



Darwin Turf Club – EPL Monitoring

Groundwater and Air Monitoring Report

Darwin Turf Club Inc

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➔ **The Power of Commitment**



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1. Introduction

Darwin Turf Club Incorporated (DTC) engaged GHD Pty Ltd (GHD) to undertake monitoring and sampling of groundwater, air quality, and track conditioning oil at the Darwin Turf Club Fannie Bay Racecourse ('the Site'), locality of the Site is presenting in Figure 1.

GHD has undertaken the routine monitoring on behalf of DTC since April 2020, completing a total of 21 groundwater monitoring events (GMEs) and 10 air quality monitoring events (AQMEs) to date. The monitoring locations for April 2024 can be found in Appendix A.

The monitoring of groundwater, air quality and track conditioning oil is a requirement of the Site's Environment Protection Licence number 218-02 (EPL 218-02), which was updated and issued to DTC by the Northern Territory Environment Protection Authority (NT EPA) on 1 September 2022. The EPL is attached in Appendix B

EPL 218-02 permits the application of oil to the racecourse surface, as part of soil conditioning and track maintenance works. NT EPA conditions detailed within the EPL require DTC to undertake routine environmental monitoring of groundwater and air quality before, during, and after the application of oil to the track surface. In addition, oil sampling is a requirement of EPL 218-02 and oil samples are taken 10 days prior to the application event and on the day of the application event.

Measures associated with environmental protection are presented in the Fannie Bay Racecourse Environmental Management Plan (EMP) prepared by GHD in 2022 and updated in 2023 (GHD, 2023).

The EPL includes specific clauses relating to monitoring specifications, control measures, reporting and non-compliance notification requirements.

The environmental monitoring requirements documented in the EPL prescribe the following:

- A groundwater monitoring event (GME) to be conducted up to two weeks prior to the oil application to the track.
- A second GME must be conducted within 48 hours after the oil has been applied to the track surface.
- An air quality monitoring event (AQME) must be conducted on the day of oil application, capturing ambient air during the application period.
- Oil sampling is to be conducted 10 days prior to oil application and on the day of oil application.
- Additional specifications on the monitoring requirements including monitoring locations are documented in the EMP (GHD, 2023).

1.1 Purpose of this report

The purpose of this report is to document the results of the oil testing, AQME and the pre-and post-application GMEs conducted by GHD on behalf of DTC, during the April 2024 monitoring period. The monitoring was associated with an oil application event, conducted by DTC on 30 April 2024.

This report fulfils, in part, the requirements of the EMP and EPL under which DTC operates the racecourse facility. Specifically, in fulfilment of EPL 218-02 Clause 50 relating to monitoring reporting requirements, this report was prepared in accordance with the requirements of the Northern Territory Contaminated Land Guideline (NT EPA, 2017), and therefore includes:

- Project background and Site details.
- Details on the adopted methodologies for the GMEs and AQME.
- Assessment criteria adopted for evaluation of monitoring results.
- Laboratory and field data obtained from the recent investigations.
- A comparison of the historical and recent results against the relevant assessment criteria.
- Summary conclusions of monitoring results, including a brief evaluation of the reported exceedances to the assessment criteria.
- Includes an assessment of environmental impact from the activity as per EPL 218-02 Clause 50.4.

- Recommendations based on the results from this monitoring period.

1.2 Scope

1.2.1 April 2024 Oil Application Event

The following scope of works was undertaken:

- Two GMEs (GME 20 and GME 21) utilising seven groundwater bores as specified in Figure 2 and in the DTC Environmental Management Plan (EMP) (GHD, 2023). The GMEs were undertaken before and after track conditioning activities.
- One AQME involving monitoring of the three locations specified in Figure 3, Appendix A. The sampling was undertaken during the oil application activities.
- Laboratory analysis of samples of the oil mixture prior to the applications and during application.

1.3 Limitations

This report: has been prepared by GHD for Darwin Turf Club Inc and may only be used and relied on by Darwin Turf Club Inc for the purpose agreed between GHD and Darwin Turf Club Inc as set out in section 1 of this report.

GHD otherwise disclaims responsibility to any person other than Darwin Turf Club Inc arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section(s) 12 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the Site may be different from the Site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular Site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant Site features and conditions may have been identified in this report.

GHD has prepared this report on the basis of information provided by Darwin Turf Club Inc and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Site details

2.1 Site location and setting

Fannie Bay Racecourse comprises approximately 47 ha and is situated approximately 4 km north of Darwin CBD. The Site is located off Dick Ward Drive.

The Site is bound by Dick Ward Drive to the north, stables and Douglas Street to the east, Playford and Wells Street to the south and east. Residential properties bound Douglas Street, Playford Street and Wells Street.

The racecourse is located in close proximity to Ludmilla Primary School, residential areas of Fannie Bay and Ludmilla, and coastal areas. The activities undertaken at these Sites are sensitive receptors to potential impacts from the application of waste oil to the racetrack, notably offensive odours.

A general layout of the Site is provided in Figure 1, Appendix A.

2.1.1 Climate

The Site is located in the wet/dry tropics and is subject to annual periods of flood and drought. The dry season extends from approximately March to September, displaying moderate temperatures, low humidity and winds predominately from the east. The wet season occurs for the remaining months and tropical cyclones, thunderstorms and monsoon rain with winds predominately from the northwest are common, in association with high temperatures and humidity.

The climate statistics for the Site are shown in Figure 4, Appendix A, and are taken from the Darwin Airport weather station (ID 014015), located 4.6 km from the Site.

2.1.2 Geology and hydrogeology

The superficial geology underlying the Site comprises unconsolidated sand, ferruginous and clayey, sandy and gravelly soils underlain by kaolinitic claystone (NTGS, 1985).

DEPWS (2000) indicated the southern portion of the Site is underlain by a shallow freshwater aquifer, potentially suitable for human consumption and garden watering. The groundwater yield is less than 0.5 L/s. However, the map indicates that the northernmost 200 m of the Site is likely to be underlain by shallow groundwater which is brackish to saline and unsuitable for most extractive uses, with a yield less than 0.5 L/s. It is likely that the groundwater towards the north is subject to saline influence from the Ludmilla Creek estuary (GHD, 2022).

Interpretation of groundwater standing water levels (SWLs) from the April 2024 GMEs, indicated a generally northerly groundwater flow direction towards Ludmilla Creek wetland area (refer to Figure 2, Appendix A). Based on the contours, the hydraulic gradient is approximately 0.007 m/m (GHD, 2023).

2.1.3 Topography and hydrology

The Site is relatively flat with the track approximately 0.5 m above the surrounding ground level. Surface water drainage at the Site generally flows from south to north.

The closest surface water feature is Ludmilla Creek and associated mangrove wetlands, situated approximately 500 m to the northeast of the Site. It is assumed the surface water on the Site ultimately drains into Ludmilla Creek which discharges into the Beagle Gulf.

A drainage culvert is present within the northern portion of the Site. Surface water runoff from the grassed central area and the racetrack are likely to flow into this drainage culvert under Dick Ward Drive and into Ludmilla Creek which discharges into the Beagle Gulf.

3. Groundwater monitoring methodology

3.1 Overview

Two GMEs were undertaken on 24 April 2024 (GME 20) and 1 May 2024 (GME 21) in accordance with EPL 218-02 requirements. Seven boreholes that were monitored are identified in Table 1 and displayed in Figure 2, Appendix A.

