-11
Total HxCDD isomers	-	0.068	1.0E-09
1234678 HpCDF	-	0.014	2.1E-10
1234789 HpCDF	-	0.0027	4.1E-11
Total HpCDF isomers	-	0.026	4.0E-10
1234678 HpCDD	-	0.052	7.9E-10
Total HpCDD isomers	-	0.10	1.6E-09
OCDF	-	0.0037	5.6E-11
OCDD	-	0.24	3.6E-09
Sum of congeners Sum of positive detections	-	1.1	1.6E-08
Total I-TEQ Sum of positive detections	0.1	0.016	2.4E-10

Table 41: Sample information – PCBs

PCBs (USEPA Method 23)					
PCBs		Licence limit	standard conditions Concentration		Emission Rate
		ng/Nm^3	ng/Nm^3		g/min
	PCB#77	-	1.0		1.5E-08
	PCB#81	-	0.044		6.7E-10
	PCB#126	-	0.022		3.4E-10
	PCB#169	-	< 0.0012	<	1.8E-11
	PCB#105	-	4.1		6.3E-08
	PCB#114	-	0.25		3.8E-09
	PCB#118	-	9.6		1.5E-07
	PCB#123	-	0.14		2.1E-09
	PCB#156	-	1.2		1.9E-08
	PCB#157	-	0.27		4.1E-09
	PCB#167	-	0.42		6.4E-09
	PCB#189	-	0.044		6.7E-10
	Sum of PCB Congeners Sum of positive detections	-	17		2.6E-07
	Total TEQ Sum of positive detections	-	0.0028		4.3E-11

7 APPENDIX

Attachment 7 Emissions Monitoring Program

Substance	Units	Emission Limit^	Frequency	Test Method^
Sample Plane Criteria	-	-	During commissioning and Two months after commissioning and Four months after commissioning then Quarterly (January, April, July and October)	TM-1
Oxides of Nitrogen (NO_x) (as NO_2)	mg/m^3	350		TM-11
Hydrogen Chloride	mg/m^3	100		TM-8
Carbon Monoxide	mg/m^3	125		TM-32
Carbon Dioxide	mg/m^3	-		TM-24
Fluorine compounds (as Hydrogen Fluoride)	mg/m^3	50		TM-9
Sulphuric acid mists	mg/m^3	100		TM-13
Dioxins and Furans	ng/m^3	0.1		TM-18
Type 1 and Type 2 substances in aggregate. antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, manganese, mercury, nickel, selenium, tin or vanadium or any compound containing one or more of those elements.	mg/m^3	1		TM-12 and TM-13 and TM-14
Cadmium (Cd) and cadmium compounds	mg/m^3	0.2		TM-14
Mercury (Hg) and mercury compounds	mg/m^3	0.2		TM-14
Volatile Organic Compounds (VOCs), as n-propane [1]	mg/m^3	40		TM-34 [1]
Chlorine (Cl_2)	mg/m^3	200		TM-7
Hydrogen Sulphide (H_2S) [2]	mg/m^3	5		TM-5 [2]
PFAS (Analysis on a minimum of 28 PFAS compounds using LC-MS/MS)	µg/L	- *		-
Ammonia – N [3]	mg/m^3	-		TM-3 [3]
Odour [4]	-	-		OM-7 [4]
Polychlorinated Biphenyls	mg/m^3	-		-
Sulphur Dioxide	mg/m^3	-		TM-4

* - No limit currently set. If further revisions of the PFAS NEPM include an emission limit then the new limit will apply.

^ - Based on the New South Wales Environmental Operations (Clean Air) Regulations 2010.

[1] - The prescribed method, TM-34, will be used with modification. A moisture removal trap will be placed in front of the solid sorbent media to prevent water from entering the media. Both the condensate captured in the trap and the sorbent media will be analysed for VOCs and the results will be combined and reported.

[2] - The prescribed method, TM-5, will be used with modification. A sample of exhaust gas will be passed through a buffer solution to remove any potential SO_2 present before being captured in a specialised gas sampling bag.

[3] - The prescribed method TM-3 will be used with modification. A moisture removal trap will be placed in front of the media to prevent water from entering the tube.

[4] - The odour samples bags will be diluted beyond the suggested limit in OM-7 (AS4323.3). This is required to avoid condensation forming in the sample bags.

Attachment 7 for EPL188-03 Page **1** of **1**

Figure 4: Excerpt from EPL188-03 – Attachment 7

APPENDIX

B

SAMPLING FREQUENCIES

Cardno

now

Stantec

Attachment 3 – Surface Water Monitoring Program and Trigger Values

	Sample Locations		**Sample Locations**								
	Site Code		SW12	SW13	SW14	GW Sump	SWStg1&2	SWStg5	GWILP	GWI5	GWI6
	Easting (m E)		709035	709065	709287	709102	709724	709003	709771	708952	709811
	Northing (m S)		8630495	8630504	8630536	8629880	8629982	8630206	8630733	8630107	8629975
Parameter	**Units**	**Trigger Value**	**Frequency**								
Field Measurement											
Flow	kL/day	-	-	-	-	-	M[3]	M[3]	C[4]	C[4]	C[4]
Water Level	measure	-	M	M	M	M[5]	-	-	-	-	-
pH	pH units	6 – 8.5[1]	M	M	M	M[5]	M[5]	M[5]	Q	Q	Q
Electrical Conductivity (EC)	µS/cm	-	M	M	M	M[5]	M[5]	M[5]	Q	Q	Q
Dissolved Oxygen (DO)	% saturation	80 – 100[1]	M	M	M	M[5]	M[5]	M[5]	Q	Q	Q
Temperature	ºC	-	M	M	M	M[5]	M[5]	M[5]	Q	Q	Q
Turbidity	NTU	-	M	M	M	M[5]	M[5]	M[5]	Q	Q	Q
Metals/Metalloids (filtered (0.45µm) and unfiltered)											
Boron (B)	µg/L	-	M[5]	M[5]	M[5]	M[5]	M[5]	M[5]	Q	Q	Q
Cadmium (Cd)		1.4[2]	A[5]	A[5]	A[5]	A[5]	A[5]	A[5]	A	A	A
Chromium (Cr)[7]		20[6]	M[5]	M[5]	M[5]	M[5]	M[5]	M[5]	Q	Q	Q
Cobalt (Co)		14[2]	A[5]	A[5]	A[5]	A[5]	A[5]	A[5]	A	A	A
Copper (Cu)		3[2]	M[5]	M[5]	M[5]	M[5]	M[5]	M[5]	Q	Q	Q
Lead (Pb)		6.6[2]	M[5]	M[5]	M[5]	M[5]	M[5]	M[5]	Q	Q	Q
Nickel (Ni)		200[2]	M[5]	M[5]	M[5]	M[5]	M[5]	M[5]	Q	Q	Q
Zinc (Zn)		23[2]	M[5]	M[5]	M[5]	M[5]	M[5]	M[5]	Q	Q	Q
Other											
Total Organic Carbon (TOC)	mg/L	-	M[5]	M[5]	M[5]	M[5]	M[5]	M[5]	Q	Q	Q
Chemical Oxygen Demand (COD)		-	M[5]	M[5]	M[5]	M[5]	M[5]	M[5]	Q	Q	Q
Total Suspended Solids (TSS)		10[1]	M[5]	M[5]	M[5]	M[5]	M[5]	M[5]	Q	Q	Q
Total Dissolved Solids (TDS)		-	M[5]	M[5]	M[5]	M[5]	M[5]	M[5]	Q	Q	Q
Major Ions											
Carbonate (CO_3)	mg/L	-	M[5]	M[5]	M[5]	M[5]	M[5]	M[5]	Q	Q	Q
Bicarbonate (HCO_3)		-	M[5]	M[5]	M[5]	M[5]	M[5]	M[5]	Q	Q	Q
Calcium (Ca)		-	M[5]	M[5]	M[5]	M[5]	M[5]	M[5]	Q	Q	Q
Magnesium (Mg)		-	M[5]	M[5]	M[5]	M[5]	M[5]	M[5]	Q	Q	Q
Potassium (K)		-	M[5]	M[5]	M[5]	M[5]	M[5]	M[5]	Q	Q	Q

Sodium (Na)		-	M[5]	M[5]	M[5]	M[5]	M[5]	M[5]	Q	Q	Q
Chloride (Cl)		-	M[5]	M[5]	M[5]	M[5]	M[5]	M[5]	Q	Q	Q
Sulphate (SO_4)		-	M[5]	M[5]	M[5]	M[5]	M[5]	M[5]	Q	Q	Q
Nutrients											
Ammonia (NH_3 as N)	µg/L	20[1]	M[5]	M[5]	M[5]	M[5]	M[5]	M[5]	Q	Q	Q
Nitrate (NO_3)		-	M[5]	M[5]	M[5]	M[5]	M[5]	M[5]	Q	Q	Q
Nitrite (NO_2)		-	M[5]	M[5]	M[5]	M[5]	M[5]	M[5]	Q	Q	Q
Oxides of Nitrogen (NO_x)		20[1]	M[5]	M[5]	M[5]	M[5]	M[5]	M[5]	Q	Q	Q
Total Nitrogen (TN)		300[1]	M[5]	M[5]	M[5]	M[5]	M[5]	M[5]	Q	Q	Q
Total Phosphorous (TP)		30[1]	M[5]	M[5]	M[5]	M[5]	M[5]	M[5]	Q	Q	Q
Filterable reactive phosphorous (FRP)		10[1]	M[5]	M[5]	M[5]	M[5]	M[5]	M[5]	Q	Q	Q
Hydrocarbons											
Total Recoverable Hydrocarbons (TRH)	µg/L	-	A[5]	A[5]	A[5]	A[5]	A[5]	A[5]	A	A	A
Benzene		900[2]	A[5]	A[5]	A[5]	A[5]	A[5]	A[5]	A	A	A
Toluene		-	A[5]	A[5]	A[5]	A[5]	A[5]	A[5]	A	A	A
Ethylbenzene		-	A[5]	A[5]	A[5]	A[5]	A[5]	A[5]	A	A	A
Xylene		-	A[5]	A[5]	A[5]	A[5]	A[5]	A[5]	A	A	A
Naphthalene		90[2]	A[5]	A[5]	A[5]	A[5]	A[5]	A[5]	A	A	A
PFAS (per-and poly-fluoroalkyl substances) (Analysis on a minimum of 28 PFAS compounds using LC-MS/MS)											
PFOS	µg/L	2[8]	A[5]	A[5]	A[5]	A[5]	A[5]	A[5]	A	A	A
PFOA		632[8]	A[5]	A[5]	A[5]	A[5]	A[5]	A[5]	A	A	A

C – Continuous
M – Monthly
Q – Quarterly (January, April, July, October)
A – Annually (January)

[1] – Based on Darwin Harbour Water Objectives (Shoal Bay upper area marine ambient water quality)
[2] – Based on 90% species protection for marine waters ANZECC Water Quality Guidelines 2018 (ANZG 2018)
[6] – Based on Hexavalent chromium 90% species protection ANZECC Water Quality Guidelines 2018 (ANZG 2018)

[3] – Estimate the flow at the time of sampling
[4] – Using a flow meter
[5] – Only during months October to April
[7] – Analyse for Trivalent and Hexavalent Chromium if total chromium exceeds trigger value
[8] – Based on PFAS NEMP 2.0 however, trigger values for the latest NEMP must be used when available

Attachment 4 - Groundwater Monitoring Program

Parameter	Units	Frequency (all monitoring bores identified in Appendix 5)
Field Measurement		
Flow	kL/day	M[1]
Standing Water Level (SWL)	m AHD	M
pH	pH units	Q
Electrical Conductivity (EC)	µS/cm	Q
Dissolved Oxygen (DO)	% saturation	Q
Temperature	ºC	Q
Reduction Oxidation Potential (REDOX)	mV	Q
Metals/Metalloids (filtered (0.45µm))		
Arsenic (As)	µg/L	A
Boron (B)		Q
Cadmium (Cd)		A
Chromium (Cr)		Q
Cobalt (Co)		A
Copper (Cu)		Q
Lead (Pb)		Q
Lithium (Li)		A
Nickel (Ni)		Q
Vanadium (V)		A
Zinc (Zn)		Q
Major Ions		
Carbonate (CO_3)	mg/L	Q
Bicarbonate (HCO_3)		Q
Calcium (Ca)		Q
Magnesium (Mg)		Q
Potassium (K)		Q
Sodium (Na)		Q
Chloride (Cl)		Q
Sulphate (SO_4)		Q
Nutrients		
Ammonia (NH_3 as N)	µg/L	Q
Ammonium (NH_4)		Q
Nitrate (NO_3)		Q
Nitrite (NO_2)		Q
Oxides of Nitrogen (NO_x)		Q
Total Nitrogen (TN)		Q
Total Phosphorous (TP)		Q
Hydrocarbons		
Total Recoverable Hydrocarbons (TRH)	µg/L	A
Benzene		A
Toluene		A
Ethylbenzene		A
Xylene		A
Naphthalene		A
PFAS (per-and poly-fluoroalkyl substances) (Analysis on a minimum of 28 PFAS compounds using LC-MS/MS)		
PFOS	µg/L	Q
PFOA		Q
Other		
Chemical Oxygen Demand (COD)	mg/L	Q
Total Organic Carbon (TOC)		Q
Total Dissolved Solids (TDS)		Q
Organophosphate Pesticides	µg/L	A

Organochlorine Pesticides		A
Polychlorinated Biphenyls		A
Tributyltin Oxide		A
Phenols		A
Escherichia Coli	CFU 100mL	A
Enterococci		A

M – Monthly
Q – Quarterly (January, April, July, October)
A – Annually (January)
[1] – If the water level is above top of casing when measuring SWLs then estimate the flow.

Attachment 6 - Leachate Monitoring Program

		Sample Locations									
	Site Code	LP01	LP02	DW2	DW3	DW5	DW6	DW7[1]	DW8[1]	TC Sump	LMP02
	Easting (m E)	709534	709531	709029	709038	709023	709041	709450	709459	709465	709938
	Northing (m S)	8630726	8630713	8630459	8630216	8630122	8630039	8630121	8630042	8630233	8629759
Parameter	**Units**	**Frequency**									
Flow	kL/day	-	-	C[2]	C[2]	C[2]	C[2]	C[2]	C[2]	C[2]	C[2]
Water Level	measure	M	M	M	M	M	M	M	M	M	M
pH	pH units	Q	Q	B	B	B	B	B	B	B	B
Electrical Conductivity (EC)	µS/cm	Q	Q	B	B	B	B	B	B	B	B
Dissolved Oxygen (DO)	% saturation	Q	Q	B	B	B	B	B	B	B	B
Temperature	ºC	Q	Q	B	B	B	B	B	B	B	B
Turbidity	NTU	Q	Q	B	B	B	B	B	B	B	B
Metals/Metalloids (filtered (0.45µm) and unfiltered)											
Aluminium (Al)	µg/L	Q	Q	B	B	B	B	B	B	B	B
Arsenic (As)		Q	Q	B	B	B	B	B	B	B	B
Boron (B)		Q	Q	B	B	B	B	B	B	B	B
Cadmium (Cd)		Q	Q	B	B	B	B	B	B	B	B
Chromium (Cr)		Q	Q	B	B	B	B	B	B	B	B
Cobalt (Co)		Q	Q	B	B	B	B	B	B	B	B
Copper (Cu)		Q	Q	B	B	B	B	B	B	B	B
Iron (Fe)		Q	Q	B	B	B	B	B	B	B	B
Lead (Pb)		Q	Q	B	B	B	B	B	B	B	B
Lithium (Li)		Q	Q	B	B	B	B	B	B	B	B
Manganese (Mn)		Q	Q	B	B	B	B	B	B	B	B
Mercury (Hg)		Q	Q	B	B	B	B	B	B	B	B
Nickel (Ni)		Q	Q	B	B	B	B	B	B	B	B
Selenium (Se)		Q	Q	B	B	B	B	B	B	B	B
Vanadium (V)		Q	Q	B	B	B	B	B	B	B	B
Zinc (Zn)		Q	Q	B	B	B	B	B	B	B	B
Major Ions											
Carbonate (CO_3)	mg/L	Q	Q	B	B	B	B	B	B	B	B
Bicarbonate (HCO_3)		Q	Q	B	B	B	B	B	B	B	B
Calcium (Ca)		Q	Q	B	B	B	B	B	B	B	B
Magnesium (Mg)		Q	Q	B	B	B	B	B	B	B	B
Potassium (K)		Q	Q	B	B	B	B	B	B	B	B

Sodium (Na)		Q	Q	B	B	B	B	B	B	B	B
Chloride (Cl)		Q	Q	B	B	B	B	B	B	B	B
Sulphate (SO_4)		Q	Q	B	B	B	B	B	B	B	B
Nutrients											
Ammonia (NH_3)	µg/L	Q	Q	B	B	B	B	B	B	B	B
Ammonium (NH_4)		Q	Q	B	B	B	B	B	B	B	B
Nitrate (NO_3)		Q	Q	B	B	B	B	B	B	B	B
Nitrite (NO_2)		Q	Q	B	B	B	B	B	B	B	B
Oxides of Nitrogen (NOx)		Q	Q	B	B	B	B	B	B	B	B
Total Nitrogen (TN)		Q	Q	B	B	B	B	B	B	B	B
Total Phosphorous (TP)		Q	Q	B	B	B	B	B	B	B	B
Filterable reactive phosphorous (FRP)		Q	Q	B	B	B	B	B	B	B	B
Hydrocarbons											
Total Recoverable Hydrocarbons (TRH)	µg/L	Q	Q	B	B	B	B	B	B	B	B
Polycyclic Aromatic Hydrocarbons (PAHs)		Q	Q	B	B	B	B	B	B	B	B
Benzene		Q	Q	B	B	B	B	B	B	B	B
Toluene		Q	Q	B	B	B	B	B	B	B	B
Ethylbenzene		Q	Q	B	B	B	B	B	B	B	B
Xylene		Q	Q	B	B	B	B	B	B	B	B
Naphthalene		Q	Q	B	B	B	B	B	B	B	B
PFAS (per-and poly-fluoro alkyl substances) (Analysis on a minimum of 28 PFAS compounds using LC-MS/MS)											
PFOS	µg/L	Q	Q	B	B	B	B	B	B	B	B
PFOA		Q	Q	B	B	B	B	B	B	B	B
Other											
Organophosphate Pesticides	µg/L	A	A	-	-	-	-	-	-	-	-
Organochlorine Pesticides		A	A	-	-	-	-	-	-	-	-
Polychlorinated Biphenyls		A	A	-	-	-	-	-	-	-	-
Tributyltin Oxide		A	A	-	-	-	-	-	-	-	-
Phenols		A	A	-	-	-	-	-	-	-	-
Chemical Oxygen Demand (COD)	mg/L	Q	Q	B	B	B	B	B	B	B	B
Total Suspended Solids (TSS)		Q	Q	B	B	B	B	B	B	B	B
Total Organic Carbon (TOC)		Q	Q	B	B	B	B	B	B	B	B
Total Dissolved Solids (TDS)		Q	Q	B	B	B	B	B	B	B	B
Escherichia Coli	CFU 100ml	A	A	-	-	-	-	-	-	-	-
Enterococci		A	A	-	-	-	-	-	-	-	-

C – Continuous
M – Monthly

Q – Quarterly (January, April, July, October)
B – Biannually (January, July)
A – Annually (July)

[1] - Sampling points for Stage 6 leachate collection only active once Stage 6 begins to accept waste
[2] – Using a flow meter

Attachment 7 Emissions Monitoring Program

Substance	Units	Emission Limit^	Frequency	Test Method^
Sample Plane Criteria	-	-	During commissioning and Two months after commissioning and Four months after commissioning then Quarterly (January, April, July and October)	TM-1
Oxides of Nitrogen (NO_x) (as NO_2)	mg/m^3	350		TM-11
Hydrogen Chloride	mg/m^3	100		TM-8
Carbon Monoxide	mg/m^3	125		TM-32
Carbon Dioxide	mg/m^3	-		TM-24
Fluorine compounds (as Hydrogen Fluoride)	mg/m^3	50		TM-9
Sulphuric acid mists	mg/m^3	100		TM-13
Dioxins and Furans	ng/m^3	0.1		TM-18
Type 1 and Type 2 substances in aggregate. antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, manganese, mercury, nickel, selenium, tin or vanadium or any compound containing one or more of those elements.	mg/m^3	1		TM-12 and TM-13 and TM-14
Cadmium (Cd) and cadmium compounds	mg/m^3	0.2		TM-14
Mercury (Hg) and mercury compounds	mg/m^3	0.2		TM-14
Volatile Organic Compounds (VOCs), as n-propane [1]	mg/m^3	40		TM-34 [1]
Chlorine (Cl_2)	mg/m^3	200		TM-7
Hydrogen Sulphide (H_2S) [2]	mg/m^3	5		TM-5 [2]
PFAS (Analysis on a minimum of 28 PFAS compounds using LC-MS/MS)	µg/L	- *		-
Ammonia – N [3]	mg/m^3	-		TM-3 [3]
Odour [4]	-	-		OM-7 [4]
Polychlorinated Biphenyls	mg/m^3	-		-
Sulphur Dioxide	mg/m^3	-		TM-4

* - No limit currently set. If further revisions of the PFAS NEPM include an emission limit then the new limit will apply.