Table 1 Groundwater sampling program

Bore ID	Location (relative to the racetrack)	Analytical suite
MW01	North	– Total Recoverable Hydrocarbons (TRH) – Benzene, Toluene, Ethylbenzene, o- & m- & p- Xylenes (BTEX) – Dissolved metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc) – Per- and poly-fluoroalkyl substances (PFAS)
MW02	North	
MW03	Northwest	
MW04	Northeast	
MW05	East	
MW06	South	
MW07	West	

The weather at the time of the GMEs was sunny and clear. Weather observations recorded from the Darwin Airport weather station (Station No: 014015) and in the field noted the following:

- GME 20 – sunny, with a maximum temperature of 32.7 ° Celsius (° C). No rainfall was recorded.
- GME 21 – sunny and windy, with a maximum temperature of 32.9° C. No rainfall was recorded.

3.2 Sampling protocol

During each GME, the following activities were completed at each groundwater bore location:

- Each bore was visually inspected, and the bore condition was noted.
- The bore cap was removed, and the headspace was immediately monitored using a calibrated photo-ionisation detector (PID).
- An initial standing water level (SWL) reading was measured using a calibrated interface probe.
- Groundwater sampling was undertaken using low flow sampling techniques comprising a peristaltic pump and flow cell with calibrated YSI Pro DSS water quality meter.
- Purging was undertaken until the water quality parameters listed in Table 5 stabilised according to the definitions defined by the NT EPA Methodology for the Sampling of Groundwater (DIR, 2016)
- Samples were collected into laboratory supplied containers with appropriate preservative, as required.
- Samples for dissolved metals analysis were field filtered through a <0.45 µm disposable in-line filter.
- The samples were placed in chilled storage containers and transported under Chain of Custody (CoC) documentation to ALS Environmental Darwin, who organised transportation to ALS Environmental Sydney for analysis.
- Additional quality assurance / quality control (QAQC) samples were collected to maintain data quality.

SWLs, PID readings and field water quality parameters were measured using a calibrated interface probe, calibrated PID and calibrated YSI Pro DSS® water quality meter. The calibration certificates for this equipment are attached in Appendix F.

The Methodology for the Sampling of Groundwater (DPIR, 2016) was used to develop the groundwater methodology and uses the following Australian/New Zealand Standards:

- AS5667.1:1998 Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples
- AS5667.11:1998 Part 11 Guidance on sampling of ground waters
- The volume of water in the bore has been calculated in Table 4 (Section 7.1) and uses the following formula:
 - Water Volume (Litres) = $\pi r^2 (D-SWL) \times 1000$
 - **Where r** =radius of inner bore casing (in meters)
 - **π** = approx. (3.14)
 - **D** = total depth of the bore (in meters)
 - **SWL** = Standing Water Level (distance from ground to water level, in meters).

3.3 Assessment criteria (trigger Values)

The DTC Environmental Management Plan (GHD, 2023) documents assessment criteria for groundwater which are based on the Australian New Zealand Guidelines (ANZG) for Fresh and Marine Water Quality published in 2018. These criteria are referred to as Trigger Values in the EPL. They provide the basis upon which non-conformances with the EPL are based.

The assessment criteria (trigger values) are summarised in Table 2.

Table 2 Groundwater trigger values

Parameter	Units	Assessment criteria (Trigger Values)
Field parameters		
pH	pH units	6.0 – 8.0
Temperature	°C	N/A
Turbidity	NTU–	2 - 15
Electrical conductivity	µS/cm	0 - 250
Dissolved oxygen	% saturation	0 - 110
Laboratory analysis		
Dissolved metals		
Arsenic	mg/L	0.013
Cadmium	mg/L	0.0002
Chromium	mg/L	0.001
Copper	mg/L	0.0014
Lead	mg/L	0.0034
Mercury	mg/L	0.0006
Nickel	mg/L	0.011
Zinc	mg/L	0.008
BTEX		
Benzene	µg/L	950
Toluene	µg/L	180
Ethylbenzene	µg/L	80
Xylenes	µg/L	350
Total Recoverable Hydrocarbons (TRH)		
TRH (C10 – C36)	mg/L	0.6
PFAS		
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.13
Perfluorooctanoic acid (PFOA)	µg/L	220

3.4 Non-compliance

Clause 46 of the EPL states that a non-compliance with the EPL includes:

- 46.1 an exceedance of a trigger value specified in Attachment 1 on three consecutive sampling occasions; or
- 46.2 an exceedance of a trigger value specified in Attachment 1 on a single occasion where the parameter measures greater than or equal to three times or more the trigger value.
- DTC must notify the EPA when a non-compliance has occurred, as detailed in the Clause 45 of the EPL. Notification must include:
 - 45.1 when the non-compliance was detected and by whom;
 - 45.2 the date and time of the non-compliance;
 - 45.3 the actual and potential causes and contributing factors to the non-compliance;
 - 45.4 the risk of environmental harm arising from the non-compliance;
 - 45.5 the action(s) that have or will be undertaken to mitigate any environmental harm arising from the non-compliance;
 - 45.6 corrective actions that have or will be undertaken to ensure the non-compliance does not reoccur; and
 - 45.7 if no action was taken, why no action was taken;
 - 45.8 a date when an incident investigation report will be submitted to the NT EPA.

4. Air quality monitoring methodology

One ambient AQME was undertaken on 30 April 2024 to coincide with the oil application to the track occurring the same day. Monitoring was undertaken at three locations which are typically down-wind of the track area: AQM01, AQM02 and AQM03 (Figure 3, Appendix A). These locations have been identified to assess the risk to potentially sensitive nearby receptors.

The weather at the time of the AQME is summarised below (Darwin Airport weather station: 014015):

- Ambient temperature was recorded at a maximum of 34.3° C over the course of the day.
- No rainfall was recorded.

Wind was coming from the southeast at 9 am and east to north easterly at 3 pm, with maximum wind speeds recorded at 43 km/h.

4.1 Sampling protocol

GHD commenced the AQME at 06:00 am on 30 April 2024. Portable canisters were placed at the three nominated sampling locations to collect a single round of air samples on the day of oil application to the track surface. The air monitoring used portable 6 L Summa® canisters, fitted with flow meters, to collect a single round of air samples. The Summa® canister draws a sample of air under vacuum and the flow meter controls the continuous intake of air for a period of 12 hours.

The Summa® canisters were then dispatched for analysis to Eurofins MGT, a NATA-accredited laboratory for analysis. At the time of deployment, the weather conditions were noted as: warm, humid and dark.

During the AQME, the following activities were completed at each sampling location:

- Portable canisters were calibrated for an ultra-low-level 12-hour fill time prior to setup.
- The pressure gauge on each of the canisters was checked to ensure a vacuum pressure of approximately -30 kPa within the canister, prior to sampling.
- The canisters were set up at each of sampling location prior to the commencement of oil application for track conditioning.
- At the time of deployment, the weather conditions were noted.
- The canisters were placed between 1.2 – 1.5 m above ground level.
- Once the canister fill period had expired, the cannisters were recovered and transported under CoC documentation to Eurofins MGT for laboratory analysis.
- The samples were analysed for BTEX compounds.

Samples were analysed by the receiving laboratory using a laboratory that is NATA-accredited for the analysis method.

4.2 Assessment criteria

Assessment criteria specified in the DTC EMP (GHD, 2023) have been derived from the National Environment Protection (Air Toxics) Measure (NEPM) (NEPC, 2013). The assessment criteria are referred to as ‘trigger values’ in the EPL and define the criteria for when a non-conformance with the EPL has occurred. The assessment criteria are summarised in Table 3.

Table 3 *Air quality assessment criteria*

Parameter	Units	Assessment criteria / Trigger Values	Source
BTEX			
Benzene	ppb	3	Value provided in EMP derived from the National Environment Protection (Air Toxics) Measure (NEPM)
Toluene	ppb	1,000	
Ethylbenzene	ppb	N/A	
o-Xylene	ppb	250	
m- & p- Xylenes	ppb	250	

5. Oil sampling methodology

As per the EPL 218-02, analysis of a representative sample (where practicable) of the oil applied for track conditioning was undertaken prior to and on the day of application. Oil analysis was undertaken to ensure the composition is not contaminated by polychlorinated biphenyls and per- and polyfluoroalkyl substances (PFAS) to the lowest limit of laboratory reporting (LOR).

5.1 Sampling protocol

An oil sample was collected prior to the application from Cleanaway on 24 April 2024. An oil sample was also collected on the day of application on 30 April 2024.

Oil samples were collected into laboratory supplied containers with appropriate preservative, as required. Samples were immediately placed into chilled coolers and sent to NATA accredited laboratory.

6. Quality control and assurance

6.1 Field quality control methods

All field works were undertaken by experienced Environmental Scientists in accordance with GHD's standard operating procedures and in general compliance with ASC NEPM contamination sampling recommendations and requirements.

6.2 Blind and split duplicates

A single sample is divided into three separate sampling containers. The parent sample and the blind sample are sent anonymously to the primary project laboratory (ALS Environmental) with the split sample sent to the secondary laboratory (Eurofins MGT). Blind duplicates provide an indication of the analytical precision of the laboratory but are susceptible to influence by other factors such as sampling techniques and sample media heterogeneity. Split duplicate samples provide an indication of the repeatability of the results between laboratories.

One set of field duplicate samples (Field Duplicate and Interlab Duplicate) was collected and analysed as part of the QAQC analytical program. The precision of the data from these samples was assessed by calculating the Relative Percent Difference (RPD) between duplicate sample pairs, using the following formula:

$$RPD\% = \frac{|C_o - C_d|}{C_o + C_d} \times 100$$

C_o = Analyte concentration of the original sample

C_d = Analyte concentration of the duplicate sample

Nominal acceptance criteria of 30% and 50% were adopted for field duplicates of inorganics and organics, respectively. Blind and split duplicate samples should return RPDs within these criteria, however it is noted that the criteria will not always be achieved, particularly in heterogeneous media or when comparing low analyte concentrations. In the event RPD values exceed these limits, an explanation is offered for the source of these discrepancies in sample results.

6.3 Laboratory quality control methods

In addition to field QAQC procedures, the receiving laboratories also adopt internal QAQC procedures to ensure data quality and reliability. These procedures are required as part of their NATA-accreditation.

The nominated NATA accredited analytical laboratories (ALS Environmental and Eurofins MGT Laboratory) adopted their internal procedures and methods in accordance with their quality assurance systems. Results from these procedures are provided alongside the individual monitoring reports as appendices.

7. Groundwater monitoring results

The groundwater monitoring events were undertaken prior to and post oil application. GME 20 was completed on 24 April 2024 prior to application and GME 21 completed on 1 May 2024 which was the day following oil application (30 April 2024).

7.1 Field observations and measurements

7.1.1 GME 20 and GME 21

Field observations and bore condition notes are presented in Table 4 and Table 5, respectively. Monitoring bores were accessible since reinstatement works for the Fannie Bay Racecourse groundwater monitoring network were completed in 2021. Monitoring well condition was good and there were no signs of deterioration or damage was observed. The following key field observations were noted during GME 20 and GME 21:

- Non-aqueous phase liquid (NAPL) was not detected during well gauging and PID readings obtained were within the acceptable limits defined by the EMP (Table 4). No hydrocarbon odours were detected in any of the monitoring wells;
- Monitoring well MW01 was partially blocked as water levels and recharge rate within the bore were low in comparison to neighbouring bores MW02 and MW03;
- There was approximately 50 - 60 cm of water within MW01 and approximately 2 m of water within MW02 and MW03. Additional details on the volume of water within each well is identified in Table 4; and
- All wells had sufficient water levels and were purged with a peristaltic pump. Although MW01 contained less water, GHD was able to stabilise the parameters and collect a sample.

The SWLs and water quality parameters for all bores are recorded in Table 4. The full set of purge parameters are attached in Appendix C for reference.

Table 4 *Monitoring well observations and depths for GME20 and GME 21*

Monitoring well	Easting (m)	Northing (m)	Top of monitoring pipe (m AHD)	Ground surface (m AHD)	Volume of water within bore (as of 1/05/24) (L)	Length of casing above ground (m)	PID (GME 20) (ppm)	PID (GME 21) (ppm)
MW01	700459.294	8626054.921	6.098	5.205	2.68	0.893	0.8	0.2
MW02	700468.771	8626066.059	6.142	5.141	5.32	1.001	0.5	0.2
MW03	700443.913	8626042.781	6.303	5.327	5.62	0.976	0.2	0.3
MW04	700707.819	8626092.343	5.866	4.793	4.20	1.073	0.7	0.3
MW05	700852.819	8625805.358	11.085	10.375	5	0.710	0.3	0.3
MW06	700784.599	8625421.479	14.393	13.768	5.25	0.625	0.1	0.2
MW07	700489.877	8625828.824	7.111	6.102	7.49	1.009	0.3	0

Table 5 **GME 20 and GME 21 Groundwater field parameters**

Bore ID	Bore Depth (mbTOC)	SWL (mbTOC)	SWL (mbgl)	Temp (°C)	DO (mg/L)	DO (% S)	pH (pH units)	EC (SPC)	ORP (mv)	Turbidity (NTU)	Comments
GME 20 – 24/04/2024											
MW01	3.01	2.44	1.547	33.3	-0.16	-2.24	5.09	628	-491.8	74.7	Clear, white floating particulates, no odour, no sheen.
MW02	4.29	2.495	1.494	33.4	2.04	28.6	4.63	596	-235.3	1415	Clear, white floating particulates, no odour, no sheen.
MW03	4.62	2.65	1.674	33.2	0.02	0.28	4.42	639	-373.7	12.57	Clear, white floating particulates, no odour, no sheen.
MW04	5.095	2.23	1.157	35.0	0.27	3.89	4.70	14890	-300.7	1362	Clear, white floating particulates, no odour, no sheen.
MW05	6.49	4.54	3.83	32.5	4.41	60.91	3.92	602	-131.3	22.07	Clear, no odour, no sheen.
MW06	7.70	5.48	4.855	32.4	0.08	1.1	5.25	578	-535.1	63.71	Clear, no odour, no sheen.
MW07	6.06	3.085	2.076	31.3	0.91	12.32	3.88	1129	-187.7	353	Clear, white floating particulates present, no odour, no sheen.
GME 21 – 1/05/2024											
MW01	3.00	2.52	1.627	33.5	-0.06	-0.84	5.33	724	-394.5	45.94	Slightly turbid brown, white floating particulates present, no odour, no sheen.
MW02	4.28	2.57	1.569	33.4	1.30	18.24	4.76	655	-243.8	461.4	Slightly turbid brown, white floating particulates present, no odour, no sheen.
MW03	4.62	2.73	1.754	33.7	-0.11	-1.55	4.51	723	-383.3	14.21	Clear, trace floating particulates, no odour, no sheen.
MW04	5.09	2.33	1.257	34.5	0.59	8.42	4.53	16598	-458.3	116.3	Clear, trace white suspended solids to no white suspended solids, no odour, no sheen.
MW05	5.50	3.66	2.95	32.4	4.83	66.6	3.57	690	-72.1	7.45	Clear, floating white particulates present, no odour, no sheen.
MW06	6.66	4.61	3.985	32.2	0.03	0.41	4.77	644	-486.1	21.93	Slightly turbid to turbid brown, no odour, no sheen.
MW07	6.05	3.24	2.231	30.6	-0.16	-2.14	4.05	2402	-518.6	1118	Clear, white floating particulates, no odour, no sheen.