^ - Based on the New South Wales Environmental Operations (Clean Air) Regulations 2010.

[1] - The prescribed method, TM-34, will be used with modification. A moisture removal trap will be placed in front of the solid sorbent media to prevent water from entering the media. Both the condensate captured in the trap and the sorbent media will be analysed for VOCs and the results will be combined and reported.

[2] - The prescribed method, TM-5, will be used with modification. A sample of exhaust gas will be passed through a buffer solution to remove any potential SO_2 present before being captured in a specialised gas sampling bag.

[3] - The prescribed method TM-3 will be used with modification. A moisture removal trap will be placed in front of the media to prevent water from entering the tube.

[4] - The odour samples bags will be diluted beyond the suggested limit in OM-7 (AS4323.3). This is required to avoid condensation forming in the sample bags.

Attachment 8 - Depositional Sampling Program

		Sample Locations			
	Site Code	DS01	DS02	DS03	DS04
	Easting (m E)	709187	709580	709788	709252
	Northing (m S)	8630904	8631014	8630614	8630601
Parameter	**Units**	**Frequency**			
Metals/Metalloids					
Aluminium (Al)	µg/L	B	B	B	B
Boron (B)		B	B	B	B
Chromium (Cr)		B	B	B	B
Cobalt (Co)		B	B	B	B
Copper (Cu)		B	B	B	B
Lead (Pb)		B	B	B	B
Lithium (Li)		B	B	B	B
Mercury (Hg)		B	B	B	B
Nickel (Ni)		B	B	B	B
Zinc (Zn)		B	B	B	B
PFAS (per-and poly-fluoro alkyl substances) (Analysis on a minimum of 28 PFAS compounds using LC-MS/MS)					
PFOS	µg/L	B	B	B	B
PFOA		B	B	B	B
B – Biannually (January, July)					

Attachment 9 – Soil Sampling Program

		Sample Locations			
	Site Code	SS01	SS02	SS03	SS04
	Easting (m E)	709187	709580	709788	709252
	Northing (m S)	8630904	8631014	8630614	8630601
Parameter	**Units**	**Frequency**			
Metals/Metalloids					
Aluminium (Al)	µg/L	B	B	B	B
Boron (B)		B	B	B	B
Chromium (Cr)		B	B	B	B
Cobalt (Co)		B	B	B	B
Copper (Cu)		B	B	B	B
Lead (Pb)		B	B	B	B
Lithium (Li)		B	B	B	B
Mercury (Hg)		B	B	B	B
Nickel (Ni)		B	B	B	B
Zinc (Zn)		B	B	B	B
PFAS (per-and poly-fluoro alkyl substances) (Analysis on a minimum of 28 PFAS compounds using LC-MS/MS)					
PFOS	µg/L	B	B	B	B
PFOA		B	B	B	B
B – Biannually (January, July)					

APPENDIX

C

JULY 2021 – JUNE 2022 RESULTS

Cardno

now

Stantec

Chem Name	Units	EQL	ANZG (2018) Marine Water 90% LOSP Toxicant DGVs	Darwin Harbour WQO (Shoal Bay upper area ambient marine)(applicable to surface water only)	PFAS NEMP 2020 Interim Marine 90%	Field ID	DW2	DW3	GW1-12	GW12-12	GW12-30	GW13-12	GW14-12	GW14-3	GW15-12	GW16-12	GW16-30	GW16-3	GW17-12	GW17-30	GW2-12	GW3-12
						Sample Date	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021
						Lab Report No.	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843
Field																						
SWL	mbgl						-	-	11.3	9.3	9.3	14	3.6	2.22	6.4	5.5	8.7	-	8.76	9.31	9.05	7.92
pH	pH		6-8	6-8.5			7.83	7.95	8.93	4.21	4.41	5.33	4.94	6.21	4.52	5.05	5.25	4.29	6.81	7.21	6.92	6.5
Electrical conductivity	uS/cm						31805	24300	44616	67.6	57.4	326.8	16965	2868	2944	256.6	248.7	633	11693	64654	21595	764
Redox Potential	mV						21.1	55.4	86.2	122.6	85.6	195	72.4	66.2	139.8	56.1	46.1	370.5	85.1	94.7	70.6	25.9
Dissolved Oxygen	%S			80-100			18	33.5	31.7	34.4	30.1	21	36.6	30.3	38	20.2	38.3	27.6	36.1	28.2	38	37.1
Temp	oC						36.2	35.7	30.3	33.4	31.8	29.7	30.5	29.3	30.7	28.9	29.1	31.2	31.5	31.5	32.2	31.9
Turbidity	ntu						17030	13162.5	26299	37.7	33.15	55.9	10010	1722.5	17722.5	160.55	150.15	75.4	6760	31590	12324	442
PFAS																						
(8:2 FTSA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
(10:2 FTSA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
(4:2 FTSA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
(N-EtFOSAA)	UG/L	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
(N-EtFOSA)	mg/L	0.00005					<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
(N-EtFOSE)	UG/L	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
(N-MeFOSAA)	UG/L	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
(N-MeFOSE)	UG/L	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	UG/L	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sum of PFASs (n=30)*	UG/L	0.1					5.04	25.57	<0.1	<0.1	<0.1	0.52	<0.1	2.05	<0.1	0.36	<0.1	1.65	<0.1	<0.1	<0.1	<0.1
Sum of US EPA PFAS (PFOS + PFOA)*	UG/L	0.01					0.81	1.43	<0.01	0.01	<0.01	0.15	<0.01	0.25	<0.01	0.08	<0.01	0.36	<0.01	<0.01	<0.01	<0.01
Sum of WA DWER PFAS (n=10)*	UG/L	0.05					4.9	25.45	<0.05	<0.05	<0.05	0.52	<0.05	2.01	<0.05	0.35	<0.05	1.62	<0.05	<0.05	<0.05	<0.05
Perfluorobutanesulfonic acid (PFBS)	UG/L	0.01					1.7	15	<0.01	<0.01	<0.01	0.17	<0.01	0.31	<0.01	0.04	<0.01	0.15	<0.01	<0.01	<0.01	<0.01
Perfluorononanesulfonic acid (PFNS)(trace)	µg/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorobutanoic acid (PFBA)	UG/L	0.05					0.43	2.1	<0.05	<0.05	<0.05	<0.05	<0.05	0.26	<0.05	<0.05	<0.05	0.29	<0.05	<0.05	<0.05	<0.05
Perfluorodecanesulfonic acid (PFDS)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecanoic acid (PFDA)	UG/L	0.01					0.06	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorododecanoic acid (PFDoDA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptanesulfonic acid (PFHpS)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptanoic acid (PFHpA)	UG/L	0.01					0.21	0.61	<0.01	<0.01	<0.01	0.02	<0.01	0.12	<0.01	0.04	<0.01	0.15	<0.01	<0.01	<0.01	<0.01
Perfluorohexanesulfonic acid (PFHxS)	UG/L	0.01					0.12	0.38	<0.01	<0.01	<0.01	0.06	<0.01	0.1	<0.01	0.07	<0.01	0.18	<0.01	<0.01	<0.01	<0.01
Perfluorohexanoic acid (PFHxA)	UG/L	0.01					0.87	3.5	<0.01	<0.01	<0.01	0.07	0.01	0.43	<0.01	0.05	<0.01	0.23	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	UG/L	0.01					0.04	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorooctane sulfonamide (FOSA)	UG/L	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Perfluorooctanoate	UG/L	0.01			632		0.53	1.3	<0.01	<0.01	<0.01	0.05	<0.01	0.22	<0.01	0.05	<0.01	0.24	<0.01	<0.01	<0.01	<0.01
Perfluorooctanesulfonic acid (PFOS)	UG/L	0.01			2		0.28	0.13	<0.01	0.01	<0.01	0.1	<0.01	0.03	<0.01	0.03	<0.01	0.12	<0.01	<0.01	<0.01	<0.01
Perfluoropentanesulfonic acid (PFPeS)	UG/L	0.01					0.02	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01
Perfluoropentanoic acid (PFPeA)	UG/L	0.01					0.76	1.6	<0.01	<0.01	<0.01	0.05	0.02	0.54	<0.01	0.07	<0.01	0.26	<0.01	<0.01	<0.01	<0.01
Perfluoropropanesulfonic acid (PFPrS)	UG/L	0.01					0.02	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
Perfluorotetradecanoic acid (PFTeDA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorotridecanoic acid (PFTrDA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroundecanoic acid (PFUnDA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sum (PFHxS + PFOS)*	UG/L	0.01					0.4	0.51	<0.01	0.01	<0.01	0.16	<0.01	0.13	<0.01	0.1	<0.01	0.3	<0.01	<0.01	<0.01	<0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	UG/L	0.01					0.93	1.81	<0.01	0.01	<0.01	0.21	<0.01	0.35	<0.01	0.15	<0.01	0.54	<0.01	<0.01	<0.01	<0.01
VFA																						
4-Methylvaleric acid*	MG/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Heptanoic acid*	MG/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Isovaleric acid*	MG/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Isobutyric acid*	MG/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Total VFA as Acetic Acid Equivalents*	MG/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
BTEX																						
Benzene	µg/L	1	900	900			<1	<4	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Ethylbenzene	µg/L	1	110				<1	<4	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Toluene	µg/L	1	230				<1	5	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Xylene (m & p)	µg/L	2					<2	10	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Xylene (o)	µg/L	1					<1	36	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Xylene Total	µg/L	3					<3	46	-	-	-	-	-	-	-	-	-	-	<3	<3	-	-
C6-C10 less BTEX (F1)	mg/L	0.02					<0.02	0.16	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	-	-
Chlorinated Hydrocarbons																						
1,1,1,2-tetrachloroethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
1,1,1-trichloroethane	µg/L	1	400				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
1,1,2,2-tetrachloroethane	µg/L	1	500				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
1,1,2-trichloroethane	µg/L	1	5800				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
1,1-dichloroethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
1,1-dichloroethene	µg/L	1	900				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
1,2,3-trichloropropane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
1,2-dichloroethane	µg/L	1	2600				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
1,2-dichloropropane	µg/L	1	1200				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-

Chem Name	Units	EQL	ANZG (2018) Marine Water 90% LOSP Toxicant DGVs	Darwin Harbour WQO (Shoal Bay upper area ambient marine)(applicable to surface water only)	PFAS NEMP 2020 Interim Marine 90%	Field ID	DW2	DW3	GW1-12	GW12-12	GW12-30	GW13-12	GW14-12	GW14-3	GW15-12	GW16-12	GW16-30	GW16-3	GW17-12	GW17-30	GW2-12	GW3-12
						Sample Date	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021
						Lab Report No.	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843
1,3-dichloropropane	µg/L	1	1400				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Bromochloromethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Bromodichloromethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Bromoform	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Carbon tetrachloride	µg/L	1	320				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Chlorodibromomethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Chloroethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Chloroform	µg/L	5	1100				-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Chloromethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
cis-1,2-dichloroethene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
cis-1,3-dichloropropene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Dibromomethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Dichloromethane	µg/L	1	5000				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Trichloroethene	µg/L	1	400				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Tetrachloroethene	µg/L	1	100				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
trans-1,2-dichloroethene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
trans-1,3-dichloropropene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Vinyl chloride	µg/L	1	140				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Explosives																						
1,3,5-Trinitrobenzene	mg/L	0.1					-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-
1,3-Dinitrobenzene	mg/L	0.1					-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-
2,4,6-Trinitrotoluene (TNT)	mg/L	0.1					-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-
2,4-& 2,6-Dinitrotoluene	mg/L	0.1					-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-
2-Nitrotoluene	µg/L	100					-	-	-	-	-	-	-	-	-	-	-	-	<100	<100	-	-
4-Nitrotoluene	mg/L	0.1					-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-
m-Nitrotoluene	mg/L	0.1					-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-
Nitrobenzene	µg/L	100					-	-	-	-	-	-	-	-	-	-	-	-	<100	<100	-	-
RDX	mg/L	0.1					-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-
Halogenated Benzenes																						
1,2-dichlorobenzene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
1,3-dichlorobenzene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
1,4-dichlorobenzene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
4-chlorotoluene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Bromobenzene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Chlorobenzene	µg/L	1	100				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Hexachlorobenzene	µg/L	0.2	0.2				-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Halogenated Hydrocarbons																						
1,2-dibromoethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Bromomethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Dichlorodifluoromethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Iodomethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Trichlorofluoromethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Halogenated Phenols																						
2,4,5-trichlorophenol	µg/L	10					<10	<10	-	-	-	-	-	-	-	-	-	-	<10	<10	-	-
2,4,6-trichlorophenol	µg/L	10					<10	<10	-	-	-	-	-	-	-	-	-	-	<10	<10	-	-
2,4-dichlorophenol	µg/L	3					<3	<3	-	-	-	-	-	-	-	-	-	-	<3	<3	-	-
2,6-dichlorophenol	µg/L	3					<3	<3	-	-	-	-	-	-	-	-	-	-	<3	<3	-	-
2-chlorophenol	µg/L	3					<3	<3	-	-	-	-	-	-	-	-	-	-	<3	<3	-	-
Pentachlorophenol	µg/L	10	33				<10	<10	-	-	-	-	-	-	-	-	-	-	<10	<10	-	-
tetrachlorophenols	µg/L	30					<30	<30	-	-	-	-	-	-	-	-	-	-	<30	<30	-	-
Herbicides																						
2,4,5-Trichlorophenoxy-propanoic acid	mg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Dinoseb	µg/L	100					<100	<100	-	-	-	-	-	-	-	-	-	-	<100	<100	-	-
Glyphosate	mg/L	0.01					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Inorganics																						
Alkalinity (Bicarbonate as CaCO3)	mg/L	20					-	-	250	<20	<20	<20	<20	<20	<20	<20	<20	<20	24	120	64	30
Nitrite + Nitrate as N	mg/L	0.05					-	-	0.22	0.5	0.48	0.07	0.94	0.74	0.29	0.52	0.13	4.4	0.3	0.92	0.46	0.63
Carbonate Alkalinity (as CaCO3)	mg/L	10					-	-	24	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Alkalinity (Hydroxide) as CaCO3	µg/L	20000					-	-	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000
Alkalinity (total) as CaCO3	mg/L	20					-	-	270	<20	<20	<20	<20	<20	<20	<20	<20	<20	24	120	64	30
Ammonia as N	µg/L	10	1200	20			-	-	<10	40	<10	1400	<10	40	10	20	<10	1200	<10	<10	<10	<10
Chloride	mg/L	1					-	-	14,000	10	9.8	65	5200	1000	810	63	38	120	3700	21,000	8100	180
COD	mg/L	25					320	4200	2200	<25	35	120	170	63	<25	<25	<25	57	1700	250	460	<25
Ferrous Iron	mg/L	0.05					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kjeldahl Nitrogen Total	mg/L	0.2					-	-	<0.2	<0.2	<0.2	1.9	<0.2	1.9	<0.2	0.3	<0.2	84	0.8	<0.2	<0.2	<0.2
Nitrate (as N)	mg/L	0.02					-	-	0.21	0.5	0.48	0.07	0.94	0.74	0.29	0.52	0.13	4.4	0.3	0.92	0.46	0.63
Nitrite (as N)	mg/L	0.02					-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

Chem Name	Units	EQL	ANZG (2018) Marine Water 90% LOSP Toxicant DGVs	Darwin Harbour WQO (Shoal Bay upper area ambient marine)(applicable to surface water only)	PFAS NEMP 2020 Interim Marine 90%	Field ID	DW2	DW3	GW1-12	GW12-12	GW12-30	GW13-12	GW14-12	GW14-3	GW15-12	GW16-12	GW16-30	GW16-3	GW17-12	GW17-30	GW2-12	GW3-12
						Sample Date	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021
						Lab Report No.	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843
Nitrogen (Total)	µg/L	200		**300**			-	-	220	500	480	1970	940	2640	290	820	<200	88,400	1100	920	460	630
Phosphate (as P)	mg/L	0.01					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus	mg/L	0.01		**0.03**			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Reactive Phosphorus as P	mg/L	0.01		**0.01**			-	-	0.05	0.01	0.06	<0.01	0.03	0.05	0.01	0.01	<0.01	<0.01	0.11	0.05	0.06	<0.01
Sodium	mg/L	0.5					-	-	7800	3.7	2.5	34	3500	430	350	42	33	78	2000	10,000	3200	89
Sodium (Filtered)	mg/L	0.5					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	5					-	-	1300	5.6	<5	10	510	190	120	<5	31	37	310	1700	1100	20
TDS	mg/L	10					2000	7200	14,000	110	45	160	6400	1800	1400	140	47	260	5800	33,000	9400	400
TOC	mg/L	5					63	1200	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
TSS	mg/L	1		**0.01|10**			66	35	990	310	37	330	10	200	12	20	4.9	1100	6500	74	18	97
MAH																						
1,2,4-trimethylbenzene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
1,3,5-trimethylbenzene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Total MAH	mg/L	0.003					-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	-	-
Isopropylbenzene	µg/L	1	**40**				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Styrene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Metals																						
Aluminium	mg/L	0.05					0.47	2.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	0.001					0.006	0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (Filtered)	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	-	-
Barium	mg/L	0.02					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium (Filtered)	mg/L	0.02					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium (Filtered)	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	-	-
Boron	mg/L	0.05					0.53	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron (Filtered)	mg/L	0.05					-	-	0.34	0.1	<0.05	0.09	0.53	0.12	0.06	<0.05	<0.05	0.13	0.06	0.37	0.3	<0.05
Cadmium	mg/L	0.0002	**0.014**	**0.014**			<0.0002	<0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium (Filtered)	mg/L	0.0002	**0.014**	**0.014**			-	-	-	-	-	-	-	-	-	-	-	-	0.0006	0.002	-	-
Calcium	mg/L	0.5					-	-	1100	2.4	0.9	6.6	310	64	35	3	2.6	8.1	310	2100	360	21
Calcium (Filtered)	mg/L	0.5					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (hexavalent)	mg/L	0.005	**0.02**	**0.02**			-	-	-	-	-	-	-	-	-	-	-	-	<0.005	<0.005	-	-
Chromium (III+VI)	mg/L	0.001					0.005	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (III+VI) (Filtered)	mg/L	0.001					-	-	<0.001	<0.001	<0.001	<0.001	0.045	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	0.004	<0.001
Cobalt	mg/L	0.001	**0.014**	**0.014**			0.003	0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt (Filtered)	mg/L	0.001	**0.014**	**0.014**			-	-	-	-	-	-	-	-	-	-	-	-	0.009	0.014	-	-
Copper	mg/L	0.001	**0.003**	**0.003**			0.002	0.006	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper (Filtered)	mg/L	0.001	**0.003**	**0.003**			-	-	<0.001	<0.001	0.002	<0.001	0.004	<0.001	0.016	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Iron	mg/L	0.05					2.4	3.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (Filtered)	mg/L	0.05					-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	-	-
Lithium	mg/L	0.005					<0.005	0.007	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	mg/L	0.001	**0.0066**	**0.0066**			0.002	0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead (Filtered)	mg/L	0.001	**0.0066**	**0.0066**			-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.004	0.07	<0.001	<0.001
Magnesium	mg/L	0.5					-	-	1300	<0.5	0.5	1	310	50	42	<0.5	1.5	3.3	200	1400	360	9.4
Magnesium (Filtered)	mg/L	0.5					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	mg/L	0.005					0.31	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese (Filtered)	mg/L	0.005					-	-	-	-	-	-	-	-	-	-	-	-	0.17	2.8	-	-
Mercury	mg/L	0.0001	**0.0007**				<0.0001	<0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury (Filtered)	mg/L	0.0001	**0.0007**				-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001	-	-
Nickel	mg/L	0.001	**0.2**	**0.2**			0.012	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (Filtered)	mg/L	0.001	**0.2**	**0.2**			-	-	<0.001	<0.001	0.001	0.003	0.057	0.013	0.013	<0.001	0.003	<0.001	0.066	0.038	0.048	0.006
Phosphorus	mg/L	0.01		**0.01|0.03**			-	-	0.85	0.06	0.14	0.06	0.04	0.08	<0.01	<0.01	0.01	0.04	0.59	0.03	0.07	0.02
Potassium	mg/L	0.5					-	-	31	1.3	1.1	7.1	86	21	8.2	<0.5	4.6	10	19	100	38	3.3
Potassium (Filtered)	mg/L	0.5					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.001					0.002	0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium (Filtered)	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	-	-
Tin	mg/L	0.005					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	0.005	**0.16**				<0.005	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium (Filtered)	mg/L	0.005	**0.16**				-	-	-	-	-	-	-	-	-	-	-	-	<0.005	<0.005	-	-
Zinc	mg/L	0.005	**0.023**				0.006	0.018	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc (Filtered)	mg/L	0.005	**0.023**				-	-	<0.005	<0.005	0.008	0.01	0.13	0.028	0.034	<0.005	0.014	0.008	0.35	0.16	0.27	0.028
Organic																						
Methane	mg/L	0.05					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organochlorine Pesticides																						
4,4-DDE	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
a-BHC	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Aldrin	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Aldrin + Dieldrin	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-

Chem Name	Units	EQL	ANZG (2018) Marine Water 90% LOSP Toxicant DGVs	Darwin Harbour WQO (Shoal Bay upper area ambient marine)(applicable to surface water only)	PFAS NEMP 2020 Interim Marine 90%	Field ID	DW2	DW3	GW1-12	GW12-12	GW12-30	GW13-12	GW14-12	GW14-3	GW15-12	GW16-12	GW16-30	GW16-3	GW17-12	GW17-30	GW2-12	GW3-12
						Sample Date	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021
						Lab Report No.	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843
b-BHC	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
chlordane	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
d-BHC	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
DDD	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
DDT	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
DDT+DDE+DDD	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Dieldrin	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Endosulfan I	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Endosulfan II	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Endosulfan sulphate	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Endrin	µg/L	0.2	**0.01**				-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Endrin aldehyde	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Endrin ketone	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
g-BHC (Lindane)	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Heptachlor	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Heptachlor epoxide	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Methoxychlor	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Toxaphene	mg/L	0.005					-	-	-	-	-	-	-	-	-	-	-	-	<0.005	<0.005	-	-
Organophosphorous Pesticides																						
Azinophos methyl	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Bolstar (Sulprofos)	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Chlorfenvinphos	µg/L	20					-	-	-	-	-	-	-	-	-	-	-	-	<20	<20	-	-
Chlorpyrifos	µg/L	2	**0.04**				-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Chlorpyrifos-methyl	mg/L	0.002					-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	-	-
Coumaphos	µg/L	20					-	-	-	-	-	-	-	-	-	-	-	-	<20	<20	-	-
Demeton-O	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Demeton-S	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Diazinon	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Dichlorvos	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Dimethoate	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Disulfoton	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Ethion	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Ethoprop	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Fenitrothion	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Fensulfothion	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Fenthion	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Malathion	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Merphos	mg/L	0.002					-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	-	-
Methyl parathion	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Mevinphos (Phosdrin)	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Monocrotophos	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Naled (Dibrom)	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Omethoate	µg/L	20					-	-	-	-	-	-	-	-	-	-	-	-	<20	<20	-	-
Phorate	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Pyrazophos	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Ronnel	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Terbufos	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Trichloronate	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Tetrachlorvinphos	mg/L	0.002					-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	-	-
Organotins																						
Tributyltin	µg/L	12.5					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other																						
Butyric Acid	mg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Hexanoic Acid	mg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
6:2 Fluorotelomer Sulfonate (6:2 FtS)	mg/L	0.00005					<0.00005	0.00083	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
PAH																						
Benzo(b+j)fluoranthene	mg/L	0.001					<0.001	<0.001	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	-	-
PAH/Phenols																						
2,4-dimethylphenol	µg/L	3					<3	<3	-	-	-	-	-	-	-	-	-	-	<3	<3	-	-
2,4-dinitrophenol	mg/L	0.03					<0.03	<0.03	-	-	-	-	-	-	-	-	-	-	<0.03	<0.03	-	-
2-methylphenol	µg/L	3					<3	<3	-	-	-	-	-	-	-	-	-	-	<3	<3	-	-
2-nitrophenol	µg/L	10					<10	<10	-	-	-	-	-	-	-	-	-	-	<10	<10	-	-
3-&4-methylphenol	µg/L	6					<6	<6	-	-	-	-	-	-	-	-	-	-	<6	<6	-	-
4,6-Dinitro-2-methylphenol	µg/L	30					<30	<30	-	-	-	-	-	-	-	-	-	-	<30	<30	-	-
4-chloro-3-methylphenol	µg/L	10					<10	<10	-	-	-	-	-	-	-	-	-	-	<10	<10	-	-
4-nitrophenol	µg/L	30					<30	<30	-	-	-	-	-	-	-	-	-	-	<30	<30	-	-
Acenaphthene	µg/L	1					<1	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-

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						Sample Date	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021
						Lab Report No.	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843	816843
Acenaphthylene	µg/L	1					<1	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Anthracene	µg/L	1	1.5				<1	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Benz(a)anthracene	µg/L	1					<1	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Benzo(a) pyrene	µg/L	1	0.4				<1	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Benzo(g,h,i)perylene	µg/L	1					<1	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Benzo(k)fluoranthene	µg/L	1					<1	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Chrysene	µg/L	1					<1	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Cresol Total	mg/L	0.01					<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	<0.01	<0.01	-	-
Dibenz(a,h)anthracene	µg/L	1					<1	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Fluoranthene	µg/L	1	1.7				<1	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Fluorene	µg/L	1					<1	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Indeno(1,2,3-c,d)pyrene	µg/L	1					<1	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Naphthalene	µg/L	1	90				<1	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
PAHs (Sum of total)	µg/L	1					<1	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Phenanthrene	µg/L	1	4				<1	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Phenol	µg/L	3	520				<3	<3	-	-	-	-	-	-	-	-	-	-	<3	<3	-	-
Pyrene	µg/L	1					<1	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Pesticides																						
Parathion	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Pirimiphos-methyl	mg/L	0.02					-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	-	-
Phenolics																						
4,6-Dinitro-o-cyclohexyl phenol	µg/L	100					<100	<100	-	-	-	-	-	-	-	-	-	-	<100	<100	-	-
Phenols (Total Halogenated)	mg/L	0.01					<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	<0.01	<0.01	-	-
Phenols (Total Non Halogenated)	mg/L	0.1					<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-
Polychlorinated Biphenyls																						
Arochlor 1016	µg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Arochlor 1221	µg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Arochlor 1232	µg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Arochlor 1242	µg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Arochlor 1248	µg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Arochlor 1254	µg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Arochlor 1260	µg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
PCBs (Sum of total)	µg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Solvents																						
Methyl Ethyl Ketone	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
4-Methyl-2-pentanone	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Acetone	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	-	-
Allyl chloride	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	-	-
Carbon disulfide	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
SVOCs																						
EPN	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
TPH																						
C10-C16	mg/L	0.05					0.06	2.9	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	-	-
C16-C34	mg/L	0.1					0.9	10	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-
C34-C40	mg/L	0.1					<0.1	0.3	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-
F2-NAPHTHALENE	mg/L	0.05					0.06	2.9	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	-	-
+C10 - C36 (Sum of total)	µg/L	100					1100	13,000	-	-	-	-	-	-	-	-	-	-	<100	<100	-	-
C6 - C9	µg/L	20					<20	120	-	-	-	-	-	-	-	-	-	-	<20	<20	-	-
C10 - C14	µg/L	50					<50	2400	-	-	-	-	-	-	-	-	-	-	<50	<50	-	-
C15 - C28	µg/L	100					700	10,000	-	-	-	-	-	-	-	-	-	-	<100	<100	-	-
C29-C36	µg/L	100					400	600	-	-	-	-	-	-	-	-	-	-	<100	<100	-	-
C10 - C40 (Sum of total)	µg/L	100					960	13,200	-	-	-	-	-	-	-	-	-	-	<100	<100	-	-
C6-C10	mg/L	0.02					<0.02	0.21	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	-	-

Chem Name	Units	EQL	ANZG (2018) Marine Water 90% LOSP Toxicant DGVs	Darwin Harbour WQO (Shoal Bay upper area ambient marine)(applicable to surface water only)	PFAS NEMP 2020 Interim Marine 90%	Field ID	GW5-12	GW7-12	GW7-3	GW8-12	GW8-3	LMP02	LP02	WW6	WW9	GW17-12	GW17-30	SW12	SW13	SW14	GW17-30	GW18-12
						Sample Date	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	8/09/2021	8/09/2021	8/09/2021	8/09/2021	8/09/2021	12/10/2021	12/10/2021
						Lab Report No.	816843	816843	816843	816843	816843	816843	816843	816843	816843	823129	823129				831794	831794
Field																						
SWL	mbgl						0.98	0.87	2.73	2.41	2.5	-	-	5	4.38	10.1	10.6				12.24	8.27
pH	pH		6-8	6-8.5			6.83	6.46	-	7.08	5.14	8.05	8.45	5.39	4.35	5.56	6.69	8.68	8.08	6.98	7.31	6.05
Electrical conductivity	uS/cm						3447	8355	31221	75553	19994	5761	7194	70856	6943	10682	52154	5598	4808	2230	48690	22594
Redox Potential	mV						90.2	114.3	135	128.2	137.7	131.7	25.2	76.7	151	183.2	218.8	152	134.1	146.8	55.6	36.6
Dissolved Oxygen	%S			80-100			41.3	33.6	24.5	36	23.8	70.7	12.4	17.6	34.7	48.9	40.1	93	93.8	78.2	14.9	41.6
Temp	oC						31.1	27.2	27.8	26.4	25.9	28	26.4	32.2	30.5	28.6	28.5	29.2	28.1	30.3	31.3	31.4
Turbidity	ntu						2034.5	5206	19227.5	47840	12779	3555.5	4576	40430	4082	650.5	318	330.5	295	131.59	287.32	130.78
PFAS																						
(8:2 FTSA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	0.03	0.18	<0.01	<0.01	<0.01	<0.01	-	-	-	<0.01	<0.01
(10:2 FTSA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	<0.01	<0.01
(4:2 FTSA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	<0.01	<0.01
(N-EtFOSAA)	UG/L	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	0.71	0.17	<0.05	<0.05	<0.05	<0.05	-	-	-	<0.05	<0.05
(N-EtFOSA)	mg/L	0.00005					<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	-	-	-	<0.00005	<0.00005
(N-EtFOSE)	UG/L	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	<0.05	<0.05
(N-MeFOSAA)	UG/L	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	0.31	0.28	<0.05	<0.05	<0.05	<0.05	-	-	-	<0.05	<0.05
(N-MeFOSE)	UG/L	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	<0.05	<0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	UG/L	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	<0.05	<0.05
Sum of PFASs (n=30)*	UG/L	0.1					<0.1	<0.1	0.33	<0.1	0.68	7.8	22.67	0.27	<0.1	<0.1	<0.1	-	-	-	<0.1	<0.1
Sum of US EPA PFAS (PFOS + PFOA)*	UG/L	0.01					<0.01	0.04	0.15	<0.01	0.28	2.36	3.2	<0.01	<0.01	<0.01	<0.01	-	-	-	<0.01	<0.01
Sum of WA DWER PFAS (n=10)*	UG/L	0.05					<0.05	0.06	0.32	<0.05	0.64	6.53	21.68	0.27	<0.05	<0.05	<0.05	-	-	-	<0.05	<0.05
Perfluorobutanesulfonic acid (PFBS)	UG/L	0.01					<0.01	<0.01	0.04	<0.01	0.03	0.49	9.7	<0.01	<0.01	<0.01	<0.01	-	-	-	<0.01	<0.01
Perfluorononanesulfonic acid (PFNS)(trace)	µg/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	<0.01	<0.01
Perfluorobutanoic acid (PFBA)	UG/L	0.05					<0.05	<0.05	<0.05	<0.05	0.11	0.76	1.9	<0.05	<0.05	<0.05	<0.05	-	-	-	<0.05	<0.05
Perfluorodecanesulfonic acid (PFDS)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	<0.01	<0.01
Perfluorodecanoic acid (PFDA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.19	<0.01	<0.01	<0.01	<0.01	-	-	-	<0.01	<0.01
Perfluorododecanoic acid (PFDoDA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	<0.01	<0.01
Perfluoroheptanesulfonic acid (PFHpS)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	0.06	0.03	<0.01	<0.01	<0.01	<0.01	-	-	-	<0.01	<0.01
Perfluoroheptanoic acid (PFHpA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	0.02	0.26	0.53	0.01	<0.01	<0.01	<0.01	-	-	-	<0.01	<0.01
Perfluorohexanesulfonic acid (PFHxS)	UG/L	0.01					<0.01	0.02	0.1	<0.01	0.15	1.4	0.57	<0.01	<0.01	<0.01	<0.01	-	-	-	<0.01	<0.01
Perfluorohexanoic acid (PFHxA)	UG/L	0.01					<0.01	<0.01	0.01	<0.01	0.03	0.7	3	0.04	<0.01	<0.01	<0.01	-	-	-	<0.01	<0.01
Perfluorononanoic acid (PFNA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	0.01	0.04	0.12	<0.01	<0.01	<0.01	<0.01	-	-	-	<0.01	<0.01
Perfluorooctane sulfonamide (FOSA)	UG/L	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	<0.05	<0.05
Perfluorooctanoate	UG/L	0.01			632		<0.01	0.01	0.04	<0.01	0.13	0.76	1.8	<0.01	<0.01	<0.01	<0.01	-	-	-	<0.01	<0.01
Perfluorooctanesulfonic acid (PFOS)	UG/L	0.01			2		<0.01	0.03	0.11	<0.01	0.15	1.6	1.4	<0.01	<0.01	<0.01	<0.01	-	-	-	<0.01	<0.01
Perfluoropentanesulfonic acid (PFPeS)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	0.01	0.07	0.07	<0.01	<0.01	<0.01	<0.01	-	-	-	<0.01	<0.01
Perfluoropentanoic acid (PFPeA)	UG/L	0.01					<0.01	<0.01	0.02	<0.01	0.02	0.42	1.5	0.02	<0.01	<0.01	<0.01	-	-	-	<0.01	<0.01
Perfluoropropanesulfonic acid (PFPrS)	UG/L	0.01					<0.01	<0.01	0.01	<0.01	0.02	0.08	0.09	<0.01	<0.01	<0.01	<0.01	-	-	-	<0.01	<0.01
Perfluorotetradecanoic acid (PFTeDA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	<0.01	<0.01
Perfluorotridecanoic acid (PFTrDA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	<0.01	<0.01
Perfluoroundecanoic acid (PFUnDA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	-	-	-	<0.01	<0.01
Sum (PFHxS + PFOS)*	UG/L	0.01					<0.01	0.05	0.21	<0.01	0.3	3	1.97	<0.01	<0.01	<0.01	<0.01	-	-	-	<0.01	<0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	UG/L	0.01					<0.01	0.06	0.25	<0.01	0.43	3.76	3.77	<0.01	<0.01	<0.01	<0.01	-	-	-	<0.01	<0.01
VFA																						
4-Methylvaleric acid*	MG/L	5					-	-	-	-	-	-	-	-	-	<5	<5	-	-	-	-	-
Heptanoic acid*	MG/L	5					-	-	-	-	-	-	-	-	-	<5	<5	-	-	-	-	-
Isovaleric acid*	MG/L	5					-	-	-	-	-	-	-	-	-	<5	<5	-	-	-	-	-
Isobutyric acid*	MG/L	5					-	-	-	-	-	-	-	-	-	<5	<5	-	-	-	-	-
Total VFA as Acetic Acid Equivalents*	MG/L	5					-	-	-	-	-	-	-	-	-	<5	<5	-	-	-	-	-
BTEX																						
Benzene	µg/L	1	900	900			-	-	-	-	-	<1	<4	-	-	<1	<1	-	-	-	<1	<100
Ethylbenzene	µg/L	1	110				-	-	-	-	-	<1	<4	-	-	<1	<1	-	-	-	<1	<100
Toluene	µg/L	1	230				-	-	-	-	-	<1	<4	-	-	<1	<1	-	-	-	<1	<100
Xylene (m & p)	µg/L	2					-	-	-	-	-	<2	<8	-	-	<2	<2	-	-	-	<2	<200
Xylene (o)	µg/L	1					-	-	-	-	-	1	<4	-	-	<1	<1	-	-	-	<1	<100
Xylene Total	µg/L	3					-	-	-	-	-	<3	<12	-	-	<3	<3	-	-	-	<3	<300
C6-C10 less BTEX (F1)	mg/L	0.02					-	-	-	-	-	<0.02	<0.08	-	-	<0.02	<0.02	-	-	-	<0.02	<2
Chlorinated Hydrocarbons																						
1,1,1,2-tetrachloroethane	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
1,1,1-trichloroethane	µg/L	1	400				-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
1,1,2,2-tetrachloroethane	µg/L	1	500				-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
1,1,2-trichloroethane	µg/L	1	5800				-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
1,1-dichloroethane	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
1,1-dichloroethene	µg/L	1	900				-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
1,2,3-trichloropropane	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
1,2-dichloroethane	µg/L	1	2600				-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
1,2-dichloropropane	µg/L	1	1200				-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100

Chem Name	Units	EQL	ANZG (2018) Marine Water 90% LOSP Toxicant DGVs	Darwin Harbour WQO (Shoal Bay upper area ambient marine)(applicable to surface water only)	PFAS NEMP 2020 Interim Marine 90%	Field ID	GW5-12	GW7-12	GW7-3	GW8-12	GW8-3	LMP02	LP02	WW6	WW9	GW17-12	GW17-30	SW12	SW13	SW14	GW17-30	GW18-12
						Sample Date	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	8/09/2021	8/09/2021	8/09/2021	8/09/2021	8/09/2021	12/10/2021	12/10/2021
						Lab Report No.	816843	816843	816843	816843	816843	816843	816843	816843	816843	823129	823129				831794	831794
1,3-dichloropropane	µg/L	1	1400				-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
Bromochloromethane	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
Bromodichloromethane	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
Bromoform	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
Carbon tetrachloride	µg/L	1	320				-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
Chlorodibromomethane	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
Chloroethane	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<5	<100
Chloroform	µg/L	5	1100				-	-	-	-	-	-	-	-	-	<5	<5	-	-	-	<5	<100
Chloromethane	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<5	<100
cis-1,2-dichloroethene	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
cis-1,3-dichloropropene	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
Dibromomethane	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
Dichloromethane	µg/L	1	5000				-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<5	<100
Trichloroethene	µg/L	1	400				-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
Tetrachloroethene	µg/L	1	100				-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
trans-1,2-dichloroethene	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
trans-1,3-dichloropropene	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
Vinyl chloride	µg/L	1	140				-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<5	<100
Explosives																						
1,3,5-Trinitrobenzene	mg/L	0.1					-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-	-	<0.1	<0.1
1,3-Dinitrobenzene	mg/L	0.1					-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-	-	<0.1	<0.1
2,4,6-Trinitrotoluene (TNT)	mg/L	0.1					-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-	-	<0.1	<0.1
2,4-& 2,6-Dinitrotoluene	mg/L	0.1					-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-	-	<0.1	<0.1
2-Nitrotoluene	µg/L	100					-	-	-	-	-	-	-	-	-	<100	<100	-	-	-	<100	<100
4-Nitrotoluene	mg/L	0.1					-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-	-	<0.1	<0.1
m-Nitrotoluene	mg/L	0.1					-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-	-	<0.1	<0.1
Nitrobenzene	µg/L	100					-	-	-	-	-	-	-	-	-	<100	<100	-	-	-	<100	<100
RDX	mg/L	0.1					-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-	-	<0.1	<0.1
Halogenated Benzenes																						
1,2-dichlorobenzene	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
1,3-dichlorobenzene	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
1,4-dichlorobenzene	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
4-chlorotoluene	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
Bromobenzene	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
Chlorobenzene	µg/L	1	100				-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
Hexachlorobenzene	µg/L	0.2	0.2				-	-	-	-	-	-	<0.2	-	-	<0.2	<0.2	-	-	-	<0.2	<0.2
Halogenated Hydrocarbons																						
1,2-dibromoethane	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
Bromomethane	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<5	<100
Dichlorodifluoromethane	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<5	<100
Iodomethane	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
Trichlorofluoromethane	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<5	<100
Halogenated Phenols																						
2,4,5-trichlorophenol	µg/L	10					-	-	-	-	-	<10	<10	-	-	<10	<10	-	-	-	<10	<10
2,4,6-trichlorophenol	µg/L	10					-	-	-	-	-	<10	<10	-	-	<10	<10	-	-	-	<10	<10
2,4-dichlorophenol	µg/L	3					-	-	-	-	-	<3	<3	-	-	<3	<3	-	-	-	<3	<3
2,6-dichlorophenol	µg/L	3					-	-	-	-	-	<3	<3	-	-	<3	<3	-	-	-	<3	<3
2-chlorophenol	µg/L	3					-	-	-	-	-	<3	<3	-	-	<3	<3	-	-	-	<3	<3
Pentachlorophenol	µg/L	10	33				-	-	-	-	-	<10	<10	-	-	<10	<10	-	-	-	<10	<10
tetrachlorophenols	µg/L	30					-	-	-	-	-	<30	<30	-	-	<30	<30	-	-	-	<30	<30
Herbicides																						
2,4,5-Trichlorophenoxy-propanoic acid	mg/L	5					-	-	-	-	-	-	-	-	-	<5	<5	-	-	-	-	-
Dinoseb	µg/L	100					-	-	-	-	-	<100	<100	-	-	<100	<100	-	-	-	<100	<100
Glyphosate	mg/L	0.01					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<1
Inorganics																						
Alkalinity (Bicarbonate as CaCO3)	mg/L	20					74	120	130	210	39	-	2800	32	<20	24	150	-	-	-	77	120
Nitrite + Nitrate as N	mg/L	0.05					0.08	<0.05	16	2.6	9.7	-	<0.5	4.1	0.98	0.32	1	-	-	-	1.1	0.43
Carbonate Alkalinity (as CaCO3)	mg/L	10					10	<10	<10	<10	<10	-	360	<10	<10	<10	<10	-	-	-	<10	<10
Alkalinity (Hydroxide) as CaCO3	µg/L	20000					<20,000	<20,000	<20,000	<20,000	<20,000	-	<20,000	<20,000	<20,000	<20,000	<20,000	-	-	-	<20,000	<20,000
Alkalinity (total) as CaCO3	mg/L	20					84	130	130	210	39	-	3100	32	<20	24	150	-	-	-	77	120
Ammonia as N	µg/L	10	1200	20			<10	140	<10	<10	18,000	-	690,000	5300	<10	<10	<10	-	-	-	<10	50
Chloride	mg/L	1					880	2500	7700	29,000	6900	-	2200	24,000	2000	3500	19,000	-	-	-	17,000	6100
COD	mg/L	25					<25	<25	170	420	190	140	2900	230	37	880	2500	-	-	-	400	500
Ferrous Iron	mg/L	0.05					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kjeldahl Nitrogen Total	mg/L	0.2					<0.2	<0.2	0.6	<0.2	16	-	650	6.5	<0.2	3.3	2.2	-	-	-	<0.2	0.5
Nitrate (as N)	mg/L	0.02					0.08	<0.02	16	2.6	9.7	-	<0.2	4.1	0.98	0.32	1	-	-	-	1.1	0.43
Nitrite (as N)	mg/L	0.02					<0.02	<0.02	0.03	<0.02	<0.02	-	<0.2	<0.02	<0.02	<0.02	<0.02	-	-	-	<0.02	<0.02