7.1.2 Pre-application GME field water quality parameters

A summary of the field parameters observed during the pre-application GME (GME 20) is provided below:

- Groundwater temperatures were typical of Darwin groundwaters and ranged between 31.3°C (MW07) and 35.0°C (MW04).
- Concentrations of DO indicated anaerobic conditions in GME 20 with a DO of less than 5 - 6 mg/L.
- Field pH ranged from 3.88 pH units (MW07) to 5.25 pH units (MW06) indicating acidic conditions typical of groundwaters within shallow aquifers within Darwin and the surrounding areas.
- Turbidity ranged from low to very high across the Site. Groundwater well MW02 and MW04 recorded higher levels of turbidity compared to the rest of the Site with 1415.0 NTU and 1362.05 NTU, respectively.

7.1.3 Post-application GME field water quality parameters

A summary of the field parameters observed during the post-application GME (GME 21) is provided below:

- Groundwater temperatures were typical of Darwin groundwaters ranging from 30.6°C (MW07) to 34.5°C (MW04).
- Concentrations of DO indicate anaerobic conditions in GME 21 with a DO of less than 5 - 6 mg/L.
- Field pH ranged from 4.05 pH units (MW07) to 5.33 pH units (MW01) indicating acidic conditions typical of groundwaters within shallow aquifers within Darwin and surrounding areas.
- Turbidity ranged from low turbidity to very high turbidity across the Site, with MW02 and MW07 recording higher levels of turbidity compared to the rest of the Site with 461.41 NTU and 1117.68 NTU, respectively.

7.2 Laboratory results

Copies of the certified laboratory reports are attached in Appendix D. The results of the groundwater analyses are summarised in tables within Appendix E, and presented against the relevant assessment criteria.

An overview of the groundwater results is presented below:

- Concentrations of TRH/BTEXN were less than the laboratory LOR for all groundwater samples.
- The majority of dissolved metals reported less than the laboratory LOR. Copper, cadmium, lead, nickel and zinc were detected in groundwater samples at concentrations greater than adopted assessment criteria at several locations (Table 6).
- Concentrations of PFAS were greater than the laboratory LOR for all of the samples collected with the exception of the post-application MW04 sample, however, were less than the adopted assessment criteria (where established). PFAS (Sum of Total) concentrations ranged from 0.01 µg/L (MW02, MW05 and MW07) to 0.35 µg/L (MW01).

A summary of individual analyte exceedances to the acceptance criteria are presented in Table 6.

Table 6 GME results with exceedances highlighted

Analyte	Trigger Values (GHD, 2023)	Unit	Exceedance concentration													
			MW01	MW02	MW03	MW04	MW05	MW06	MW07	MW01	MW02	MW03	MW04	MW05	MW06	MW07
Dissolved metals			GME 20							GME 21						
Copper	0.0014	mg/L	<0.001	0.002	0.002	0.003	0.007	0.003	<0.001	<0.001	<0.001	<0.001	0.002	0.004	<0.001	0.002
Cadmium	0.0002	mg/L	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.001	0.0002	<0.0001	<0.0001	0.0002
Lead	0.0034	mg/L	<0.001	<0.001	<0.001	<0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	0.005
Nickel	0.011	mg/L	<0.001	<0.001	0.002	0.047	0.001	0.003	0.002	<0.001	<0.001	0.002	0.113	<0.001	0.002	0.004
Zinc	0.008	mg/L	0.006	0.006	0.006	0.155	0.007	0.019	0.007	<0.005	0.006	<0.005	0.356	0.012	0.010	0.009
Field water quality parameters			GME 20							GME 21						
Field pH	6.0 – 8.0	pH units	5.09	4.63	4.42	4.70	3.92	5.25	3.88	5.33	4.76	4.51	4.53	4.83	4.77	4.05
Dissolve d oxygen (DO)	80 – 110	%	-2.24	28.6	0.28	3.89	60.91	1.1	12.32	-0.84	18.24	-1.55	8.42	66.6	0.41	-2.14
Turbidity	2 - 15	NTU	74.65	1415	-	1362	22.07	63.71	353	45.94	461	-	116	-	21.93	1118
Electrical conductivity	0 - 250	µS/cm	628	596	639	14890	602	578	1129	724	655	723	16598	690	644	2402

Notes

Italics - reported within the relevant assessment criteria

Bold – value exceeding adopted criteria

As per EPL requirements described in Section 3.3, DTC is required to notify NT EPA of specific non-compliances with the EPL. Considering these non-compliance definitions, the results from the April 2024 monitoring period have been assessed and tabulated against these clause definitions. These are presented in Table 7 and Table 8.

Table 7 EPL Clause 46.1: NT EPA notifiable exceedances: three consecutive exceedances

Bore ID	Parameter/Analyte:	pH	DO	Copper	Nickel	Zinc
	Assessment criteria:	6.0-8.0 (pH units)	80-110 (%)	0.0014 (mg/L)	0.011 (mg/L)	0.008 (mg/L)
MW02	GME 19	5.36	35.5	N/A	N/A	N/A
	GME 20	4.63	28.6			
	GME 21	4.76	18.24			
MW03	GME 19	4.22	20.5	N/A	N/A	N/A
	GME 20	4.42	0.28			
	GME 21	4.51	-1.55			
MW04	GME 19	5.01	16.7	N/A	0.135	0.339
	GME 20	4.70	3.89		0.047	0.155
	GME 21	4.53	8.42		0.113	0.356
MW05	GME 19	5.01	N/A	N/A	N/A	N/A
	GME 20	3.92				
	GME 21	4.83				
MW06	GME 19	4.85	20.5	N/A	N/A	0.011
	GME 20	5.25	1.1			0.019
	GME 21	4.77	0.41			0.010
MW07	GME 19	4.26	21.2	N/A	N/A	N/A
	GME 20	3.88	12.32			
	GME 21	4.05	-2.14			

Note

N/A – no event of three consecutive exceedance

Table 8 *EPL Clause 46.2: NT EPA notifiable exceedances: results greater than or equal to three times the assessment criteria*

Parameter/Analyte	Nickel		Zinc		Copper		Turbidity		EC	
	GME 20	GME 21	GME 20	GME 21	GME 20	GME 21	GME 20	GME 21	GME 20	GME 21
Assessment Criteria:	0.011 mg/L		0.008 mg/L		0.0014 mg/L		2 – 15 NTU		0 – 250 µS/cm	
MW01	N/A		N/A		N/A		75	46	N/A	N/A
MW02	N/A		N/A		N/A		1415	461	N/A	N/A
MW03	N/A		N/A		N/A		N/A	N/A	N/A	N/A
MW04	0.047	0.113	N/A	0.356	N/A		1362	116	14,890	16,598
MW05	N/A		N/A		0.007	N/A	N/A	N/A	N/A	N/A
MW06	N/A		N/A		N/A		63.7	N/A	N/A	N/A
MW07	N/A		N/A		N/A		352.7	1118	1129	2402

Note

N/A - No notifiable exceedance

7.3 Quality control/Quality Assurance

7.3.1 Field quality control

In accordance with NEPM (2013) quality control requirements, one duplicate sample was collected and analysed for each GME, achieving a 1:10 primary-to-duplicate pair sampling ratio. These samples were collected alongside a nominated primary sample and analysed as a blind duplicate. One laboratory prepared field blank was collected and analysed for each GME. These samples were collected from the laboratory and placed into the field esky that was used to preserve the samples collected on Site.