Chem Name	Units	EQL	ANZG (2018) Marine Water 90% LOSP Toxicant DGVs	Darwin Harbour WQO (Shoal Bay upper area ambient marine)(applicable to surface water only)	PFAS NEMP 2020 Interim Marine 90%	Field ID	GW5-12	GW7-12	GW7-3	GW8-12	GW8-3	LMP02	LP02	WW6	WW9	GW17-12	GW17-30	SW12	SW13	SW14	GW17-30	GW18-12
						Sample Date	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	8/09/2021	8/09/2021	8/09/2021	8/09/2021	8/09/2021	12/10/2021	12/10/2021
						Lab Report No.	816843	816843	816843	816843	816843	816843	816843	816843	816843	823129	823129				831794	831794
Nitrogen (Total)	µg/L	200		**300**			<200	<200	16,600	2600	25,700	-	650,000	10,600	980	3620	3200	-	-	-	1100	930
Phosphate (as P)	mg/L	0.01					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus	mg/L	0.01		**0.03**			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Reactive Phosphorus as P	mg/L	0.01		**0.01**			0.05	0.04	0.02	0.04	0.1	-	8.1	0.85	0.02	0.01	0.02	-	-	-	<0.01	<0.01
Sodium	mg/L	0.5					520	1400	4900	16,000	5700	-	1800	11,000	860	2200	11,000	-	-	-	7100	2000
Sodium (Filtered)	mg/L	0.5					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	5					130	380	1200	3600	1200	-	<50	2800	210	290	1700	-	-	-	1400	510
TDS	mg/L	10					1600	4100	13,000	55,000	13,000	<10	6300	46,000	3600	5500	31,000	-	-	-	19,000	8300
TOC	mg/L	5					<5	<5	<5	<5	<5	150	1000	<5	<5	<5	<5	-	-	-	<5	43
TSS	mg/L	1		**0.01|10**			<1	17	29	<1	34	4200	85	170	1300	1700	170	-	-	-	37	260
MAH																						
1,2,4-trimethylbenzene	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
1,3,5-trimethylbenzene	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
Total MAH	mg/L	0.003					-	-	-	-	-	-	-	-	-	<0.003	<0.003	-	-	-	<0.003	<0.2
Isopropylbenzene	µg/L	1	**40**				-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
Styrene	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
Metals																						
Aluminium	mg/L	0.05					-	-	-	-	-	0.09	0.17	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	0.001					-	-	-	-	-	0.009	0.001	-	-	-	-	-	-	-	<0.001	0.001
Arsenic (Filtered)	mg/L	0.001					-	-	-	-	-	-	-	-	-	<0.001	<0.001	-	-	-	-	-
Barium	mg/L	0.02					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium (Filtered)	mg/L	0.02					-	-	-	-	-	-	-	-	-	0.11	0.35	-	-	-	0.85	0.08
Beryllium	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	0.001
Beryllium (Filtered)	mg/L	0.001					-	-	-	-	-	-	-	-	-	0.002	<0.001	-	-	-	-	-
Boron	mg/L	0.05					-	-	-	-	-	4	0.19	-	-	-	-	-	-	-	0.3	0.1
Boron (Filtered)	mg/L	0.05					0.77	1.2	1.1	2.6	0.9	-	-	0.6	0.12	0.06	0.35	-	-	-	-	-
Cadmium	mg/L	0.0002	**0.014**	**0.014**			-	-	-	-	-	<0.0002	<0.0002	-	-	-	-	-	-	-	0.0011	0.0016
Cadmium (Filtered)	mg/L	0.0002	**0.014**	**0.014**			-	-	-	-	-	-	-	-	-	0.0006	0.0024	-	-	-	-	-
Calcium	mg/L	0.5					13	39	370	1100	390	-	69	1300	73	280	2100	-	-	-	1500	340
Calcium (Filtered)	mg/L	0.5					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (hexavalent)	mg/L	0.005	**0.02**	**0.02**			-	-	-	-	-	-	-	-	-	<0.005	<0.005	-	-	-	<0.005	<0.005
Chromium (III+VI)	mg/L	0.001					-	-	-	-	-	0.016	<0.001	-	-	-	-	-	-	-	-	-
Chromium (III+VI) (Filtered)	mg/L	0.001					0.005	<0.001	<0.001	<0.001	<0.001	-	-	0.004	<0.001	-	-	-	-	-	-	-
Cobalt	mg/L	0.001	**0.014**	**0.014**			-	-	-	-	-	0.014	<0.001	-	-	-	-	-	-	-	0.007	0.009
Cobalt (Filtered)	mg/L	0.001	**0.014**	**0.014**			-	-	-	-	-	-	-	-	-	0.011	0.013	-	-	-	-	-
Copper	mg/L	0.001	**0.003**	**0.003**			-	-	-	-	-	0.002	0.002	-	-	-	-	-	-	-	0.004	0.013
Copper (Filtered)	mg/L	0.001	**0.003**	**0.003**			<0.001	<0.001	<0.001	0.005	0.007	-	-	<0.001	0.003	0.002	0.002	-	-	-	-	-
Iron	mg/L	0.05					-	-	-	-	-	5.8	0.35	-	-	-	-	-	-	-	-	-
Iron (Filtered)	mg/L	0.05					-	-	-	-	-	-	-	-	-	0.1	<0.05	-	-	-	<0.05	<0.05
Lithium	mg/L	0.005					-	-	-	-	-	<0.005	0.005	-	-	-	-	-	-	-	-	-
Lead	mg/L	0.001	**0.0066**	**0.0066**			-	-	-	-	-	0.002	<0.001	-	-	-	-	-	-	-	0.026	0.036
Lead (Filtered)	mg/L	0.001	**0.0066**	**0.0066**			<0.001	<0.001	<0.001	<0.001	0.001	-	-	<0.001	<0.001	0.01	0.061	-	-	-	-	-
Magnesium	mg/L	0.5					24	83	710	2100	770	-	43	1600	120	230	1500	-	-	-	860	260
Magnesium (Filtered)	mg/L	0.5					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	mg/L	0.005					-	-	-	-	-	0.033	0.06	-	-	-	-	-	-	-	1.5	0.16
Manganese (Filtered)	mg/L	0.005					-	-	-	-	-	-	-	-	-	0.2	2.8	-	-	-	-	-
Mercury	mg/L	0.0001	**0.0007**				-	-	-	-	-	<0.0001	<0.0001	-	-	-	-	-	-	-	<0.0001	<0.0001
Mercury (Filtered)	mg/L	0.0001	**0.0007**				-	-	-	-	-	-	-	-	-	<0.0001	<0.0001	-	-	-	-	-
Nickel	mg/L	0.001	**0.2**	**0.2**			-	-	-	-	-	0.05	0.002	-	-	-	-	-	-	-	0.03	0.02
Nickel (Filtered)	mg/L	0.001	**0.2**	**0.2**			0.001	0.005	0.021	0.041	0.013	-	-	0.72	0.042	0.069	0.04	-	-	-	-	-
Phosphorus	mg/L	0.01		**0.01|0.03**			0.05	0.04	0.02	0.05	0.02	-	12	1.8	0.06	0.82	0.13	-	-	-	0.05	0.3
Potassium	mg/L	0.5					19	40	120	400	120	-	710	200	20	21	110	-	-	-	81	19
Potassium (Filtered)	mg/L	0.5					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.001					-	-	-	-	-	0.002	-	-	-	-	-	-	-	-	<0.001	0.001
Selenium (Filtered)	mg/L	0.001					-	-	-	-	-	-	-	-	-	<0.001	<0.001	-	-	-	-	-
Tin	mg/L	0.005					-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	0.005	**0.16**				-	-	-	-	-	0.014	<0.005	-	-	-	-	-	-	-	-	-
Vanadium (Filtered)	mg/L	0.005	**0.16**				-	-	-	-	-	-	-	-	-	<0.005	<0.005	-	-	-	<0.005	<0.005
Zinc	mg/L	0.005	**0.023**				-	-	-	-	-	0.03	0.006	-	-	-	-	-	-	-	0.075	0.21
Zinc (Filtered)	mg/L	0.005	**0.023**				0.008	0.037	0.02	0.11	0.33	-	-	0.086	0.11	0.38	0.19	-	-	-	-	-
Organic																						
Methane	mg/L	0.05					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organochlorine Pesticides																						
4,4-DDE	µg/L	0.2					-	-	-	-	-	-	<0.2	-	-	<0.2	<0.2	-	-	-	<0.2	<0.2
a-BHC	µg/L	0.2					-	-	-	-	-	-	<0.2	-	-	<0.2	<0.2	-	-	-	<0.2	<0.2
Aldrin	µg/L	0.2					-	-	-	-	-	-	<0.2	-	-	<0.2	<0.2	-	-	-	<0.2	<0.2
Aldrin + Dieldrin	µg/L	0.2					-	-	-	-	-	-	<0.2	-	-	<0.2	<0.2	-	-	-	<0.2	<0.2

Chem Name	Units	EQL	ANZG (2018) Marine Water 90% LOSP Toxicant DGVs	Darwin Harbour WQO (Shoal Bay upper area ambient marine)(applicable to surface water only)	PFAS NEMP 2020 Interim Marine 90%	Field ID	GW5-12	GW7-12	GW7-3	GW8-12	GW8-3	LMP02	LP02	WW6	WW9	GW17-12	GW17-30	SW12	SW13	SW14	GW17-30	GW18-12
						Sample Date	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	8/09/2021	8/09/2021	8/09/2021	8/09/2021	8/09/2021	12/10/2021	12/10/2021
						Lab Report No.	816843	816843	816843	816843	816843	816843	816843	816843	816843	823129	823129				831794	831794
b-BHC	µg/L	0.2					-	-	-	-	-	-	<0.2	-	-	<0.2	<0.2	-	-	-	<0.2	<0.2
chlordane	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
d-BHC	µg/L	0.2					-	-	-	-	-	-	<0.2	-	-	<0.2	<0.2	-	-	-	<0.2	<0.2
DDD	µg/L	0.2					-	-	-	-	-	-	<0.2	-	-	<0.2	<0.2	-	-	-	<0.2	<0.2
DDT	µg/L	0.2					-	-	-	-	-	-	<0.2	-	-	<0.2	<0.2	-	-	-	<0.2	<0.2
DDT+DDE+DDD	µg/L	0.2					-	-	-	-	-	-	<0.2	-	-	<0.2	<0.2	-	-	-	<0.2	<0.2
Dieldrin	µg/L	0.2					-	-	-	-	-	-	<0.2	-	-	<0.2	<0.2	-	-	-	<0.2	<0.2
Endosulfan I	µg/L	0.2					-	-	-	-	-	-	<0.2	-	-	<0.2	<0.2	-	-	-	<0.2	<0.2
Endosulfan II	µg/L	0.2					-	-	-	-	-	-	<0.2	-	-	<0.2	<0.2	-	-	-	<0.2	<0.2
Endosulfan sulphate	µg/L	0.2					-	-	-	-	-	-	<0.2	-	-	<0.2	<0.2	-	-	-	<0.2	<0.2
Endrin	µg/L	0.2	**0.01**				-	-	-	-	-	-	<0.2	-	-	<0.2	<0.2	-	-	-	<0.2	<0.2
Endrin aldehyde	µg/L	0.2					-	-	-	-	-	-	<0.2	-	-	<0.2	<0.2	-	-	-	<0.2	<0.2
Endrin ketone	µg/L	0.2					-	-	-	-	-	-	<0.2	-	-	<0.2	<0.2	-	-	-	<0.2	<0.2
g-BHC (Lindane)	µg/L	0.2					-	-	-	-	-	-	<0.2	-	-	<0.2	<0.2	-	-	-	<0.2	<0.2
Heptachlor	µg/L	0.2					-	-	-	-	-	-	<0.2	-	-	<0.2	<0.2	-	-	-	<0.2	<0.2
Heptachlor epoxide	µg/L	0.2					-	-	-	-	-	-	<0.2	-	-	<0.2	<0.2	-	-	-	<0.2	<0.2
Methoxychlor	µg/L	0.2					-	-	-	-	-	-	<0.2	-	-	<0.2	<0.2	-	-	-	<0.2	<0.2
Toxaphene	mg/L	0.005					-	-	-	-	-	-	<0.005	-	-	<0.005	<0.005	-	-	-	<0.005	<0.005
Organophosphorous Pesticides																						
Azinophos methyl	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
Bolstar (Sulprofos)	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
Chlorfenvinphos	µg/L	20					-	-	-	-	-	-	<20	-	-	<20	<20	-	-	-	<20	<20
Chlorpyrifos	µg/L	2	**0.04**				-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
Chlorpyrifos-methyl	mg/L	0.002					-	-	-	-	-	-	<0.002	-	-	<0.002	<0.002	-	-	-	<0.002	<0.002
Coumaphos	µg/L	20					-	-	-	-	-	-	<20	-	-	<20	<20	-	-	-	<20	<20
Demeton-O	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
Demeton-S	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
Diazinon	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
Dichlorvos	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
Dimethoate	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
Disulfoton	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
Ethion	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
Ethoprop	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
Fenitrothion	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
Fensulfothion	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
Fenthion	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
Malathion	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
Merphos	mg/L	0.002					-	-	-	-	-	-	<0.002	-	-	<0.002	<0.002	-	-	-	<0.002	<0.002
Methyl parathion	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
Mevinphos (Phosdrin)	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
Monocrotophos	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
Naled (Dibrom)	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
Omethoate	µg/L	20					-	-	-	-	-	-	<20	-	-	<20	<20	-	-	-	<20	<20
Phorate	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
Pyrazophos	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
Ronnel	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
Terbufos	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
Trichloronate	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
Tetrachlorvinphos	mg/L	0.002					-	-	-	-	-	-	<0.002	-	-	<0.002	<0.002	-	-	-	<0.002	<0.002
Organotins																						
Tributyltin	µg/L	12.5					-	-	-	-	-	-	-	-	-	-	-				-	-
Other																						
Butyric Acid	mg/L	5					-	-	-	-	-	-	-	-	-	<5	<5	-	-	-	-	-
Hexanoic Acid	mg/L	5					-	-	-	-	-	-	-	-	-	<5	<5	-	-	-	-	-
6:2 Fluorotelomer Sulfonate (6:2 FtS)	mg/L	0.00005					<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.00011	0.0011	0.0002	<0.00005	<0.00005	<0.00005	-	-	-	<0.00005	<0.00005
PAH																						
Benzo(b+j)fluoranthene	mg/L	0.001					-	-	-	-	-	<0.001	<0.001	-	-	<0.001	<0.001	-	-	-	<0.001	<0.001
PAH/Phenols																						
2,4-dimethylphenol	µg/L	3					-	-	-	-	-	<3	<3	-	-	<3	<3	-	-	-	<3	<3
2,4-dinitrophenol	mg/L	0.03					-	-	-	-	-	<0.03	<0.03	-	-	<0.03	<0.03	-	-	-	<0.03	<0.03
2-methylphenol	µg/L	3					-	-	-	-	-	<3	<3	-	-	<3	<3	-	-	-	<3	<3
2-nitrophenol	µg/L	10					-	-	-	-	-	<10	<10	-	-	<10	<10	-	-	-	<10	<10
3-&4-methylphenol	µg/L	6					-	-	-	-	-	<6	<6	-	-	<6	<6	-	-	-	<6	<6
4,6-Dinitro-2-methylphenol	µg/L	30					-	-	-	-	-	<30	<30	-	-	<30	<30	-	-	-	<30	<30
4-chloro-3-methylphenol	µg/L	10					-	-	-	-	-	<10	<10	-	-	<10	<10	-	-	-	<10	<10
4-nitrophenol	µg/L	30					-	-	-	-	-	<30	<30	-	-	<30	<30	-	-	-	<30	<30
Acenaphthene	µg/L	1					-	-	-	-	-	<1	<1	-	-	<1	<1	-	-	-	<1	<1

Chem Name	Units	EQL	ANZG (2018) Marine Water 90% LOSP Toxicant DGVs	Darwin Harbour WQO (Shoal Bay upper area ambient marine)(applicable to surface water only)	PFAS NEMP 2020 Interim Marine 90%	Field ID	GW5-12	GW7-12	GW7-3	GW8-12	GW8-3	LMP02	LP02	WW6	WW9	GW17-12	GW17-30	SW12	SW13	SW14	GW17-30	GW18-12
						Sample Date	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	8/09/2021	8/09/2021	8/09/2021	8/09/2021	8/09/2021	12/10/2021	12/10/2021
						Lab Report No.	816843	816843	816843	816843	816843	816843	816843	816843	816843	823129	823129				831794	831794
Acenaphthylene	µg/L	1					-	-	-	-	-	<1	<1	-	-	<1	<1	-	-	-	<1	<1
Anthracene	µg/L	1	1.5				-	-	-	-	-	<1	<1	-	-	<1	<1	-	-	-	<1	<1
Benz(a)anthracene	µg/L	1					-	-	-	-	-	<1	<1	-	-	<1	<1	-	-	-	<1	<1
Benzo(a) pyrene	µg/L	1	0.4				-	-	-	-	-	<1	<1	-	-	<1	<1	-	-	-	<1	<1
Benzo(g,h,i)perylene	µg/L	1					-	-	-	-	-	<1	<1	-	-	<1	<1	-	-	-	<1	<1
Benzo(k)fluoranthene	µg/L	1					-	-	-	-	-	<1	<1	-	-	<1	<1	-	-	-	<1	<1
Chrysene	µg/L	1					-	-	-	-	-	<1	<1	-	-	<1	<1	-	-	-	<1	<1
Cresol Total	mg/L	0.01					-	-	-	-	-	<0.01	<0.01	-	-	<0.01	<0.01	-	-	-	<0.01	<0.01
Dibenz(a,h)anthracene	µg/L	1					-	-	-	-	-	<1	<1	-	-	<1	<1	-	-	-	<1	<1
Fluoranthene	µg/L	1	1.7				-	-	-	-	-	<1	<1	-	-	<1	<1	-	-	-	<1	<1
Fluorene	µg/L	1					-	-	-	-	-	<1	<1	-	-	<1	<1	-	-	-	<1	<1
Indeno(1,2,3-c,d)pyrene	µg/L	1					-	-	-	-	-	<1	<1	-	-	<1	<1	-	-	-	<1	<1
Naphthalene	µg/L	1	90				-	-	-	-	-	<10 - 2	<1	-	-	<1	<1	-	-	-	<1	<1
PAHs (Sum of total)	µg/L	1					-	-	-	-	-	2	<1	-	-	<1	<1	-	-	-	<1	<1
Phenanthrene	µg/L	1	4				-	-	-	-	-	<1	<1	-	-	<1	<1	-	-	-	<1	<1
Phenol	µg/L	3	520				-	-	-	-	-	<3	<3	-	-	<3	<3	-	-	-	<3	<3
Pyrene	µg/L	1					-	-	-	-	-	<1	<1	-	-	<1	<1	-	-	-	<1	<1
Pesticides																						
Parathion	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2	-	-	-	<2	<2
Pirimiphos-methyl	mg/L	0.02					-	-	-	-	-	-	<0.02	-	-	<0.02	<0.02	-	-	-	<0.02	<0.02
Phenolics																						
4,6-Dinitro-o-cyclohexyl phenol	µg/L	100					-	-	-	-	-	<100	<100	-	-	<100	<100	-	-	-	<100	<100
Phenols (Total Halogenated)	mg/L	0.01					-	-	-	-	-	<0.01	<0.01	-	-	<0.01	<0.01	-	-	-	<0.01	<0.01
Phenols (Total Non Halogenated)	mg/L	0.1					-	-	-	-	-	<0.1	<0.1	-	-	<0.1	<0.1	-	-	-	<0.1	<0.1
Polychlorinated Biphenyls																						
Arochlor 1016	µg/L	5					-	-	-	-	-	-	<5	-	-	<5	<5	-	-	-	<5	<5
Arochlor 1221	µg/L	5					-	-	-	-	-	-	<5	-	-	<5	<5	-	-	-	<5	<5
Arochlor 1232	µg/L	5					-	-	-	-	-	-	<5	-	-	<5	<5	-	-	-	<5	<5
Arochlor 1242	µg/L	5					-	-	-	-	-	-	<5	-	-	<5	<5	-	-	-	<5	<5
Arochlor 1248	µg/L	5					-	-	-	-	-	-	<5	-	-	<5	<5	-	-	-	<5	<5
Arochlor 1254	µg/L	5					-	-	-	-	-	-	<5	-	-	<5	<5	-	-	-	<5	<5
Arochlor 1260	µg/L	5					-	-	-	-	-	-	<5	-	-	<5	<5	-	-	-	<5	<5
PCBs (Sum of total)	µg/L	5					-	-	-	-	-	-	<1	-	-	<5	<5	-	-	-	<5	<5
Solvents																						
Methyl Ethyl Ketone	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<5	2300
4-Methyl-2-pentanone	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<5	<100
Acetone	mg/L	0.001					-	-	-	-	-	-	-	-	-	<0.001	<0.001	-	-	-	<0.005	1.1
Allyl chloride	mg/L	0.001					-	-	-	-	-	-	-	-	-	<0.001	<0.001	-	-	-	<0.001	<0.1
Carbon disulfide	µg/L	1					-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	<1	<100
SVOCs																						
EPN	µg/L	2					-	-	-	-	-	-	<2	-	-	<2	<2				<2	<2
TPH																						
C10-C16	mg/L	0.05					-	-	-	-	-	2.5	0.79	-	-	<0.05	<0.05	-	-	-	<0.05	<0.05
C16-C34	mg/L	0.1					-	-	-	-	-	18	2.4	-	-	<0.1	<0.1	-	-	-	<0.1	<0.1
C34-C40	mg/L	0.1					-	-	-	-	-	1.4	<0.1	-	-	<0.1	<0.1	-	-	-	<0.1	<0.1
F2-NAPHTHALENE	mg/L	0.05					-	-	-	-	-	2.5	0.79	-	-	<0.05	<0.05	-	-	-	<0.05	<0.05
+C10 - C36 (Sum of total)	µg/L	100					-	-	-	-	-	23,600	3160	-	-	<100	<100	-	-	-	<100	<100
C6 - C9	µg/L	20					-	-	-	-	-	<20	<80	-	-	<20	<20	-	-	-	<20	<2000
C10 - C14	µg/L	50					-	-	-	-	-	1600	460	-	-	<50	<50	-	-	-	<50	<50
C15 - C28	µg/L	100					-	-	-	-	-	11,000	2600	-	-	<100	<100	-	-	-	<100	<100
C29-C36	µg/L	100					-	-	-	-	-	11,000	100	-	-	<100	<100	-	-	-	<100	<100
C10 - C40 (Sum of total)	µg/L	100					-	-	-	-	-	21,900	3190	-	-	<100	<100	-	-	-	<100	<100
C6-C10	mg/L	0.02					-	-	-	-	-	<0.02	<0.08	-	-	<0.02	<0.02	-	-	-	<0.02	<2

Chem Name	Units	EQL	ANZG (2018) Marine Water 90% LOSP Toxicant DGVs	Darwin Harbour WQO (Shoal Bay upper area ambient marine)(applicable to surface water only)	PFAS NEMP 2020 Interim Marine 90%	Field ID	SW12	SW13	SW14	GW SUMP	GW12-12	GW12-30	GW13-12	GW14-12	GW14-3	GW16-12	GW16-30	GW16-3	GW17-30	GW18-12	GW2-12	GW2-3
						Sample Date	12/10/2021	12/10/2021	12/10/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	9/11/2021
						Lab Report No.				840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043
Field																						
SWL	mbgl									-	9.17	5.26	11.59	2.77	1.75	3.35	2.61	9.95	10.99	6.63	3.47	1.18
pH	pH		6-8	6-8.5			7.79	8.94	7.25	6.58	6.53	6.05	5.81	5.4	6.34	5.34	5.3	5.46	7.38	5.71	6.54	7.12
Electrical conductivity	uS/cm						14127	5163	3283	848	144.8	49.6	342.7	16764	16672	2420	628	182	44885	1351	23890	2138
Redox Potential	mV						34	8.9	32.3	100.8	266.2	256.7	63.4	179.3	171.7	184.7	173.3	210.9	125.4	31.8	109.7	194.7
Dissolved Oxygen	%S			80-100			97.6	115	74.1	42.8	66.8	56.6	29.4	72.6	61.4	8.6	13.6	65.7	32.8	96.5	15	108.8
Temp	oC						31.7	31.6	32.4	29.7	28.3	28.3	29.4	27.5	27.8	29.5	30.3	29.8	28.2	29.2	30.2	31.1
Turbidity	ntu						290.6	263.9	152.7	369.7	7.8	1.87	-	2.33	3.91	21.6	15.3	6.67	7.7	26.5	6.3	2.84
PFAS																						
(8:2 FTSA)	UG/L	0.01					-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
(10:2 FTSA)	UG/L	0.01					-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
(4:2 FTSA)	UG/L	0.01					-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
(N-EtFOSAA)	UG/L	0.05					-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
(N-EtFOSA)	mg/L	0.00005					-	-	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
(N-EtFOSE)	UG/L	0.05					-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
(N-MeFOSAA)	UG/L	0.05					-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
(N-MeFOSE)	UG/L	0.05					-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	UG/L	0.05					-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sum of PFASs (n=30)*	UG/L	0.1					-	-	-	-	<0.1	<0.1	0.6	<0.1	1.21	0.35	<0.1	1.2	<0.1	0.27	<0.1	<0.1
Sum of US EPA PFAS (PFOS + PFOA)*	UG/L	0.01					-	-	-	-	<0.01	<0.01	0.19	<0.01	0.18	0.05	<0.01	0.35	<0.01	0.14	<0.01	<0.01
Sum of WA DWER PFAS (n=10)*	UG/L	0.05					-	-	-	-	<0.05	<0.05	0.6	<0.05	1.16	0.34	<0.05	1.17	<0.05	0.27	<0.05	<0.05
Perfluorobutanesulfonic acid (PFBS)	UG/L	0.01					-	-	-	-	<0.01	<0.01	0.16	<0.01	0.33	0.03	<0.01	0.14	<0.01	<0.01	<0.01	<0.01
Perfluorononanesulfonic acid (PFNS)(trace)	µg/L	0.01					-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorobutanoic acid (PFBA)	UG/L	0.05					-	-	-	-	<0.05	<0.05	0.07	<0.05	0.16	0.07	<0.05	0.16	<0.05	<0.05	<0.05	<0.05
Perfluorodecanesulfonic acid (PFDS)	UG/L	0.01					-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecanoic acid (PFDA)	UG/L	0.01					-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorododecanoic acid (PFDoDA)	UG/L	0.01					-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptanesulfonic acid (PFHpS)	UG/L	0.01					-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptanoic acid (PFHpA)	UG/L	0.01					-	-	-	-	<0.01	<0.01	0.02	<0.01	0.05	0.03	<0.01	0.09	<0.01	<0.01	<0.01	<0.01
Perfluorohexanesulfonic acid (PFHxS)	UG/L	0.01					-	-	-	-	0.02	<0.01	0.05	<0.01	0.07	0.06	<0.01	0.11	<0.01	0.1	<0.01	<0.01
Perfluorohexanoic acid (PFHxA)	UG/L	0.01					-	-	-	-	<0.01	<0.01	0.07	<0.01	0.17	0.05	<0.01	0.16	<0.01	0.02	<0.01	<0.01
Perfluorononanoic acid (PFNA)	UG/L	0.01					-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorooctane sulfonamide (FOSA)	UG/L	0.05					-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Perfluorooctanoate	UG/L	0.01			632		-	-	-	-	<0.01	<0.01	0.06	<0.01	0.12	0.05	<0.01	0.19	<0.01	0.01	<0.01	<0.01
Perfluorooctanesulfonic acid (PFOS)	UG/L	0.01			2		-	-	-	-	<0.01	<0.01	0.13	<0.01	0.06	<0.01	<0.01	0.16	<0.01	0.13	<0.01	<0.01
Perfluoropentanesulfonic acid (PFPeS)	UG/L	0.01					-	-	-	-	<0.01	<0.01	<0.01	<0.01	0.02	0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01
Perfluoropentanoic acid (PFPeA)	UG/L	0.01					-	-	-	-	<0.01	<0.01	0.04	<0.01	0.2	0.05	<0.01	0.16	<0.01	0.01	<0.01	<0.01
Perfluoropropanesulfonic acid (PFPrS)	UG/L	0.01					-	-	-	-	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
Perfluorotetradecanoic acid (PFTeDA)	UG/L	0.01					-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorotridecanoic acid (PFTrDA)	UG/L	0.01					-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroundecanoic acid (PFUnDA)	UG/L	0.01					-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sum (PFHxS + PFOS)*	UG/L	0.01					-	-	-	-	0.02	<0.01	0.18	<0.01	0.13	0.06	<0.01	0.27	<0.01	0.23	<0.01	<0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	UG/L	0.01					-	-	-	-	0.02	<0.01	0.24	<0.01	0.25	0.11	<0.01	0.46	<0.01	0.24	<0.01	<0.01
VFA																						
4-Methylvaleric acid*	MG/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Heptanoic acid*	MG/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Isovaleric acid*	MG/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Isobutyric acid*	MG/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Total VFA as Acetic Acid Equivalents*	MG/L	5					-	-	-	-	-	-	-	-	-	-	-	-	9.9	11	-	-
BTEX																						
Benzene	µg/L	1	900	900			-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Ethylbenzene	µg/L	1	110				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Toluene	µg/L	1	230				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Xylene (m & p)	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Xylene (o)	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Xylene Total	µg/L	3					-	-	-	-	-	-	-	-	-	-	-	-	<3	<3	-	-
C6-C10 less BTEX (F1)	mg/L	0.02					-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	-	-
Chlorinated Hydrocarbons																						
1,1,1,2-tetrachloroethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
1,1,1-trichloroethane	µg/L	1	400				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
1,1,2,2-tetrachloroethane	µg/L	1	500				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
1,1,2-trichloroethane	µg/L	1	5800				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
1,1-dichloroethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
1,1-dichloroethene	µg/L	1	900				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
1,2,3-trichloropropane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
1,2-dichloroethane	µg/L	1	2600				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
1,2-dichloropropane	µg/L	1	1200				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-

Chem Name	Units	EQL	ANZG (2018) Marine Water 90% LOSP Toxicant DGVs	Darwin Harbour WQO (Shoal Bay upper area ambient marine)(applicable to surface water only)	PFAS NEMP 2020 Interim Marine 90%	Field ID	SW12	SW13	SW14	GW SUMP	GW12-12	GW12-30	GW13-12	GW14-12	GW14-3	GW16-12	GW16-30	GW16-3	GW17-30	GW18-12	GW2-12	GW2-3
						Sample Date	12/10/2021	12/10/2021	12/10/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	9/11/2021
						Lab Report No.				840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043
1,3-dichloropropane	µg/L	1	**1400**			-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Bromochloromethane	µg/L	1				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Bromodichloromethane	µg/L	1				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Bromoform	µg/L	1				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Carbon tetrachloride	µg/L	1	**320**			-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Chlorodibromomethane	µg/L	1				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Chloroethane	µg/L	1				-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Chloroform	µg/L	5	**1100**			-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Chloromethane	µg/L	1				-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
cis-1,2-dichloroethene	µg/L	1				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
cis-1,3-dichloropropene	µg/L	1				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Dibromomethane	µg/L	1				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Dichloromethane	µg/L	1	**5000**			-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Trichloroethene	µg/L	1	**400**			-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Tetrachloroethene	µg/L	1	**100**			-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
trans-1,2-dichloroethene	µg/L	1				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
trans-1,3-dichloropropene	µg/L	1				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Vinyl chloride	µg/L	1	**140**			-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Explosives																					
1,3,5-Trinitrobenzene	mg/L	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dinitrobenzene	mg/L	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,6-Trinitrotoluene (TNT)	mg/L	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-& 2,6-Dinitrotoluene	mg/L	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Nitrotoluene	µg/L	100				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitrotoluene	mg/L	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
m-Nitrotoluene	mg/L	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrobenzene	µg/L	100				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RDX	mg/L	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Halogenated Benzenes																					
1,2-dichlorobenzene	µg/L	1				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
1,3-dichlorobenzene	µg/L	1				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
1,4-dichlorobenzene	µg/L	1				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
4-chlorotoluene	µg/L	1				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Bromobenzene	µg/L	1				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Chlorobenzene	µg/L	1	**100**			-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Hexachlorobenzene	µg/L	0.2	**0.2**			-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Halogenated Hydrocarbons																					
1,2-dibromoethane	µg/L	1				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Bromomethane	µg/L	1				-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Dichlorodifluoromethane	µg/L	1				-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Iodomethane	µg/L	1				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Trichlorofluoromethane	µg/L	1				-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Halogenated Phenols																					
2,4,5-trichlorophenol	µg/L	10				-	-	-	-	-	-	-	-	-	-	-	-	<10	<10	-	-
2,4,6-trichlorophenol	µg/L	10				-	-	-	-	-	-	-	-	-	-	-	-	<10	<10	-	-
2,4-dichlorophenol	µg/L	3				-	-	-	-	-	-	-	-	-	-	-	-	<3	<3	-	-
2,6-dichlorophenol	µg/L	3				-	-	-	-	-	-	-	-	-	-	-	-	<3	<3	-	-
2-chlorophenol	µg/L	3				-	-	-	-	-	-	-	-	-	-	-	-	<3	<3	-	-
Pentachlorophenol	µg/L	10	**33**			-	-	-	-	-	-	-	-	-	-	-	-	<10	<10	-	-
tetrachlorophenols	µg/L	30				-	-	-	-	-	-	-	-	-	-	-	-	<30	<30	-	-
Herbicides																					
2,4,5-Trichlorophenoxy-propanoic acid	mg/L	5				-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Dinoseb	µg/L	100				-	-	-	-	-	-	-	-	-	-	-	-	<100	<100	-	-
Glyphosate	mg/L	0.01				-	-	-	-	-	-	-	-	-	-	-	-	<0.01	<0.01	-	-
Inorganics																					
Alkalinity (Bicarbonate as CaCO3)	mg/L	20				-	-	-	<20	<20	<20	22	23	<20	<20	<20	<20	45	<20	230	<20
Nitrite + Nitrate as N	mg/L	0.05				-	-	-	8.1	0.96	0.24	<0.05	0.64	3.3	0.55	0.18	11	0.88	12	22	4.4
Carbonate Alkalinity (as CaCO3)	mg/L	10				-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	27	<10	<10
Alkalinity (Hydroxide) as CaCO3	µg/L	20000				-	-	-	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000
Alkalinity (total) as CaCO3	mg/L	20				-	-	-	<20	<20	<20	22	23	<20	<20	<20	<20	45	43	230	<20
Ammonia as N	µg/L	10	**1200**	**20**		-	-	-	**1800**	20	20	2000	20	30	20	60	1200	20	80	66,000	20
Chloride	mg/L	1				-	-	-	150	34	6.8	61	5500	960	53	19	110	14,000	200	7400	480
COD	mg/L	25				-	-	-	190	<25	<25	<25	74	54	<25	<25	<25	310	77	190	<25
Ferrous Iron	mg/L	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kjeldahl Nitrogen Total	mg/L	0.2				-	-	-	8.8	0.3	0.4	2.2	<0.2	1.1	0.3	0.5	3.2	<0.2	1	66	1
Nitrate (as N)	mg/L	0.02				-	-	-	8.1	0.96	0.24	<0.02	0.64	3.3	0.55	0.18	11	0.16	10	14	4.4
Nitrite (as N)	mg/L	0.02				-	-	-	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.72	1	8.2	<0.02

Chem Name	Units	EQL	ANZG (2018) Marine Water 90% LOSP Toxicant DGVs	Darwin Harbour WQO (Shoal Bay upper area ambient marine)(applicable to surface water only)	PFAS NEMP 2020 Interim Marine 90%	Field ID	SW12	SW13	SW14	GW SUMP	GW12-12	GW12-30	GW13-12	GW14-12	GW14-3	GW16-12	GW16-30	GW16-3	GW17-30	GW18-12	GW2-12	GW2-3
						Sample Date	12/10/2021	12/10/2021	12/10/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	9/11/2021
						Lab Report No.				840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043
Nitrogen (Total)	µg/L	200		**300**			-	-	-	**16,900**	1260	640	2200	640	4400	850	680	14,200	880	13,000	40,000	5400
Phosphate (as P)	mg/L	0.01					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus	mg/L	0.01		**0.03**			-	-	-	<0.01	**2**	0.03	0.04	0.02	0.01	<0.01	0.01	0.02	0.02	0.02	0.41	0.89
Reactive Phosphorus as P	mg/L	0.01		**0.01**			-	-	-	**1.4**	0.13	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.4	0.04
Sodium	mg/L	0.5					-	-	-	46	18	2.6	34	3100	5400	35	22	74	6500	200	3700	240
Sodium (Filtered)	mg/L	0.5					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	5					-	-	-	220	69	<5	<5	640	200	<5	20	23	1100	210	1000	38
TDS	mg/L	10					-	-	-	880	100	120	150	6700	1800	130	130	250	16,000	790	9900	900
TOC	mg/L	5					-	-	-	56	<5	<5	<5	<5	<5	<5	<5	<5	<5	8	<5	<5
TSS	mg/L	1		**0.01|10**			-	-	-	**140**	85	9.9	19	<5	16	6.1	5.5	110	8.7	120	6.5	5.2
MAH																						
1,2,4-trimethylbenzene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
1,3,5-trimethylbenzene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Total MAH	mg/L	0.003					-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	-	-
Isopropylbenzene	µg/L	1	**40**				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Styrene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Metals																						
Aluminium	mg/L	0.05					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (Filtered)	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	<0.001	0.001	-	-
Barium	mg/L	0.02					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium (Filtered)	mg/L	0.02					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium (Filtered)	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	-	-
Boron	mg/L	0.05					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron (Filtered)	mg/L	0.05					-	-	-	0.2	0.09	<0.05	0.08	0.72	<0.5	<0.05	<0.05	0.15	0.31	0.13	0.47	0.06
Cadmium	mg/L	0.0002	**0.014**	**0.014**			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium (Filtered)	mg/L	0.0002	**0.014**	**0.014**			-	-	-	-	-	-	-	-	-	-	-	-	0.0004	<0.0002	-	-
Calcium	mg/L	0.5					-	-	-	42	5.9	1.6	4.9	170	760	2.8	3	9.2	1600	71	340	27
Calcium (Filtered)	mg/L	0.5					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (hexavalent)	mg/L	0.005	**0.02**	**0.02**			-	-	-	-	-	-	-	-	-	-	-	-	<0.005	<0.005	-	-
Chromium (III+VI)	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (III+VI) (Filtered)	mg/L	0.001					-	-	-	0.001	<0.001	<0.001	<0.001	0.028	<0.001	<0.001	<0.001	<0.001	-	-	<0.001	<0.001
Cobalt	mg/L	0.001	**0.014**	**0.014**			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt (Filtered)	mg/L	0.001	**0.014**	**0.014**			-	-	-	-	-	-	-	-	-	-	-	-	0.004	0.001	-	-
Copper	mg/L	0.001	**0.003**	**0.003**			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper (Filtered)	mg/L	0.001	**0.003**	**0.003**			-	-	-	**0.007**	0.003	<0.001	<0.001	0.005	0.002	<0.001	<0.001	0.002	<0.001	0.004	0.002	<0.001
Iron	mg/L	0.05					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (Filtered)	mg/L	0.05					-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	-	-
Lithium	mg/L	0.005					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	mg/L	0.001	**0.0066**	**0.0066**			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead (Filtered)	mg/L	0.001	**0.0066**	**0.0066**			-	-	-	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Magnesium	mg/L	0.5					-	-	-	22	1.1	1.3	1.1	250	720	<0.5	1.1	4.1	740	24	420	25
Magnesium (Filtered)	mg/L	0.5					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	mg/L	0.005					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese (Filtered)	mg/L	0.005					-	-	-	-	-	-	-	-	-	-	-	-	0.76	0.005	-	-
Mercury	mg/L	0.0001	**0.0007**				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury (Filtered)	mg/L	0.0001	**0.0007**				-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001	-	-
Nickel	mg/L	0.001	**0.2**	**0.2**			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (Filtered)	mg/L	0.001	**0.2**	**0.2**			-	-	-	0.002	0.002	0.001	0.003	0.051	0.013	<0.001	0.003	0.002	0.024	0.002	0.066	0.004
Phosphorus	mg/L	0.01		**0.01|0.03**			-	-	-	**2**	0.03	0.04	0.02	0.01	<0.01	0.01	0.02	0.02	0.02	0.41	0.89	<0.01
Potassium	mg/L	0.5					-	-	-	100	2.1	0.8	6.4	68	190	<0.5	3.7	11	120	65	63	4.4
Potassium (Filtered)	mg/L	0.5					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium (Filtered)	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	-	-
Tin	mg/L	0.005					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	0.005	**0.16**				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium (Filtered)	mg/L	0.005	**0.16**				-	-	-	-	-	-	-	-	-	-	-	-	<0.005	0.025	-	-
Zinc	mg/L	0.005	**0.023**				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc (Filtered)	mg/L	0.005	**0.023**				-	-	-	**0.039**	0.043	0.022	0.035	0.11	0.026	0.02	0.023	0.094	<0.005	<0.005	0.43	0.033
Organic																						
Methane	mg/L	0.05					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organochlorine Pesticides																						
4,4-DDE	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
a-BHC	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Aldrin	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Aldrin + Dieldrin	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-