The duplicates and field blanks analysed are summarised in Table 9.

Table 9 April 2024 GME QAQC sample summary

April 2024 GME QAQC sample summary				
Parent sample	Duplicate sample	Sample Date	Laboratory	Analysis
MW06	Field Duplicate	24/04/2024	ALS	– TRH – BTEXN – 8 metals – PFAS
MW07	Field Duplicate	01/05/2024	ALS	– TRH – BTEXN – 8 metals – PFAS
-	Field Blank	23/04/2024	ALS	– BTEXN – TRH
-	Field Blank	23/04/2024	ALS	– BTEXN – TRH

There were no analytes detected greater than the laboratory LOR in the field blank samples analysed. The A summary of the RPD exceedances reported are provided in .

Table 10 RPD Summary

Sample ID	Parent Sample	Analyte	RPD Exceedance (%)
FD_01	MW06	Copper	40
FD_02	MW07	Copper	67
		Zinc	57
		Perfluorooctane sulfonic acid (PFOS)	133
		Perfluorohexane sulfonic acid (PFHxS)	150
		Perfluoroheptanoic acid (PFHpA)	40
		Perfluorohexanoic acid (PFHxA)	40
		Sum of PFHxS and PFOS	140

The majority of the detected concentrations detected as RPD exceedances are at or close to the LOR, with minor differences between the parent sample and duplicate sample. Overall based on field QA/QC results the dataset is considered of sufficient quality and reliable to fulfil the requirements of this investigation.

7.3.2 Laboratory QAQC results

The analysis of matrix spikes, matrix spike duplicates, internal laboratory control samples and surrogates was undertaken by the laboratory. A summary of the laboratory quality control procedures is given below:

- Samples were extracted and analysed within appropriate holding times.
- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control outliers occur.
- No Matrix Spike outliers occur.
- No surrogate recovery outliers occur.
- No Analysis Holding Time outliers exist.
- Quality Control Sample Frequency Outliers exist (see Table 11).
- Laboratory QAQC reports are presented within the laboratory documentation in Appendix D.

The majority of QC frequencies were met except for those listed in Table 11 and Table 12. Where QC frequencies were not met, they were 0% (below the expected rate of 5% and 10%). This is not considered to impact the results as the majority of QC frequencies for the laboratory duplicates and all surrogate recoveries were achieved.

Table 11 *Quality control sample frequency outliers (Laboratory Duplicates)*

Analyte	Method	Rate (%)		Quality control specification
		Actual	Expected	
Per- and polyfluoroalkyl substances (PFAS)	EP231X	0	10	NEMP 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	10	NEMP 2013 B3 & ALS QC Standard
TRH – Semi volatile fraction	EP071	0	10	NEMP 2013 B3 & ALS QC Standard

Table 12 *Quality control sample frequency outliers (Matrix spikes)*

Analyte	Method	Rate (%)		Quality control specification
		Actual	Expected	
Per- and polyfluoroalkyl substances (PFAS)	EP231X	0	5	NEMP 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	5	NEMP 2013 B3 & ALS QC Standard
TRH – Semi volatile fraction	EP071	0	5	NEMP 2013 B3 & ALS QC Standard

Quality control sample frequency Overall based on laboratory QA/QC results the dataset is considered of sufficient quality and reliable to fulfil the requirements of this investigation.

8. Air quality monitoring results

8.1 Summary of air quality data

Weather data was collected through the BOM (2024) website of past climate data. The weather monitoring results are summarised in Table 13. At the time of canister deployment, the weather conditions were noted as: warm, slightly humid, sunny with calm, south easterly winds.

Figure 5 displays the wind direction and speed over the 12-hour air quality monitoring period (30/04/2024 06:00 – 18:00) on a wind rose. The wind was south easterly in the morning and east north easterly in the afternoon.

The weather data collected during the oil application period indicated the locations of the three air quality monitoring locations: AQM01 and AQM03 were not optimal for this wind direction however these locations were identified to assess nearby potentially sensitive receptors.

Table 13 April 2024 AQME Weather monitoring data

Parameters	AQM01	AQM02	AQM03
Canister deployment			
Date / Time	30/04/2024 6:00	11/09/2023 6:10	11/09/2023 6:20
Wind speed	20 km/h		
Wind direction	SE		
Temperature	27.6		
Canister collection			
Date / Time	30/04/2024 18:00	11/09/2023 18:10	11/09/2023 18:20
Wind speed	28 km/h		
Wind direction	ENE		
Temperature	34.3		

8.2 Laboratory results

The following Table 14 provides a summary of the April AQME results. There were no reported concentrations of BTEXN in the three air samples submitted for analysis.

Table 14 April 2024 air quality monitoring results

Analyte	Assessment criteria (NEPM)	Unit	Sample pollutant concentration		
			AQM01	AQM02	AQM03
Benzene	0.01	ppb	<0.003	<0.005	<0.003
Toluene	3.766	ppb	<0.011	<0.022	<0.014
Ethylbenzene	N/A	ppb	<0.003	<0.007	<0.004
o-Xylene	1.085	ppb	<0.003	<0.007	<0.004
m- & p- Xylenes	N/A	ppb	<0.007	<0.013	<0.008
Naphthalene	2.17	ppb	<0.016	<0.008	<0.02
NA – no assessment criterion					

9. Oil assessment results

Samples of the oil were collected prior to, and on, the application day as per the conditions of EPL 218-02. An outline of these results are presented in Table 15. The full results are presented in Appendix E.

All concentrations of PCBs and PFAS were less than the laboratory LOR in the pre-application and application day oil samples.

Table 15 *Oil assessment results*

Analyte	Unit	LOR	24 April 2024	30 April 2024
PCBS				
PCBs	µg/L	1000	<1000	<1000
PFAS				
PFOS	µg/L	5	<5	<5
PFHxS	µg/L	5	<5	<5
PFOA	µg/L	5	<5	<5
6:2 Fluorotelomer Sulfonate (6:2 FTS)	µg/L	10	<10	<10
Sum of (PFHxS + PFOS)	µg/L	5	<5	<5
Sum of PFASs	µg/L	50	<50	<50
PFAS (Sum of Total) (WA DER List)	µg/L	10	<10	<10

10. Results

Groundwater

The analytical results reported concentrations below the laboratory LOR for the majority of analytes with exception of dissolved metals and PFAS. Generally, concentrations of heavy metals and PFAS were detected at each location, either pre-application or post-application.

The results are summarised below:

- Field pH concentrations were generally acidic across the Site and ranged from 3.88 pH units (MW07 in GME20) to 5.33 pH units (MW01 in GME21). Field pH exceeded the adopted assessment criteria in all of the bores.
- Concentrations of arsenic were detected at MW04 and MW07. Between GME 20 and 21, the concentrations of arsenic slightly increased at MW04 but decreased at MW07. Arsenic concentrations did not exceed the applied trigger value (0.013 mg/L).
- Cadmium was detected greater than the laboratory LOR at MW03, MW04 and MW07, with a slight increase noted during GME 21 (post-application). In comparison to the non-detect in GME 20, the concentration of cadmium at MW03 (0.001 mg/L), MW04 (0.0002 mg/L) and MW07 (0.0002 mg/L) was greater than the laboratory LOR during GME 21. However, cadmium concentrations did not exceed the applied trigger value (0.002 mg/L).
- Whilst chromium and mercury have been detected in previous GMEs, analytical results for GME 20 and 21 were less than the laboratory LOR for all bores.
- Concentrations of copper were detected greater than the laboratory LOR (0.001 mg/L) during both GMEs at MW02, MW03, MW04 and MW05. Copper concentrations exceeded the applied trigger values (0.0014 mg/L) during both GMEs at MW04 and MW05.
- Lead concentrations were detected greater than laboratory LOR at MW04 and MW07 with the latter bore result (0.005 mg/L) exceeding the applied trigger value (0.0034 mg/L) during GME 21. Lead concentrations decreased between GME 20 and GME 21 at MW04 and increased between GME 20 and GME 21 at MW07.
- Nickel and zinc exceeded the applied trigger values at MW04 during both GMEs consistent with historical concentrations at this monitoring bore. Zinc exceeded the applied trigger values at MW06 for both GMEs and was detected greater than laboratory LOR at MW05 and MW07 during the post-application GME 21. There was a slight increase in nickel and zinc levels during the post-application GME at MW04.
- PFAS concentrations (PFOS and PFOA) were detected greater than the laboratory LOR however, these were less than the nominated trigger values for samples collected from both GME 20 and GME 21.
- TRH and BTEXN were less than the respective laboratory LOR for both GME events.
- Groundwater pH values are reflective of the nature of the Site near the coast. Copper, zinc and nickel have been detected regularly throughout the GMEs undertaken to date and are likely to reflect natural background concentrations at the DTC.
- Two field duplicates and two field blanks were submitted to ALS for analysis. There were no detections of BTEXN and TRH greater than the laboratory LOR for the field blanks. RPD exceedances for copper, zinc and PFAS were detected within the field duplicates collected however, due to the minimal difference between the concentrations of the primary sample and duplicate sample these RPD exceedances likely do not have an impact on the validity of the results.

Air quality

- The air quality monitoring was undertaken on 30 April 2024, coinciding with the application of oil mixture to the track. The air quality monitoring program returned no detectable concentrations of BTEXN at any of the air quality monitoring locations.
- This indicates that there is low risk to residents in relation to the air quality during the oil application and tilling practices within the vicinity of the Darwin Turf Club.

Oil sampling

- Waste oil analysis was undertaken to assess its composition prior to track application. Results indicated concentrations of all analytes tested (PCBs and PFAS) were below the laboratory LOR.

11. Discussion

Groundwater monitoring and air monitoring were undertaken in April 2024 for the oil application event in accordance with EPL-218-02 and the EMP (GHD, 2023).

Generally, the field parameters remained at similar levels between GME 20 and GME 21. Some minor differences were observed for the field parameters between the GMEs, although there was no consistent change indicating significant impact from the oil application.

Field pH and temperature measurements were consistent with those of Darwin groundwater and are likely to reflect natural groundwater conditions. Turbidity ranged from high to low across the monitoring wells, but this is due to natural variations rather than the application of oil.

Heavy metal concentrations across the Site were generally higher compared to the previous GMEs. In September 2023 GMEs (GME 18 and 19), concentrations of copper were only detected in MW02 and MW04, with one result (MW02) exceeding the criteria. In comparison, copper concentrations were detected greater than LOR in all monitoring wells during the April 2024 GMEs (GME 20 and 21) except for MW01. Of these detections in GME 20 and 21, each well had at least one result greater than the exceedance criteria and results from MW04 and MW05 exceeding the adopted criteria during both GMEs.

Concentrations of copper, lead, nickel and zinc were detected greater than the adopted trigger values. Given the relative consistency of the range of concentrations across all GMEs at the Site, the metal concentrations are considered to be representative of natural groundwater conditions. Therefore, there is no obvious evidence to suggest the changes are due to the oil application and the levels do not pose a significant threat to human and ecological health on the Site.

Concentrations of BTEXN, TRH and PCBs were less than the laboratory LOR during both GMEs at all sampling locations. Other contaminants of concern including PFAS were detected greater than the laboratory LOR during both GMEs in a portion of sampling locations. However, there were no detections greater than the PFAS NEMP 2.0 trigger values.

Air quality monitoring results indicates the oil application events are not posing a significant risk to on Site and surrounding receptors to the Site, considering all air quality monitoring locations showed no results greater than laboratory LOR.

Results from the analysis of the waste oil applied to the track showed that all the CoPCs (PCBs and PFAS) were below the laboratory LORs.

12. Conclusions and recommendations

12.1 Conclusion

The groundwater monitoring and air quality monitoring undertaken during the April 2024 reporting period has generally met the requirements of the EMP (GHD, 2023) and EPL 218-02.

The GME and AQME results from this reporting period indicated that the track conditioning activity undertaken at the DTC, under EPL 218-02, has not contributed hydrocarbon contamination to the surrounding environment, nor is there evidence that it has materially impacted the quality of groundwater.

While exceedances of some parameters have been noted, these have been consistently reported in previous GMEs and both before and after oil application. This suggests that the exceedance concentrations are within naturally occurring ranges.

The groundwater and air monitoring results indicate that the track conditioning activity undertaken at the Darwin Turf Club approved under EPL 218-02 does not pose a significant health risk to the surrounding receptors.

As per EPL requirements, DTC is required to notify NT EPA of specific non-compliances with the EPL. These are listed in this report (Table 7 and Table 8 in Section 7.2). However, it is likely that trigger values exceedances reflect natural background conditions and responses to climatic effects rather than the application of oil.

12.2 Recommendations

Considering the results of this monitoring report and that of previous monitoring activities, the following recommendations are proposed:

- Although the surrounding environment exhibits minimal to no impact from the track conditioning activities, groundwater and air quality monitoring should continue to be undertaken as per NT EPA and EMP requirements.
- Redevelopment or attempt to clear the sediment / partial blockage of MW01 via bailer prior to the next groundwater monitoring event is recommended to ensure groundwater recharge and water levels within MW01 are sufficient to be sampled.

13. References

Australia and New Zealand Guidelines (ANZG), 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra, ACT, Australia. Accessed 25 September 2023. Available from <https://www.waterquality.gov.au/anz-guidelines>

Bureau of Meteorology (BOM) (2024). Darwin, Northern Territory April 2024 Dail Weather Observations. Accessed 10/05/25. Available from <http://www.bom.gov.au/climate/dwo/202404/html/IDCJDW8014.202404.shtml>.

Department of Climate Change, Energy, the Environment and Water 2020. Heads of EPAs of Australia and New Zealand PFAS National Environmental Management Plan 2.0 (NEMP). Accessed 25 September 2023. Available from **PFAS National Environmental Management Plan 2.0 - DCCEEW**

Department of Environment, Parks and Water Security (DEPWS)(2000) *Water Resources of the Darwin Area*. Northern Territory Government

Department of Primary Industry and Resources (DPIR), 2016. Methodology for the Sampling of Groundwater. Northern Territory Government. Accessed 19 May 2022. Available from https://nt.gov.au/__data/assets/pdf_file/0014/203360/aa7-024-methodology-for-the-sampling-of-groundwater-advisory-note.pdf

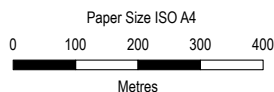
GHD (2023) *Environmental Management Plan for the Application of Used Oil*.