Chem Name	Units	EQL	ANZG (2018) Marine Water 90% LOSP Toxicant DGVs	Darwin Harbour WQO (Shoal Bay upper area ambient marine)(applicable to surface water only)	PFAS NEMP 2020 Interim Marine 90%	Field ID	SW12	SW13	SW14	GW SUMP	GW12-12	GW12-30	GW13-12	GW14-12	GW14-3	GW16-12	GW16-30	GW16-3	GW17-30	GW18-12	GW2-12	GW2-3
						Sample Date	12/10/2021	12/10/2021	12/10/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	9/11/2021
						Lab Report No.				840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043
b-BHC	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
chlordane	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
d-BHC	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
DDD	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
DDT	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
DDT+DDE+DDD	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Dieldrin	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Endosulfan I	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Endosulfan II	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Endosulfan sulphate	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Endrin	µg/L	0.2	**0.01**				-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Endrin aldehyde	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Endrin ketone	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
g-BHC (Lindane)	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Heptachlor	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Heptachlor epoxide	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Methoxychlor	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	-	-
Toxaphene	mg/L	0.005					-	-	-	-	-	-	-	-	-	-	-	-	<0.005	<0.005	-	-
Organophosphorous Pesticides																						
Azinophos methyl	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Bolstar (Sulprofos)	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Chlorfenvinphos	µg/L	20					-	-	-	-	-	-	-	-	-	-	-	-	<20	<20	-	-
Chlorpyrifos	µg/L	2	**0.04**				-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Chlorpyrifos-methyl	mg/L	0.002					-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	-	-
Coumaphos	µg/L	20					-	-	-	-	-	-	-	-	-	-	-	-	<20	<20	-	-
Demeton-O	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Demeton-S	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Diazinon	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Dichlorvos	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Dimethoate	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Disulfoton	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Ethion	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Ethoprop	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Fenitrothion	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Fensulfothion	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Fenthion	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Malathion	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Merphos	mg/L	0.002					-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	-	-
Methyl parathion	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Mevinphos (Phosdrin)	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Monocrotophos	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Naled (Dibrom)	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Omethoate	µg/L	20					-	-	-	-	-	-	-	-	-	-	-	-	<20	<20	-	-
Phorate	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Pyrazophos	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Ronnel	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Terbufos	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Trichloronate	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Tetrachlorvinphos	mg/L	0.002					-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	-	-
Organotins																						
Tributyltin	µg/L	12.5								-	-	-	-	-	-	-	-	-	-	-	-	-
Other																						
Butyric Acid	mg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Hexanoic Acid	mg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
6:2 Fluorotelomer Sulfonate (6:2 FtS)	mg/L	0.00005					-	-	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
PAH																						
Benzo(b+j)fluoranthene	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	-	-
PAH/Phenols																						
2,4-dimethylphenol	µg/L	3					-	-	-	-	-	-	-	-	-	-	-	-	<3	<3	-	-
2,4-dinitrophenol	mg/L	0.03					-	-	-	-	-	-	-	-	-	-	-	-	<0.03	<0.03	-	-
2-methylphenol	µg/L	3					-	-	-	-	-	-	-	-	-	-	-	-	<3	<3	-	-
2-nitrophenol	µg/L	10					-	-	-	-	-	-	-	-	-	-	-	-	<10	<10	-	-
3-&4-methylphenol	µg/L	6					-	-	-	-	-	-	-	-	-	-	-	-	<6	<6	-	-
4,6-Dinitro-2-methylphenol	µg/L	30					-	-	-	-	-	-	-	-	-	-	-	-	<30	<30	-	-
4-chloro-3-methylphenol	µg/L	10					-	-	-	-	-	-	-	-	-	-	-	-	<10	<10	-	-
4-nitrophenol	µg/L	30					-	-	-	-	-	-	-	-	-	-	-	-	<30	<30	-	-
Acenaphthene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-

Chem Name	Units	EQL	ANZG (2018) Marine Water 90% LOSP Toxicant DGVs	Darwin Harbour WQO (Shoal Bay upper area ambient marine)(applicable to surface water only)	PFAS NEMP 2020 Interim Marine 90%	Field ID	SW12	SW13	SW14	GW SUMP	GW12-12	GW12-30	GW13-12	GW14-12	GW14-3	GW16-12	GW16-30	GW16-3	GW17-30	GW18-12	GW2-12	GW2-3
						Sample Date	12/10/2021	12/10/2021	12/10/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	9/11/2021
						Lab Report No.				840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043
Acenaphthylene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Anthracene	µg/L	1	1.5				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Benz(a)anthracene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Benzo(a) pyrene	µg/L	1	0.4				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Benzo(g,h,i)perylene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Benzo(k)fluoranthene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Chrysene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Cresol Total	mg/L	0.01					-	-	-	-	-	-	-	-	-	-	-	-	<0.01	<0.01	-	-
Dibenz(a,h)anthracene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Fluoranthene	µg/L	1	1.7				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Fluorene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Indeno(1,2,3-c,d)pyrene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Naphthalene	µg/L	1	90				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
PAHs (Sum of total)	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Phenanthrene	µg/L	1	4				-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Phenol	µg/L	3	520				-	-	-	-	-	-	-	-	-	-	-	-	<3	<3	-	-
Pyrene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
Pesticides																						
Parathion	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
Pirimiphos-methyl	mg/L	0.02					-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	-	-
Phenolics																						
4,6-Dinitro-o-cyclohexyl phenol	µg/L	100					-	-	-	-	-	-	-	-	-	-	-	-	<100	<100	-	-
Phenols (Total Halogenated)	mg/L	0.01					-	-	-	-	-	-	-	-	-	-	-	-	<0.01	<0.01	-	-
Phenols (Total Non Halogenated)	mg/L	0.1					-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-
Polychlorinated Biphenyls																						
Arochlor 1016	µg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Arochlor 1221	µg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Arochlor 1232	µg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Arochlor 1242	µg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Arochlor 1248	µg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Arochlor 1254	µg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Arochlor 1260	µg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
PCBs (Sum of total)	µg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Solvents																						
Methyl Ethyl Ketone	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
4-Methyl-2-pentanone	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	-	-
Acetone	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	<0.005	<0.005	-	-
Allyl chloride	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	-	-
Carbon disulfide	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-
SVOCs																						
EPN	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	-
TPH																						
C10-C16	mg/L	0.05					-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	-	-
C16-C34	mg/L	0.1					-	-	-	-	-	-	-	-	-	-	-	-	<0.1	0.2	-	-
C34-C40	mg/L	0.1					-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-
F2-NAPHTHALENE	mg/L	0.05					-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	-	-
+C10 - C36 (Sum of total)	µg/L	100					-	-	-	-	-	-	-	-	-	-	-	-	<100	200	-	-
C6 - C9	µg/L	20					-	-	-	-	-	-	-	-	-	-	-	-	<20	<20	-	-
C10 - C14	µg/L	50					-	-	-	-	-	-	-	-	-	-	-	-	<50	<50	-	-
C15 - C28	µg/L	100					-	-	-	-	-	-	-	-	-	-	-	-	<100	100	-	-
C29-C36	µg/L	100					-	-	-	-	-	-	-	-	-	-	-	-	<100	100	-	-
C10 - C40 (Sum of total)	µg/L	100					-	-	-	-	-	-	-	-	-	-	-	-	<100	200	-	-
C6-C10	mg/L	0.02					-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	-	-

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						Sample Date	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	8/12/2021	8/12/2021	8/12/2021
						Lab Report No.	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	849609	849609	849609
Field																						
SWL	mbgl						7.56	1.76	1.77	2.36	1.44	1.28	2.17	2.57	-	-	-	3.33	2.05	8.99	9.65	6.08
pH	pH		6-8	6-8.5			6.02	5.97	6	6.31	5.53	5.91	6.2	4.84	-	6.01	6.01	6.58	5.07	5.27	11.99	7.12
Electrical conductivity	uS/cm						4956	1275	3278	4334	8826	2126	8190	4297	-	1124	1583	66319	2558	12923	23832	7046
Redox Potential	mV						210.7	170	118.5	140	126.6	138.7	174.2	134.8	-	98.9	100.3	124.7		91.2	-97.5	85.5
Dissolved Oxygen	%S			80-100			102.7	75.1	53.2	79.5	46.6	18.1	31.5	7.6	-	86.6	79.9	21.8	92.4	74.9	88.1	20.7
Temp	oC						28.7	28.5	28.9	29.2	28.2	29.1	28.3	28.4	-	29	27.5	29	30	27.9	27.9	29.1
Turbidity	ntu						3.17	2.61	0.91	8.58	2.26	170.6	1.12	9.37	-	934.6	1387.1	2.95	3.06	-	-	-
PFAS																						
(8:2 FTSA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	-	-	<0.01	<0.01	<0.01	<0.01	<0.01
(10:2 FTSA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	-	-	<0.01	<0.01	<0.01	<0.01	<0.01
(4:2 FTSA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	-	-	<0.01	<0.01	<0.01	<0.01	<0.01
(N-EtFOSAA)	UG/L	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
(N-EtFOSA)	mg/L	0.00005					<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.0001	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
(N-EtFOSE)	UG/L	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
(N-MeFOSAA)	UG/L	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
(N-MeFOSE)	UG/L	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	UG/L	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Sum of PFASs (n=30)*	UG/L	0.1					<0.1	<0.1	<0.1	0.28	0.19	1.31	<0.1	1.24	38.6	-	-	0.23	<0.1	<0.1	<0.1	<0.1
Sum of US EPA PFAS (PFOS + PFOA)*	UG/L	0.01					<0.01	<0.01	<0.01	0.07	0.17	0.45	0.01	0.44	<2	-	-	0.04	<0.01	<0.01	0.03	0.04
Sum of WA DWER PFAS (n=10)*	UG/L	0.05					<0.05	<0.05	<0.05	0.23	0.19	1.24	<0.05	1.14	38.6	-	-	0.23	<0.05	<0.05	<0.05	0.09
Perfluorobutanesulfonic acid (PFBS)	UG/L	0.01					<0.01	<0.01	<0.01	0.06	<0.01	0.17	<0.01	0.11	8.7	-	-	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanesulfonic acid (PFNS)(trace)	µg/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	-	-	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorobutanoic acid (PFBA)	UG/L	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	0.18	<0.05	0.15	<10	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Perfluorodecanesulfonic acid (PFDS)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	-	-	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecanoic acid (PFDA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	-	-	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorododecanoic acid (PFDoDA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	-	-	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptanesulfonic acid (PFHpS)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	-	-	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptanoic acid (PFHpA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	0.06	<0.01	0.05	1.5	-	-	0.01	<0.01	<0.01	<0.01	<0.01
Perfluorohexanesulfonic acid (PFHxS)	UG/L	0.01					<0.01	<0.01	<0.01	0.07	0.02	0.16	<0.01	0.21	<0.1	-	-	<0.01	<0.01	<0.01	<0.01	0.05
Perfluorohexanoic acid (PFHxA)	UG/L	0.01					<0.01	<0.01	<0.01	0.01	<0.01	0.11	<0.01	0.1	13	-	-	0.03	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.02	<0.1	-	-	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorooctane sulfonamide (FOSA)	UG/L	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Perfluorooctanoate	UG/L	0.01			632		<0.01	<0.01	<0.01	0.02	0.02	0.18	<0.01	0.17	1.7	-	-	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorooctanesulfonic acid (PFOS)	UG/L	0.01			2		<0.01	<0.01	<0.01	0.05	0.15	0.27	0.01	0.27	<2	-	-	0.04	<0.01	<0.01	0.03	0.04
Perfluoropentanesulfonic acid (PFPeS)	UG/L	0.01					<0.01	<0.01	<0.01	0.02	<0.01	0.02	<0.01	0.04	<0.1	-	-	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoropentanoic acid (PFPeA)	UG/L	0.01					<0.01	<0.01	<0.01	0.02	<0.01	0.11	<0.01	0.08	12	-	-	0.02	<0.01	<0.01	<0.01	<0.01
Perfluoropropanesulfonic acid (PFPrS)	UG/L	0.01					<0.01	<0.01	<0.01	0.03	<0.01	0.03	<0.01	0.04	<1	-	-	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorotetradecanoic acid (PFTeDA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	-	-	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorotridecanoic acid (PFTrDA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	-	-	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroundecanoic acid (PFUnDA)	UG/L	0.01					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	-	-	<0.01	<0.01	<0.01	<0.01	<0.01
Sum (PFHxS + PFOS)*	UG/L	0.01					<0.01	<0.01	<0.01	0.12	0.17	0.43	0.01	0.48	<2	-	-	0.04	<0.01	<0.01	0.03	0.09
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	UG/L	0.01					<0.01	<0.01	<0.01	0.14	0.19	0.61	0.01	0.65	<2	-	-	0.04	<0.01	<0.01	0.03	0.09
VFA																						
4-Methylvaleric acid*	MG/L	5					-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
Heptanoic acid*	MG/L	5					-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
Isovaleric acid*	MG/L	5					-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
Isobutyric acid*	MG/L	5					-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
Total VFA as Acetic Acid Equivalents*	MG/L	5					-	-	-	-	-	-	-	-	-	-	-	-	-	<5	5.1	<5
BTEX																						
Benzene	µg/L	1	900	900			-	-	-	-	-	-	-	-	380	-	-	-	-	<1	<1	<1
Ethylbenzene	µg/L	1	110				-	-	-	-	-	-	-	-	110	-	-	-	-	<1	<1	<1
Toluene	µg/L	1	230				-	-	-	-	-	-	-	-	120	-	-	-	-	<1	<1	<1
Xylene (m & p)	µg/L	2					-	-	-	-	-	-	-	-	670	-	-	-	-	<2	<2	<2
Xylene (o)	µg/L	1					-	-	-	-	-	-	-	-	370	-	-	-	-	<1	<1	<1
Xylene Total	µg/L	3					-	-	-	-	-	-	-	-	1000	-	-	-	-	<3	<3	<3
C6-C10 less BTEX (F1)	mg/L	0.02					-	-	-	-	-	-	-	-	8.4	-	-	-	-	<0.02	<0.02	<0.02
Chlorinated Hydrocarbons																						
1,1,1,2-tetrachloroethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
1,1,1-trichloroethane	µg/L	1	400				-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
1,1,2,2-tetrachloroethane	µg/L	1	500				-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
1,1,2-trichloroethane	µg/L	1	5800				-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
1,1-dichloroethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
1,1-dichloroethene	µg/L	1	900				-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
1,2,3-trichloropropane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
1,2-dichloroethane	µg/L	1	2600				-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
1,2-dichloropropane	µg/L	1	1200				-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1

Chem Name	Units	EQL	ANZG (2018) Marine Water 90% LOSP Toxicant DGVs	Darwin Harbour WQO (Shoal Bay upper area ambient marine)(applicable to surface water only)	PFAS NEMP 2020 Interim Marine 90%	Field ID	GW3-12	GW4-30	GW5-12	GW5-3	GW7-12	GW7-3	GW8-12	GW8-3	LP02	SW12	SW13	WW6	WW9	GW17-12	GW17-30	GW18-12
						Sample Date	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	8/12/2021	8/12/2021	8/12/2021
						Lab Report No.	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	849609	849609	849609
1,3-dichloropropane	µg/L	1	1400				-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
Bromochloromethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
Bromodichloromethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
Bromoform	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
Carbon tetrachloride	µg/L	1	320				-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
Chlorodibromomethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
Chloroethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
Chloroform	µg/L	5	1100				-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
Chloromethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
cis-1,2-dichloroethene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
cis-1,3-dichloropropene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
Dibromomethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
Dichloromethane	µg/L	1	5000				-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
Trichloroethene	µg/L	1	400				-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
Tetrachloroethene	µg/L	1	100				-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
trans-1,2-dichloroethene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
trans-1,3-dichloropropene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
Vinyl chloride	µg/L	1	140				-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
Explosives																						
1,3,5-Trinitrobenzene	mg/L	0.1					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1
1,3-Dinitrobenzene	mg/L	0.1					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1
2,4,6-Trinitrotoluene (TNT)	mg/L	0.1					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1
2,4-& 2,6-Dinitrotoluene	mg/L	0.1					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1
2-Nitrotoluene	µg/L	100					-	-	-	-	-	-	-	-	-	-	-	-	-	<100	<100	<100
4-Nitrotoluene	mg/L	0.1					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1
m-Nitrotoluene	mg/L	0.1					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1
Nitrobenzene	µg/L	100					-	-	-	-	-	-	-	-	-	-	-	-	-	<100	<100	<100
RDX	mg/L	0.1					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1
Halogenated Benzenes																						
1,2-dichlorobenzene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
1,3-dichlorobenzene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
1,4-dichlorobenzene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
4-chlorotoluene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
Bromobenzene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
Chlorobenzene	µg/L	1	100				-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
Hexachlorobenzene	µg/L	0.2	0.2				-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.2
Halogenated Hydrocarbons																						
1,2-dibromoethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
Bromomethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
Dichlorodifluoromethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
Iodomethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
Trichlorofluoromethane	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
Halogenated Phenols																						
2,4,5-trichlorophenol	µg/L	10					-	-	-	-	-	-	-	-	<10	-	-	-	-	<10	<10	<10
2,4,6-trichlorophenol	µg/L	10					-	-	-	-	-	-	-	-	<10	-	-	-	-	<10	<10	<10
2,4-dichlorophenol	µg/L	3					-	-	-	-	-	-	-	-	<3	-	-	-	-	<3	<3	<3
2,6-dichlorophenol	µg/L	3					-	-	-	-	-	-	-	-	<3	-	-	-	-	<3	<3	<3
2-chlorophenol	µg/L	3					-	-	-	-	-	-	-	-	<3	-	-	-	-	<3	<3	<3
Pentachlorophenol	µg/L	10	33				-	-	-	-	-	-	-	-	<10	-	-	-	-	<10	<10	<10
tetrachlorophenols	µg/L	30					-	-	-	-	-	-	-	-	<30	-	-	-	-	<30	<30	<30
Herbicides																						
2,4,5-Trichlorophenoxy-propanoic acid	mg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
Dinoseb	µg/L	100					-	-	-	-	-	-	-	-	<100	-	-	-	-	<100	<100	<100
Glyphosate	mg/L	0.01					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inorganics																						
Alkalinity (Bicarbonate as CaCO3)	mg/L	20					<20	<20	93	51	140	<20	260	68	7600	44	32	27	<20	<20	<20	110
Nitrite + Nitrate as N	mg/L	0.05					0.43	0.22	0.11	3.7	0.12	37	3.8	220	<5	7.2	5	5	1.1	0.2	0.16	9.7
Carbonate Alkalinity (as CaCO3)	mg/L	10					<10	<10	<10	<10	<10	<10	<10	<10	1400	<10	<10	<10	<10	<10	320	<10
Alkalinity (Hydroxide) as CaCO3	µg/L	20000					<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	1,100,000	<20,000
Alkalinity (total) as CaCO3	mg/L	20					<20	<20	93	51	140	<20	260	68	9000	44	32	27	<20	<20	1400	110
Ammonia as N	µg/L	10	1200	20			90	10	<10	20	130	1100	50	8000	810,000	1300	1100	5600	<10	<10	1900	40
Chloride	mg/L	1					140	310	780	1100	2600	520	28,000	1600	9900	190	480	22,000	660	4400	7400	1900
COD	mg/L	25					<25	<25	<25	120	28	59	2300	45	15,000	49	42	620	<25	90	<25	<25
Ferrous Iron	mg/L	0.05					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kjeldahl Nitrogen Total	mg/L	0.2					0.6	0.6	<0.2	1.4	0.6	23	0.4	11	1100	4.9	5.8	5.6	0.5	<0.2	1.2	<0.2
Nitrate (as N)	mg/L	0.02					0.43	0.22	0.1	3.7	0.1	37	3.8	220	<5	7.1	5	4.8	1.1	0.19	0.08	9.2
Nitrite (as N)	mg/L	0.02					<0.02	<0.02	<0.02	<0.02	<0.02	0.72	<0.02	1.6	2	<0.02	<0.02	0.11	<0.02	<0.02	0.08	0.54