National Environment Protection Council (NEPC)2013. *The National Environment Protection (Air Toxics) Measure*. Australian Government. Accessed 25 September 2023. Available from **National Environment Protection (Air Toxics) Measure (legislation.gov.au)**

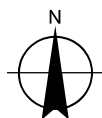
Appendices

Appendix A

Figures



Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 52



Darwin Turf Club Inc
EPL Monitoring

**Site Location -
Darwin Turf Club,
Fannie Bay Racecourse**

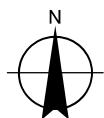
Project No. 12618429
Revision No. B
Date 21/09/2023

FIGURE 1



Paper Size ISO A4
0 25 50 75 100
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 52



Darwin Turf Club Inc
EPL Monitoring

**Groundwater depth contours and
flow direction - May 2024**

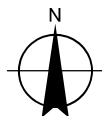
Project No. 12618429
Revision No. A
Date 21/05/2024

FIGURE 2



Paper Size ISO A4
0 25 50 75 100
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 52



Darwin Turf Club Inc
EPL Monitoring

Project No. 12618429
Revision No. A
Date 04/09/2023

Air Quality Sampling Locations

FIGURE 3

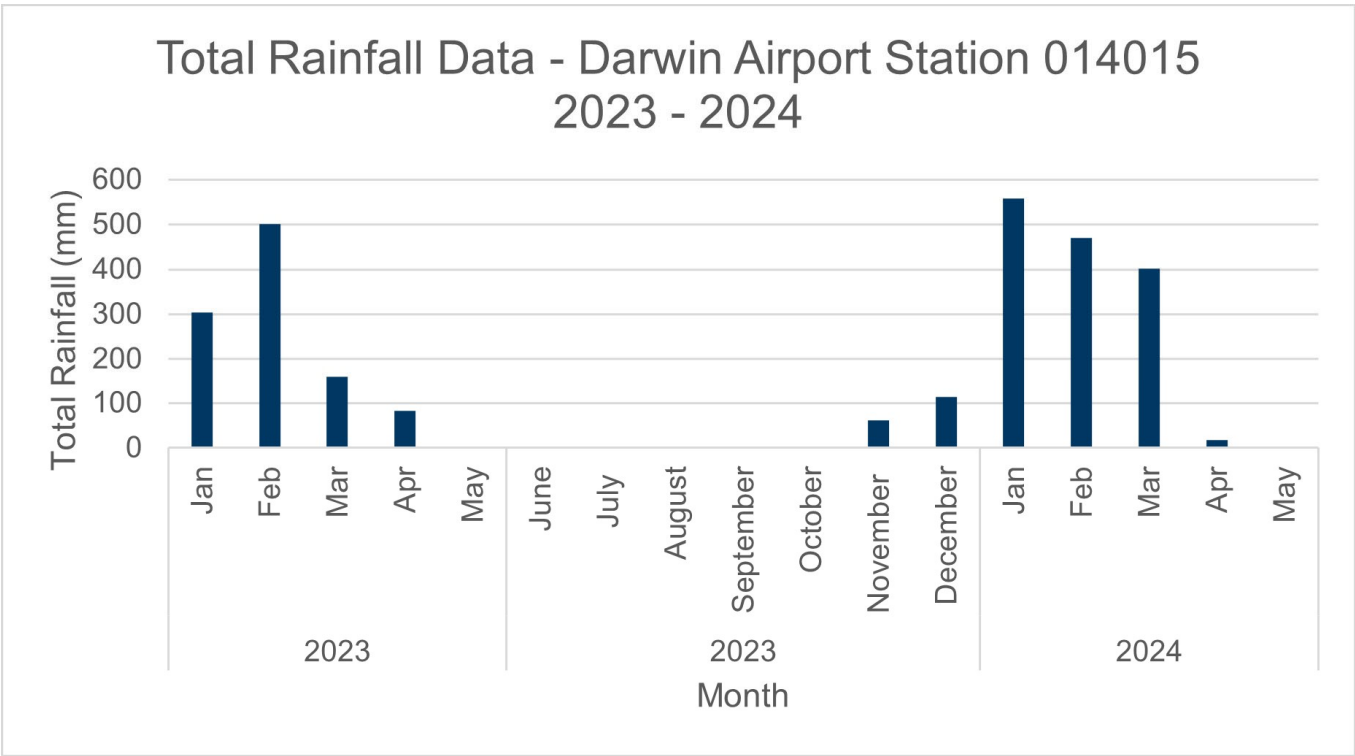


Figure 4 Rainfall data from Darwin Airport weather station (BOM, 2024)

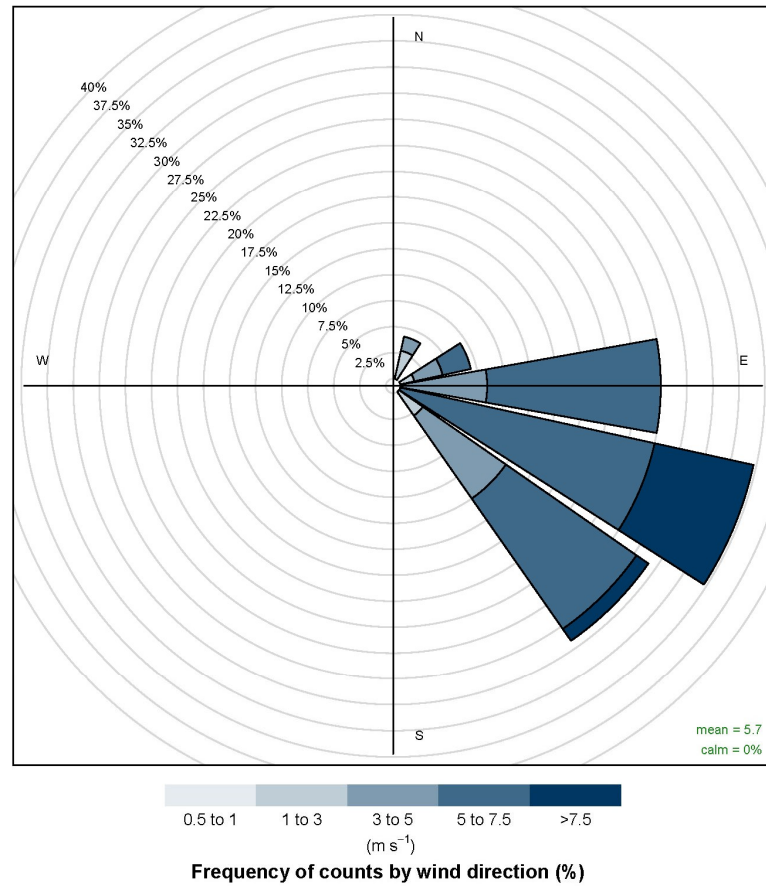


Figure 5 **Wind direction and speed over a 12 hour period on oil application day 30 April 2024**

Appendix B

EPL 218-02

ENVIRONMENT PROTECTION LICENCE(Pursuant to section 34 of the *Waste Management and Pollution Control Act*)

Licensee	Darwin Turf Club Inc.
Licence Number	EPL218 - 02
Registered Business Address	Darwin Turf Club Inc. 20 Dick Ward Drive Fannie Bay NT 0820
ABN	21 373 066 193
Premises Address	Lot 05298 Town of Darwin plan(s) S 79/109 20 DICK WARD DR, FANNIE BAY
Anniversary Date:	01 September
Commencement Date:	01/09/2022
Expiry Date:	31/08/2024
Scheduled Activity	Collecting, transporting, storing, re-cycling, treating or disposing of a listed waste (as per Table 1) on a commercial or fee for service basis, other than in or for the purpose of a sewage treatment plant. Operating premises, other than a sewage treatment plant, associated with collecting, transporting, storing, re-cycling, treating or disposing of a listed waste (as per Table 1) on a commercial or fee for service basis.
Description	Application of <i>waste mixtures</i> , or <i>waste emulsions</i> , of <i>oil and water or hydrocarbon and water</i> by disposal to Darwin Turf Club, Fannie Bay Racecourse for the purpose of conditioning the track twice yearly.