Chem Name	Units	EQL	ANZG (2018) Marine Water 90% LOSP Toxicant DGVs	Darwin Harbour WQO (Shoal Bay upper area ambient marine)(applicable to surface water only)	PFAS NEMP 2020 Interim Marine 90%	Field ID	GW3-12	GW4-30	GW5-12	GW5-3	GW7-12	GW7-3	GW8-12	GW8-3	LP02	SW12	SW13	WW6	WW9	GW17-12	GW17-30	GW18-12
						Sample Date	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	8/12/2021	8/12/2021	8/12/2021
						Lab Report No.	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	849609	849609	849609
Nitrogen (Total)	µg/L	200		**300**			1030	820	<200	5100	720	60,000	4200	231,000	1,100,000	**12,100**	**10,800**	5000	1600	200	1360	9700
Phosphate (as P)	mg/L	0.01					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus	mg/L	0.01		**0.03**			0.02	0.16	0.06	<0.01	0.07	0.03	0.02	0.29	46	**0.04**	0.02	0.99	0.03	0.1	0.02	0.06
Reactive Phosphorus as P	mg/L	0.01		**0.01**			0.01	0.07	0.07	0.01	0.06	0.01	0.05	0.06	0.87	<0.01	<0.01	0.9	<0.01	0.03	0.01	0.04
Sodium	mg/L	0.5					88	170	470	590	1400	220	15,000	500	6100	99	210	12,000	310	2100	8400	1900
Sodium (Filtered)	mg/L	0.5					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	5					19	34	120	160	390	95	3800	180	70	51	70	2700	61	420	110	360
TDS	mg/L	10					280	520	1400	2100	4100	1200	61,000	3900	34,000	1000	1100	46,000	1300	8500	20,000	3400
TOC	mg/L	5					<5	<5	<5	<5	<5	15	11	11	4200	17	12	<5	<5	<5	7.7	<5
TSS	mg/L	1		**0.01|10**			5.6	<5	<5	49	<5	67	10	24	350	**160**	**110**	18	190	200	180	34
MAH																						
1,2,4-trimethylbenzene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
1,3,5-trimethylbenzene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
Total MAH	mg/L	0.003					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003
Isopropylbenzene	µg/L	1	**40**				-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
Styrene	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
Metals																						
Aluminium	mg/L	0.05					-	-	-	-	-	-	-	-	1.6	-	-	-	-	-	-	-
Arsenic	mg/L	0.001					-	-	-	-	-	-	-	-	0.33	-	-	-	-	<0.001	<0.001	<0.001
Arsenic (Filtered)	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	0.02					-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.7	0.1
Barium (Filtered)	mg/L	0.02					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	-	0.002	<0.001	<0.001
Beryllium (Filtered)	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	0.05					-	-	-	-	-	-	-	-	20	-	-	-	-	0.07	0.32	0.13
Boron (Filtered)	mg/L	0.05					<0.05	<0.05	0.86	0.59	1.5	0.31	2.9	1	-	0.08	0.08	0.77	<0.05	-	-	-
Cadmium	mg/L	0.0002	**0.014**	**0.014**			-	-	-	-	-	-	-	-	<0.002	-	-	-	-	0.001	0.0005	0.0009
Cadmium (Filtered)	mg/L	0.0002	**0.014**	**0.014**			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	0.5					10	12	11	36	30	42	1000	200	87	34	42	1200	29	310	2100	330
Calcium (Filtered)	mg/L	0.5					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (hexavalent)	mg/L	0.005	**0.02**	**0.02**			-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	0.006	<0.005
Chromium (III+VI)	mg/L	0.001					-	-	-	-	-	-	-	-	1.2	-	-	-	-	-	-	-
Chromium (III+VI) (Filtered)	mg/L	0.001					<0.001	0.002	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	0.003	<0.001	-	-	-
Cobalt	mg/L	0.001	**0.014**	**0.014**			-	-	-	-	-	-	-	-	0.2	-	-	-	-	0.014	0.004	0.002
Cobalt (Filtered)	mg/L	0.001	**0.014**	**0.014**			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.001	**0.003**	**0.003**			-	-	-	-	-	-	-	-	0.052	-	-	-	-	0.002	0.002	0.003
Copper (Filtered)	mg/L	0.001	**0.003**	**0.003**			0.002	<0.001	<0.001	0.001	<0.001	0.005	0.002	0.004	-	**0.011**	**0.007**	0.004	0.004	-	-	-
Iron	mg/L	0.05					-	-	-	-	-	-	-	-	18	-	-	-	-	0.17	0.13	0.09
Iron (Filtered)	mg/L	0.05					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lithium	mg/L	0.005					-	-	-	-	-	-	-	-	0.53	-	-	-	-	-	-	-
Lead	mg/L	0.001	**0.0066**	**0.0066**			-	-	-	-	-	-	-	-	0.075	-	-	-	-	0.005	0.004	0.004
Lead (Filtered)	mg/L	0.001	**0.0066**	**0.0066**			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	0.005	0.002	0.003	<0.001	-	-	-
Magnesium	mg/L	0.5					7.9	11	21	44	67	29	1900	94	67	14	29	1600	48	220	1000	210
Magnesium (Filtered)	mg/L	0.5					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	mg/L	0.005					-	-	-	-	-	-	-	-	0.48	-	-	-	-	0.23	0.94	0.03
Manganese (Filtered)	mg/L	0.005					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/L	0.0001	**0.0007**				-	-	-	-	-	-	-	-	<0.0005	-	-	-	-	<0.0001	<0.0001	<0.0001
Mercury (Filtered)	mg/L	0.0001	**0.0007**				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	mg/L	0.001	**0.2**	**0.2**			-	-	-	-	-	-	-	-	0.67	-	-	-	-	0.11	0.027	0.01
Nickel (Filtered)	mg/L	0.001	**0.2**	**0.2**			0.006	0.004	<0.001	0.008	0.005	0.006	0.025	0.005	-	0.005	0.004	0.75	0.016	-	-	-
Phosphorus	mg/L	0.01		**0.01|0.03**			0.02	0.16	0.06	<0.01	0.07	0.03	0.02	0.29	46	**0.04**	0.02	0.99	0.03	0.1	0.02	0.06
Potassium	mg/L	0.5					2.7	6.5	26	41	56	69	500	89	3400	23	24	210	5.6	21	110	43
Potassium (Filtered)	mg/L	0.5					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.001					-	-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.001	<0.001	<0.001
Selenium (Filtered)	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	0.005					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	0.005	**0.16**				-	-	-	-	-	-	-	-	0.9	-	-	-	-	<0.005	<0.005	<0.005
Vanadium (Filtered)	mg/L	0.005	**0.16**				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	0.005	**0.023**				-	-	-	-	-	-	-	-	2.6	-	-	-	-	0.52	0.005	0.04
Zinc (Filtered)	mg/L	0.005	**0.023**				0.12	0.074	0.018	0.023	0.039	0.029	0.069	0.063	-	**0.039**	0.015	0.57	0.061	-	-	-
Organic																						
Methane	mg/L	0.05					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organochlorine Pesticides																						
4,4-DDE	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.2
a-BHC	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.2
Aldrin	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.2
Aldrin + Dieldrin	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.2

Chem Name	Units	EQL	ANZG (2018) Marine Water 90% LOSP Toxicant DGVs	Darwin Harbour WQO (Shoal Bay upper area ambient marine)(applicable to surface water only)	PFAS NEMP 2020 Interim Marine 90%	Field ID	GW3-12	GW4-30	GW5-12	GW5-3	GW7-12	GW7-3	GW8-12	GW8-3	LP02	SW12	SW13	WW6	WW9	GW17-12	GW17-30	GW18-12
						Sample Date	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	8/12/2021	8/12/2021	8/12/2021
						Lab Report No.	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	849609	849609	849609
b-BHC	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.2
chlordane	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
d-BHC	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.2
DDD	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.2
DDT	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.2
DDT+DDE+DDD	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.2
Dieldrin	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.2
Endosulfan I	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.2
Endosulfan II	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.2
Endosulfan sulphate	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.2
Endrin	µg/L	0.2	**0.01**				-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.2
Endrin aldehyde	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.2
Endrin ketone	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.2
g-BHC (Lindane)	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.2
Heptachlor	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.2
Heptachlor epoxide	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.2
Methoxychlor	µg/L	0.2					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.2
Toxaphene	mg/L	0.005					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	<0.005	<0.005
Organophosphorous Pesticides																						
Azinophos methyl	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Bolstar (Sulprofos)	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Chlorfenvinphos	µg/L	20					-	-	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20
Chlorpyrifos	µg/L	2	**0.04**				-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Chlorpyrifos-methyl	mg/L	0.002					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002
Coumaphos	µg/L	20					-	-	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20
Demeton-O	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Demeton-S	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Diazinon	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Dichlorvos	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Dimethoate	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Disulfoton	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Ethion	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Ethoprop	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Fenitrothion	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Fensulfothion	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Fenthion	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Malathion	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Merphos	mg/L	0.002					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002
Methyl parathion	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Mevinphos (Phosdrin)	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Monocrotophos	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Naled (Dibrom)	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Omethoate	µg/L	20					-	-	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20
Phorate	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Pyrazophos	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Ronnel	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Terbufos	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Trichloronate	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Tetrachlorvinphos	mg/L	0.002					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002
Organotins																						
Tributyltin	µg/L	12.5					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other																						
Butyric Acid	mg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
Hexanoic Acid	mg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
6:2 Fluorotelomer Sulfonate (6:2 FtS)	mg/L	0.00005					<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.0017	-	-	0.00013	<0.00005	<0.00005	<0.00005	<0.00005
PAH																						
Benzo(b+j)fluoranthene	mg/L	0.001					-	-	-	-	-	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
PAH/Phenols																						
2,4-dimethylphenol	µg/L	3					-	-	-	-	-	-	-	-	<3	-	-	-	-	<3	<3	<3
2,4-dinitrophenol	mg/L	0.03					-	-	-	-	-	-	-	-	<0.03	-	-	-	-	<0.03	<0.03	<0.03
2-methylphenol	µg/L	3					-	-	-	-	-	-	-	-	<3	-	-	-	-	<3	<3	<3
2-nitrophenol	µg/L	10					-	-	-	-	-	-	-	-	<10	-	-	-	-	<10	<10	<10
3-&4-methylphenol	µg/L	6					-	-	-	-	-	-	-	-	<6	-	-	-	-	<6	<6	<6
4,6-Dinitro-2-methylphenol	µg/L	30					-	-	-	-	-	-	-	-	<30	-	-	-	-	<30	<30	<30
4-chloro-3-methylphenol	µg/L	10					-	-	-	-	-	-	-	-	<10	-	-	-	-	<10	<10	<10
4-nitrophenol	µg/L	30					-	-	-	-	-	-	-	-	<30	-	-	-	-	<30	<30	<30
Acenaphthene	µg/L	1					-	-	-	-	-	-	-	-	<1	-	-	-	-	<1	<1	<1

Chem Name	Units	EQL	ANZG (2018) Marine Water 90% LOSP Toxicant DGVs	Darwin Harbour WQO (Shoal Bay upper area ambient marine)(applicable to surface water only)	PFAS NEMP 2020 Interim Marine 90%	Field ID	GW3-12	GW4-30	GW5-12	GW5-3	GW7-12	GW7-3	GW8-12	GW8-3	LP02	SW12	SW13	WW6	WW9	GW17-12	GW17-30	GW18-12
						Sample Date	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/11/2021	8/12/2021	8/12/2021	8/12/2021
						Lab Report No.	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	840043	849609	849609	849609
Acenaphthylene	µg/L	1					-	-	-	-	-	-	-	-	4	-	-	-	-	<1	<1	<1
Anthracene	µg/L	1	1.5				-	-	-	-	-	-	-	-	<1	-	-	-	-	<1	<1	<1
Benz(a)anthracene	µg/L	1					-	-	-	-	-	-	-	-	2	-	-	-	-	<1	<1	<1
Benzo(a) pyrene	µg/L	1	0.4				-	-	-	-	-	-	-	-	<1	-	-	-	-	<1	<1	<1
Benzo(g,h,i)perylene	µg/L	1					-	-	-	-	-	-	-	-	<1	-	-	-	-	<1	<1	<1
Benzo(k)fluoranthene	µg/L	1					-	-	-	-	-	-	-	-	<1	-	-	-	-	<1	<1	<1
Chrysene	µg/L	1					-	-	-	-	-	-	-	-	2	-	-	-	-	<1	<1	<1
Cresol Total	mg/L	0.01					-	-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	<0.01	<0.01
Dibenz(a,h)anthracene	µg/L	1					-	-	-	-	-	-	-	-	<1	-	-	-	-	<1	<1	<1
Fluoranthene	µg/L	1	1.7				-	-	-	-	-	-	-	-	4	-	-	-	-	<1	<1	<1
Fluorene	µg/L	1					-	-	-	-	-	-	-	-	5	-	-	-	-	<1	<1	<1
Indeno(1,2,3-c,d)pyrene	µg/L	1					-	-	-	-	-	-	-	-	<1	-	-	-	-	<1	<1	<1
Naphthalene	µg/L	1	90				-	-	-	-	-	-	-	-	140 - 660	-	-	-	-	<1	<1	<1
PAHs (Sum of total)	µg/L	1					-	-	-	-	-	-	-	-	169	-	-	-	-	<1	<1	<1
Phenanthrene	µg/L	1	4				-	-	-	-	-	-	-	-	4	-	-	-	-	<1	<1	<1
Phenol	µg/L	3	520				-	-	-	-	-	-	-	-	<3	-	-	-	-	<3	<3	<3
Pyrene	µg/L	1					-	-	-	-	-	-	-	-	8	-	-	-	-	<1	<1	<1
Pesticides																						
Parathion	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Pirimiphos-methyl	mg/L	0.02					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	<0.02
Phenolics																						
4,6-Dinitro-o-cyclohexyl phenol	µg/L	100					-	-	-	-	-	-	-	-	<100	-	-	-	-	<100	<100	<100
Phenols (Total Halogenated)	mg/L	0.01					-	-	-	-	-	-	-	-	<0.01	-	-	-	-	<0.01	<0.01	<0.01
Phenols (Total Non Halogenated)	mg/L	0.1					-	-	-	-	-	-	-	-	<0.1	-	-	-	-	<0.1	<0.1	<0.1
Polychlorinated Biphenyls																						
Arochlor 1016	µg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
Arochlor 1221	µg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
Arochlor 1232	µg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
Arochlor 1242	µg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
Arochlor 1248	µg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
Arochlor 1254	µg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
Arochlor 1260	µg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
PCBs (Sum of total)	µg/L	5					-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
Solvents																						
Methyl Ethyl Ketone	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
4-Methyl-2-pentanone	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
Acetone	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	<0.005	<0.005
Allyl chloride	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001
Carbon disulfide	µg/L	1					-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
SVOCs																						
EPN	µg/L	2					-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
TPH																						
C10-C16	mg/L	0.05					-	-	-	-	-	-	-	-	4.8	-	-	-	-	<0.05	<0.05	<0.05
C16-C34	mg/L	0.1					-	-	-	-	-	-	-	-	28	-	-	-	-	<0.1	<0.1	<0.1
C34-C40	mg/L	0.1					-	-	-	-	-	-	-	-	7.4	-	-	-	-	<0.1	<0.1	<0.1
F2-NAPHTHALENE	mg/L	0.05					-	-	-	-	-	-	-	-	4.14	-	-	-	-	<0.05	<0.05	<0.05
+C10 - C36 (Sum of total)	µg/L	100					-	-	-	-	-	-	-	-	37,600	-	-	-	-	<100	<100	<100
C6 - C9	µg/L	20					-	-	-	-	-	-	-	-	3200	-	-	-	-	<20	<20	<20
C10 - C14	µg/L	50					-	-	-	-	-	-	-	-	4600	-	-	-	-	<50	<50	<50
C15 - C28	µg/L	100					-	-	-	-	-	-	-	-	16,000	-	-	-	-	<100	<100	<100
C29-C36	µg/L	100					-	-	-	-	-	-	-	-	17,000	-	-	-	-	<100	<100	<100
C10 - C40 (Sum of total)	µg/L	100					-	-	-	-	-	-	-	-	40,200	-	-	-	-	<100	<100	<100
C6-C10	mg/L	0.02					-	-	-	-	-	-	-	-	10	-	-	-	-	<0.02	<0.02	<0.02

Chem Name	Units	EQL	ANZG (2018) Marine Water 90% LOSP Toxicant DGVs	Darwin Harbour WQO (Shoal Bay upper area ambient marine)(applicable to surface water only)	PFAS NEMP 2020 Interim Marine 90%	Field ID	GW18-3	GWSUMP	SW12	SW13	SW14	DW2	DW3	GW SUMP	GW10-12	GW10-3	GW1-12	GW11-3	GW12-12	GW12-30	GW12-3	GW13-12
						Sample Date	8/12/2021	8/12/2021	8/12/2021	8/12/2021	8/12/2021	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022
						Lab Report No.	849609	849609	849609	849609	849609	856948	856948	856948	856948	856948	856948	856948	856948	856948	856948	856948
Field																						
SWL	mbgl						2.21	-	-	-	-	-	-	-	1.8	1.65	1.26	1.65	1.8	1.98	0.98	9.87
pH	pH		6-8	6-8.5			6.14	7.19	7.57	7.43	7.68	7.86	7.69	7.23	4.23	4.08	12.14	4.5	5.51	4.85	6.08	5.57
Electrical conductivity	uS/cm						1750	494.5	1285	1442	1034	2415	147.5	528	63.8	64.7	7404	80.5	121	47.9	1440	391.7
Redox Potential	mV						118.1	17.5	41.2	55.3	67.9	-200.86	41.8	75.9	125.6	140.2	-85.44	113.1	102.4	121.6	101.8	-158.5
Dissolved Oxygen	%S			80-100			66.7	28.9	107.5	118.5	8.12	77.6	79.5	45.8	83.6	79.2	85.5	60.9	66.2	52.6	7.1	44.2
Temp	oC						30.9	28.8	29	26.7	30.1	33.6	35.8	24.4	28.7	29.2	28.8	27.8	28.4	28.9	28.2	28.1
Turbidity	ntu						-	333.9	140.2	85.7	15.7	3160.8	1188.7	933.8	-	-	-	-	-	-	-	-
PFAS																						
(8:2 FTSA)	UG/L	0.01					<0.01	-	-	-	-	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
(10:2 FTSA)	UG/L	0.01					<0.01	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
(4:2 FTSA)	UG/L	0.01					<0.01	-	-	-	-	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
(N-EtFOSAA)	UG/L	0.05					<0.05	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
(N-EtFOSA)	mg/L	0.00005					<0.00005	-	-	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
(N-EtFOSE)	UG/L	0.05					<0.05	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
(N-MeFOSAA)	UG/L	0.05					<0.05	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
(N-MeFOSE)	UG/L	0.05					<0.05	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	UG/L	0.05					<0.05	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sum of PFASs (n=30)*	UG/L	0.1					<0.1	-	-	-	-	34.04	17.99	1.07	0.2	<0.1	<0.1	0.39	<0.1	<0.1	0.47	0.6
Sum of US EPA PFAS (PFOS + PFOA)*	UG/L	0.01					0.04	-	-	-	-	3.1	1.09	0.07	0.06	0.03	<0.01	0.07	0.02	0.02	0.11	0.14
Sum of WA DWER PFAS (n=10)*	UG/L	0.05					0.07	-	-	-	-	33.42	17.91	1.07	0.2	0.08	<0.05	0.36	<0.05	<0.05	0.47	0.6
Perfluorobutanesulfonic acid (PFBS)	UG/L	0.01					<0.01	-	-	-	-	17	6	0.04	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	0.01	0.19
Perfluorononanesulfonic acid (PFNS)(trace)	µg/L	0.01					<0.01	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorobutanoic acid (PFBA)	UG/L	0.05					<0.05	-	-	-	-	2	1.2	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05
Perfluorodecanesulfonic acid (PFDS)	UG/L	0.01					<0.01	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecanoic acid (PFDA)	UG/L	0.01					<0.01	-	-	-	-	0.06	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorododecanoic acid (PFDoDA)	UG/L	0.01					<0.01	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptanesulfonic acid (PFHpS)	UG/L	0.01					<0.01	-	-	-	-	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptanoic acid (PFHpA)	UG/L	0.01					<0.01	-	-	-	-	0.77	0.54	0.03	0.02	<0.01	<0.01	0.03	<0.01	<0.01	0.01	0.02
Perfluorohexanesulfonic acid (PFHxS)	UG/L	0.01					0.03	-	-	-	-	1.8	0.18	<0.01	0.02	0.02	<0.01	0.07	<0.01	<0.01	0.03	0.06
Perfluorohexanoic acid (PFHxA)	UG/L	0.01					<0.01	-	-	-	-	5.6	5.8	0.49	0.03	0.01	<0.01	0.06	<0.01	<0.01	0.14	0.08
Perfluorononanoic acid (PFNA)	UG/L	0.01					<0.01	-	-	-	-	0.04	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorooctane sulfonamide (FOSA)	UG/L	0.05					<0.05	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Perfluorooctanoate	UG/L	0.01			632		<0.01	-	-	-	-	1.7	1	0.07	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	0.02	0.05
Perfluorooctanesulfonic acid (PFOS)	UG/L	0.01			2		0.04	-	-	-	-	1.4	0.09	<0.01	0.06	0.03	<0.01	0.05	0.02	0.02	0.09	0.09
Perfluoropentanesulfonic acid (PFPeS)	UG/L	0.01					<0.01	-	-	-	-	0.24	0.02	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
Perfluoropentanoic acid (PFPeA)	UG/L	0.01					<0.01	-	-	-	-	2.2	2.8	0.38	0.07	0.02	<0.01	0.1	<0.01	<0.01	0.17	0.06
Perfluoropropanesulfonic acid (PFPrS)	UG/L	0.01					<0.01	-	-	-	-	0.2	0.03	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01
Perfluorotetradecanoic acid (PFTeDA)	UG/L	0.01					<0.01	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorotridecanoic acid (PFTrDA)	UG/L	0.01					<0.01	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroundecanoic acid (PFUnDA)	UG/L	0.01					<0.01	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sum (PFHxS + PFOS)*	UG/L	0.01					0.07	-	-	-	-	3.2	0.27	<0.01	0.08	0.05	<0.01	0.12	0.02	0.02	0.12	0.15
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	UG/L	0.01					0.07	-	-	-	-	4.9	1.27	0.07	0.08	0.05	<0.01	0.14	0.02	0.02	0.14	0.2
VFA																						
4-Methylvaleric acid*	MG/L	5					<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptanoic acid*	MG/L	5					<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isovaleric acid*	MG/L	5					<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isobutyric acid*	MG/L	5					<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total VFA as Acetic Acid Equivalents*	MG/L	5					<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BTEX																						
Benzene	µg/L	1	900	900			<1	<1	<1	<1	<1	<20	<40	-	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	1	110				<1	<1	<1	<1	<1	<20	<40	-	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	µg/L	1	230				<1	<1	<1	<1	<1	<20	<40	-	<1	<1	<1	<1	<1	<1	<1	<1
Xylene (m & p)	µg/L	2					<2	<2	<2	<2	<2	<40	<80	-	<2	<2	<2	<2	<2	<2	<2	<2
Xylene (o)	µg/L	1					<1	<1	<1	<1	<1	36	65	-	<1	<1	<1	<1	<1	<1	<1	<1
Xylene Total	µg/L	3					<3	<3	<3	<3	<3	36	<120	-	<3	<3	<3	<3	<3	<3	<3	<3
C6-C10 less BTEX (F1)	mg/L	0.02					<0.02	<0.02	<0.02	<0.02	<0.02	<0.4	<0.8	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Chlorinated Hydrocarbons																						
1,1,1,2-tetrachloroethane	µg/L	1					<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,1-trichloroethane	µg/L	1	400				<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2,2-tetrachloroethane	µg/L	1	500				<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2-trichloroethane	µg/L	1	5800				<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-dichloroethane	µg/L	1					<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-dichloroethene	µg/L	1	900				<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,3-trichloropropane	µg/L	1					<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-dichloroethane	µg/L	1	2600				<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-dichloropropane	µg/L	1	1200				<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Chem Name	Units	EQL	ANZG (2018) Marine Water 90% LOSP Toxicant DGVs	Darwin Harbour WQO (Shoal Bay upper area ambient marine)(applicable to surface water only)	PFAS NEMP 2020 Interim Marine 90%	Field ID	GW18-3	GWSUMP	SW12	SW13	SW14	DW2	DW3	GW SUMP	GW10-12	GW10-3	GW1-12	GW11-3	GW12-12	GW12-30	GW12-3	GW13-12
						Sample Date	8/12/2021	8/12/2021	8/12/2021	8/12/2021	8/12/2021	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022
						Lab Report No.	849609	849609	849609	849609	849609	856948	856948	856948	856948	856948	856948	856948	856948	856948	856948	856948
1,3-dichloropropane	µg/L	1	1400				<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromochloromethane	µg/L	1					<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	µg/L	1					<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromoform	µg/L	1					<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon tetrachloride	µg/L	1	320				<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorodibromomethane	µg/L	1					<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroethane	µg/L	1					<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform	µg/L	5	1100				<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloromethane	µg/L	1					<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-dichloroethene	µg/L	1					<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,3-dichloropropene	µg/L	1					<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromomethane	µg/L	1					<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dichloromethane	µg/L	1	5000				<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	µg/L	1	400				<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	µg/L	1	100				<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,2-dichloroethene	µg/L	1					<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,3-dichloropropene	µg/L	1					<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vinyl chloride	µg/L	1	140				<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Explosives																						
1,3,5-Trinitrobenzene	mg/L	0.1					<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dinitrobenzene	mg/L	0.1					<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,6-Trinitrotoluene (TNT)	mg/L	0.1					<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-& 2,6-Dinitrotoluene	mg/L	0.1					<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Nitrotoluene	µg/L	100					<100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitrotoluene	mg/L	0.1					<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
m-Nitrotoluene	mg/L	0.1					<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrobenzene	µg/L	100					<100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RDX	mg/L	0.1					<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Halogenated Benzenes																						
1,2-dichlorobenzene	µg/L	1					<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-dichlorobenzene	µg/L	1					<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-dichlorobenzene	µg/L	1					<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-chlorotoluene	µg/L	1					<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromobenzene	µg/L	1					<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	µg/L	1	100				<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	µg/L	0.2	0.2				<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Halogenated Hydrocarbons																						
1,2-dibromoethane	µg/L	1					<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromomethane	µg/L	1					<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dichlorodifluoromethane	µg/L	1					<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iodomethane	µg/L	1					<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	µg/L	1					<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Halogenated Phenols																						
2,4,5-trichlorophenol	µg/L	10					<10	<10	<10	<10	<10	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
2,4,6-trichlorophenol	µg/L	10					<10	<10	<10	<10	<10	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
2,4-dichlorophenol	µg/L	3					<3	<3	<3	<3	<3	-	-	-	<3	<3	<3	<3	<3	<3	<3	<3
2,6-dichlorophenol	µg/L	3					<3	<3	<3	<3	<3	-	-	-	<3	<3	<3	<3	<3	<3	<3	<3
2-chlorophenol	µg/L	3					<3	<3	<3	<3	<3	-	-	-	<3	<3	<3	<3	<3	<3	<3	<3
Pentachlorophenol	µg/L	10	33				<10	<10	<10	<10	<10	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
tetrachlorophenols	µg/L	30					<30	<30	<30	<30	<30	-	-	-	<30	<30	<30	<30	<30	<30	<30	<30
Herbicides																						
2,4,5-Trichlorophenoxy-propanoic acid	mg/L	5					<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dinoseb	µg/L	100					<100	<100	<100	<100	<100	-	-	-	<100	<100	<100	<100	<100	<100	<100	<100
Glyphosate	mg/L	0.01					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inorganics																						
Alkalinity (Bicarbonate as CaCO3)	mg/L	20					73	120	75	32	<20	7400	3400	110	<20	<20	<20	<20	<20	<20	150	20
Nitrite + Nitrate as N	mg/L	0.05					3.5	<0.05	3.8	5.7	4	<2.5	<2.5	1.1	1	0.42	0.1	0.76	2.4	1.7	0.06	<0.05
Carbonate Alkalinity (as CaCO3)	mg/L	10					<10	<10	<10	<10	<10	190	<10	<10	<10	<10	140	<10	<10	<10	<10	<10
Alkalinity (Hydroxide) as CaCO3	µg/L	20000					<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	<20,000	1,200,000	<20,000	<20,000	<20,000	<20,000	<20,000
Alkalinity (total) as CaCO3	mg/L	20					73	120	75	32	<20	7600	3400	110	<20	<20	1300	<20	<20	<20	150	20
Ammonia as N	µg/L	10	1200	20			20	2000	480	2700	220	2,000,000	900,000	770	<10	10	100	30	<10	<10	790	3400
Chloride	mg/L	1					590	77	300	380	220	2100	1000	92	7.8	13	750	14	15	5.9	310	84
COD	mg/L	25					51	75	27	88	<25	4700	1900	110	<25	<25	<25	<25	<25	<25	88	<25
Ferrous Iron	mg/L	0.05					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kjeldahl Nitrogen Total	mg/L	0.2					<0.2	2.3	1.5	1.7	0.8	2000	1100	5.3	0.6	0.9	1	1.1	1.1	1.7	5.4	2.8
Nitrate (as N)	mg/L	0.02					3.5	<0.02	3.7	5.5	3.6	<1	<2.5	0.85	1	0.41	0.08	0.76	2.4	1.7	0.04	<0.02
Nitrite (as N)	mg/L	0.02					<0.02	<0.02	0.14	0.15	0.4	<1	<1	0.21	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

Chem Name	Units	EQL	ANZG (2018) Marine Water 90% LOSP Toxicant DGVs	Darwin Harbour WQO (Shoal Bay upper area ambient marine)(applicable to surface water only)	PFAS NEMP 2020 Interim Marine 90%	Field ID	GW18-3	GWSUMP	SW12	SW13	SW14	DW2	DW3	GW SUMP	GW10-12	GW10-3	GW1-12	GW11-3	GW12-12	GW12-30	GW12-3	GW13-12
						Sample Date	8/12/2021	8/12/2021	8/12/2021	8/12/2021	8/12/2021	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022
						Lab Report No.	849609	849609	849609	849609	849609	856948	856948	856948	856948	856948	856948	856948	856948	856948	856948	856948
Nitrogen (Total)	µg/L	200		300			3500	2300	5300	7400	4800	2,000,000	1,100,000	6400	1600	1320	1100	1860	3500	3400	5460	2800
Phosphate (as P)	mg/L	0.01					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus	mg/L	0.01		0.03			0.08	1	0.02	0.02	0.01	14	9.8	0.46	0.02	0.01	0.01	0.02	0.07	0.16	0.16	0.01
Reactive Phosphorus as P	mg/L	0.01		0.01			0.02	0.55	0.07	0.01	0.02	9.5	3.5	0.37	<0.01	<0.01	<0.01	0.01	0.06	0.12	0.02	<0.01
Sodium	mg/L	0.5					310	17	120	150	100	2200	850	36	6.8	7.5	310	11	14	5.9	80	45
Sodium (Filtered)	mg/L	0.5					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	5					88	12	61	68	73	<50	55	15	<5	<5	29	<5	9.3	<5	33	9
TDS	mg/L	10					1100	370	790	930	640	7700	3900	730	19	35	3000	33	71	22	440	140
TOC	mg/L	5					<5	24	7.9	8.8	<5	560	1400	38	<5	<5	<5	<5	<5	<5	34	<5
TSS	mg/L	1		0.01|10			8.5	95	36	29	<5	37	64	230	14	22	17	72	<5	<5	37	16
MAH																						
1,2,4-trimethylbenzene	µg/L	1					<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3,5-trimethylbenzene	µg/L	1					<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total MAH	mg/L	0.003					<0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropylbenzene	µg/L	1	40				<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	µg/L	1					<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																						
Aluminium	mg/L	0.05					-	-	-	-	-	0.89	<0.5	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	0.001					<0.001	-	-	-	-	0.16	0.035	-	-	-	-	-	-	-	-	-
Arsenic (Filtered)	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	0.02					0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium (Filtered)	mg/L	0.02					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	0.001					<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium (Filtered)	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	0.05					0.07	-	-	-	-	4.2	1.4	-	-	-	-	-	-	-	-	-
Boron (Filtered)	mg/L	0.05					-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	mg/L	0.0002	0.014	0.014			<0.0002	-	-	-	-	<0.002	<0.002	-	-	-	-	-	-	-	-	-
Cadmium (Filtered)	mg/L	0.0002	0.014	0.014			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	0.5					69	12	55	55	57	41	79	27	1.4	0.7	420	0.9	3.2	1	55	3
Calcium (Filtered)	mg/L	0.5					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (hexavalent)	mg/L	0.005	0.02	0.02			<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (III+VI)	mg/L	0.001					-	-	-	-	-	0.49	0.15	-	-	-	-	-	-	-	-	-
Chromium (III+VI) (Filtered)	mg/L	0.001					-	<0.001	<0.001	<0.001	<0.001	-	-	<0.001	<0.001	<0.001	0.005	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	mg/L	0.001	0.014	0.014			0.003	-	-	-	-	0.047	0.018	-	-	-	-	-	-	-	-	-
Cobalt (Filtered)	mg/L	0.001	0.014	0.014			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.001	0.003	0.003			0.005	-	-	-	-	0.25	0.48	-	-	-	-	-	-	-	-	-
Copper (Filtered)	mg/L	0.001	0.003	0.003			-	0.005	0.003	0.003	0.001	-	-	0.005	<0.001	<0.001	<0.001	<0.001	0.003	<0.001	0.002	<0.001
Iron	mg/L	0.05					0.36	-	-	-	-	4.2	11	-	-	-	-	-	-	-	-	-
Iron (Filtered)	mg/L	0.05					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lithium	mg/L	0.005					-	-	-	-	-	0.2	<0.05	-	-	-	-	-	-	-	-	-
Lead	mg/L	0.001	0.0066	0.0066			0.019	-	-	-	-	0.016	0.014	-	-	-	-	-	-	-	-	-
Lead (Filtered)	mg/L	0.001	0.0066	0.0066			-	<0.001	<0.001	<0.001	<0.001	-	-	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Magnesium	mg/L	0.5					33	8.4	12	13	9	42	41	10	<0.5	<0.5	<0.5	0.9	<0.5	0.7	35	1.1
Magnesium (Filtered)	mg/L	0.5					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	mg/L	0.005					0.025	-	-	-	-	0.13	0.31	-	-	-	-	-	-	-	-	-
Manganese (Filtered)	mg/L	0.005					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/L	0.0001	0.0007				<0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury (Filtered)	mg/L	0.0001	0.0007				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	mg/L	0.001	0.2	0.2			0.004	-	-	-	-	0.16	0.11	-	-	-	-	-	-	-	-	-
Nickel (Filtered)	mg/L	0.001	0.2	0.2			-	<0.001	0.002	0.003	<0.001	-	-	0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.001	0.002	0.002
Phosphorus	mg/L	0.01		0.01|0.03			0.08	1	0.02	0.02	0.01	14	9.8	0.46	0.02	0.01	0.01	0.02	0.07	0.16	0.16	0.01
Potassium	mg/L	0.5					1.3	51	20	23	8.7	770	390	65	<0.5	<0.5	3.1	0.5	9.7	3.7	150	12
Potassium (Filtered)	mg/L	0.5					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.001					<0.001	-	-	-	-	<0.01	<0.01	-	-	-	-	-	-	-	-	-
Selenium (Filtered)	mg/L	0.001					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	0.005					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	0.005	0.16				0.007	-	-	-	-	0.27	0.098	-	-	-	-	-	-	-	-	-
Vanadium (Filtered)	mg/L	0.005	0.16				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	0.005	0.023				0.038	-	-	-	-	0.33	0.37	-	-	-	-	-	-	-	-	-
Zinc (Filtered)	mg/L	0.005	0.023				-	0.008	<0.005	<0.005	0.006	-	-	<0.005	0.01	0.005	<0.005	<0.005	0.009	0.012	0.015	0.006
Organic																						
Methane	mg/L	0.05					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organochlorine Pesticides																						
4,4-DDE	µg/L	0.2					<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
a-BHC	µg/L	0.2					<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Aldrin	µg/L	0.2					<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Aldrin + Dieldrin	µg/L	0.2					<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

Chem Name	Units	EQL	ANZG (2018) Marine Water 90% LOSP Toxicant DGVs	Darwin Harbour WQO (Shoal Bay upper area ambient marine)(applicable to surface water only)	PFAS NEMP 2020 Interim Marine 90%	Field ID	GW18-3	GWSUMP	SW12	SW13	SW14	DW2	DW3	GW SUMP	GW10-12	GW10-3	GW1-12	GW11-3	GW12-12	GW12-30	GW12-3	GW13-12
						Sample Date	8/12/2021	8/12/2021	8/12/2021	8/12/2021	8/12/2021	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022	12/01/2022
						Lab Report No.	849609	849609	849609	849609	849609	856948	856948	856948	856948	856948	856948	856948	856948	856948	856948	856948
b-BHC	µg/L	0.2					<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
chlordane	µg/L	2					<2	<2	<2	<2	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
d-BHC	µg/L	0.2					<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
DDD	µg/L	0.2					<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
DDT	µg/L	0.2					<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
DDT+DDE+DDD	µg/L	0.2					<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Dieldrin	µg/L	0.2					<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan I	µg/L	0.2					<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan II	µg/L	0.2					<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan sulphate	µg/L	0.2					<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin	µg/L	0.2	**0.01**				<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin aldehyde	µg/L	0.2					<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	µg/L	0.2					<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
g-BHC (Lindane)	µg/L	0.2					<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor	µg/L	0.2					<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor epoxide	µg/L	0.2					<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Methoxychlor	µg/L	0.2					<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toxaphene	mg/L	0.005					<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Organophosphorous Pesticides																						
Azinophos methyl	µg/L	2					<2	<2	<2	<2	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Bolstar (Sulprofos)	µg/L	2					<2	<2	<2	<2	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Chlorfenvinphos	µg/L	20					<20	<20	<20	<20	<20	-	-	-	<20	<20	<20	<20	<20	<20	<20	<20
Chlorpyrifos	µg/L	2	**0.04**				<2	<2	<2	<2	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Chlorpyrifos-methyl	mg/L	0.002					<0.002	<0.002	<0.002	<0.002	<0.002	-	-	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Coumaphos	µg/L	20					<20	<20	<20	<20	<20	-	-	-	<20	<20	<20	<20	<20	<20	<20	<20
Demeton-O	µg/L	2					<2	<2	<2	<2	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Demeton-S	µg/L	2					<2	<2	<2	<2	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Diazinon	µg/L	2					<2	<2	<2	<2	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Dichlorvos	µg/L	2					<2	<2	<2	<2	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Dimethoate	µg/L	2					<2	<2	<2	<2	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Disulfoton	µg/L	2					<2	<2	<2	<2	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Ethion	µg/L	2					<2	<2	<2	<2	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Ethoprop	µg/L	2					<2	<2	<2	<2	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Fenitrothion	µg/L	2					<2	<2	<2	<2	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Fensulfothion	µg/L	2					<2	<2	<2	<2	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Fenthion	µg/L	2					<2	<2	<2	<2	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Malathion	µg/L	2					<2	<2	<2	<2	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Merphos	mg/L	0.002					<0.002	<0.002	<0.002	<0.002	<0.002	-	-	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Methyl parathion	µg/L	2					<2	<2	<2	<2	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Mevinphos (Phosdrin)	µg/L	2					<2	<2	<2	<2	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Monocrotophos	µg/L	2					<2	<2	<2	<2	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Naled (Dibrom)	µg/L	2					<2	<2	<2	<2	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Omethoate	µg/L	20					<20	<20	<20	<20	<20	-	-	-	<20	<20	<20	<20	<20	<20	<20	<20
Phorate	µg/L	2					<2	<2	<2	<2	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Pyrazophos	µg/L	2					<2	<2	<2	<2	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Ronnel	µg/L	2					<2	<2	<2	<2	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Terbufos	µg/L	2					<2	<2	<2	<2	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Trichloronate	µg/L	2					<2	<2	<2	<2	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Tetrachlorvinphos	mg/L	0.002					<0.002	<0.002	<0.002	<0.002	<0.002	-	-	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Organotins																						
Tributyltin	µg/L	12.5					-	-	-	-	-	-	-	<12.5	<12.5	<12.5	<12.5	<12.5	<12.5	<12.5	<12.5	<12.5
Other																						
Butyric Acid	mg/L	5					<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexanoic Acid	mg/L	5					<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6:2 Fluorotelomer Sulfonate (6:2 FtS)	mg/L	0.00005					<0.00005	-	-	-	-	0.00093	0.0003	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
PAH																						
Benzo(b+j)fluoranthene	mg/L	0.001					<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
PAH/Phenols																						
2,4-dimethylphenol	µg/L	3					<3	<3	<3	<3	<3	-	-	-	<3	<3	<3	<3	<3	<3	<3	<3
2,4-dinitrophenol	mg/L	0.03					<0.03	<0.03	<0.03	<0.03	<0.03	-	-	-	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
2-methylphenol	µg/L	3					<3	<3	<3	<3	<3	-	-	-	<3	<3	<3	<3	<3	<3	<3	<3
2-nitrophenol	µg/L	10					<10	<10	<10	<10	<10	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
3-&4-methylphenol	µg/L	6					<6	<6	<6	<6	<6	-	-	-	<6	<6	<6	<6	<6	<6	<6	<6
4,6-Dinitro-2-methylphenol	µg/L	30					<30	<30	<30	<30	<30	-	-	-	<30	<30	<30	<30	<30	<30	<30	<30
4-chloro-3-methylphenol	µg/L	10					<10	<10	<10	<10	<10	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10
4-nitrophenol	µg/L	30					<30	<30	<30	<30	<30	-	-	-	<30	<30	<30	<30	<30	<30	<30	<30
Acenaphthene	µg/L	1					<1	<1	<1	<1	<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1