Table 1 - Listed Wastes Authorised to be Handled

Listed Waste	Collection	Transport	Storage	Treatment	Recycling	Disposal
Waste mixtures, or waste emulsions, of oil and water or hydrocarbon and water	✗	✗	✗	✗	✗	✓

✓ Activity authorised by this licence

✗ Activity not authorised by this licence

ENVIRONMENT PROTECTION LICENCE 218 - 02

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ATTACHMENTS

- 1 12526136-REP-0_Environmental Management Plan for the Application of Used Oil.pdf_11568393.pdf

ENVIRONMENT PROTECTION LICENCE 218 - 02

INFORMATION ABOUT THIS LICENCE

- This licence does not in any way relieve the licence holder from its obligations to comply with the *Waste Management and Pollution Control Act* (WMPC Act), including the general environmental duty in section 12 of the WMPC Act and the duty to notify of incidents causing or threatening to cause pollution under section 14 of the WMPC Act.

Duration of a licence (section 40, 43 and 45 of the WMPC Act)

- A licence will remain in force until its expiry date or until it is surrendered by the licensee or is suspended or cancelled in accordance with the WMPC Act.
- The licensee must notify the Northern Territory Environment Protection Authority (NT EPA) within 14 days after ceasing to conduct the activity.
- The licensee may, with the approval of the NT EPA, surrender the licence to the NT EPA.

Amendment or Revocation of a licence (section 37 of the WMPC Act)

- The licensee may apply to amend or revoke a condition of this licence.
- A fee applies and the application must be made using the designated form via NT EPA Online.
- The NT EPA may also amend or revoke a condition of this licence as set out in section 38 of the WMPC Act.

Transfer of a licence (section 46 of the WMPC Act)

- The licensee can apply to transfer their licence to another person.

Renewal of a licence (section 40 of the WMPC Act and section 3 of the Regulations)

- The licensee may apply for the renewal of their licence not earlier than 90 days, and not later than 30 days, before their licence expires.
- A fee applies and the application must be made via NT EPA Online.

Public Register

- A copy of environment protection licences and any plans for environmental management, reports, submissions or documents required as a condition of an environment protection licence, will be placed on a register in accordance with section 9 of the WMPC Act.
- A copy of the Annual Return will be placed on the register.
- The NT EPA makes this register freely available from the NT EPA website.

Environment Protection Objectives (Part 4 of the WMPC Act), and Water Quality Standards (section 73 of the *Water Act*)

- 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.

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- The following EPOs and Beneficial Use Declarations (BUDs) are relevant to this licence:
 - Darwin Harbour Region: Aquaculture, environment, cultural, rural stock and domestic

Environmental Interests

- This section highlights sensitivity of the surrounding land use and environment associated with the location of the approved activity.
- Sites of Conservation Significance
- Ramsar Wetland

Cultural Interests

- It is the licensee's responsibility to contact the Aboriginal Areas Protection Authority, appropriate land council or other governing body and ensure that any Authority Certificates required as a result of conducting the licenced activity are obtained and complied with.

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RULES FOR INTERPRETING THE CONDITIONS OF THIS LICENCE

- Where there is a discrepancy between the conditions of this licence and any plan, standard, guideline or other document referred to in this licence, the conditions of this licence prevail to the extent of the inconsistency.
- Any reference to any standard (Australian or international) in this licence means the relevant parts of the current version of that standard.
- A reference to any guideline or code of practice (or to the relevant parts of any guideline or code of practice) in this licence means the current version of the guideline or code of practice.
- Under section 39 of the WMPC Act, any contravention of or failure to comply with this licence by the licensee may be an offence.
- In determining whether the licensee has committed an offence, the licensee may be liable for the conduct of its directors, employees or agents.
- The licensee should ensure that each of its directors, employees, contractors or agents are aware of, and comply with, this licence.
- In this licence, unless the contrary intention appears, words that are defined in the WMPC Act are intended to have the meaning given to them in that Act.

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LICENCE CONDITIONS

GENERAL

- 1 The licensee must ensure the contact details recorded in NT EPA Online for this licence are correct at all times.
- 2 The licensee must at all times have a 24 hour emergency contact.
- 3 The licensee must notify the NT EPA prior to making any operational change that will cause, or is likely to cause, an increase in the potential for environmental harm.
- 4 The licensee must pay via NT EPA Online the annual fee calculated in accordance with the method prescribed in the Regulations within 10 business days of the anniversary date of this licence, for each year or part of a year that this licence is in force.
- 5 The licensee must cause clear and legible signage, in English, to be displayed in a prominent location at each public entrance to the premises that includes the following details:
 - 5.1 environment protection licence number issued under the WMPC Act; and
 - 5.2 24 hour emergency contact details.
- 6 The licensee must cause a copy of this licence to be available for inspection by any person, in hard copy form, at the premises.
- 7 The licensee must provide to the NT EPA, within 10 business days of a request, a copy of any document, monitoring data or other information in relation to the activity, in the format requested by the NT EPA.
- 8 All notices, reports, documents or other correspondence required to be provided as a condition of this licence, unless otherwise specified as a condition of this licence, must be provided in electronic form by uploading the document via NT EPA Online (or by emailing waste@nt.gov.au).
- 9 The licensee must implement, maintain and follow the documents listed in Table 2.
Table 2 - Documents Relevant to the Licenced Activity

Document Ref.	Document Name
12526136	Fannie Bay Racecourse Environmental Management Plan (EMP) for the Application of Used Oil, Rev 0, 21 January 2022
- 10 Within 10 business days of any amendment being made to a document listed in Table 2 the licensee must provide the amended document to the NT EPA, along with:
 - 10.1 a tabulated summary of the amendment(s) with document references;
 - 10.2 reasons for the amendment(s); and
 - 10.3 an assessment of environmental risk associated with the amendment(s).
- 11 The NT EPA may require the licensee to revise or amend and resubmit any amended document. Where the NT EPA requires a document to be resubmitted, the licensee must submit it to the NT EPA by the date specified by the NT EPA.
- 12 The licensee must, for the duration of this licence, implement, maintain and follow a Consultation and Communication Plan which includes a strategy for communicating with persons who are likely to have a real interest in, or be affected by, the activity.

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- 13 The licensee must operate and maintain a community feedback number.
- 14 The licensee must display the community feedback number:
 - 14.1 where the licensee has a website, in a prominent location on the licensee's website;
 - 14.2 in the Consultation and Communication Plan; and
 - 14.3 in other publicly available documents relating to the activity.
- 15 The licensee must maintain a Complaint Log for all complaints received by the licensee in relation to the activity.
- 16 The licensee must ensure that the Complaint Log includes, for each complaint received by the licensee, the following information:
 - 16.1 the person to whom the complaint was made;
 - 16.2 the person responsible for managing the complaint;
 - 16.3 the date and time the complaint was reported;
 - 16.4 the date and time of the event(s) that led to the complaint;
 - 16.5 the contact details of the complainant if known, or where no details are provided a note to that effect;
 - 16.6 the nature of the complaint;
 - 16.7 the nature of event(s) giving rise to the complaint;
 - 16.8 prevailing weather conditions at the time (where relevant to the complaint);
 - 16.9 the action taken in relation to the complaint, including any follow-up contact with the complainant; and
 - 16.10 if no action was taken, why no action was taken.
- 17 The licensee must implement, maintain and follow an Emergency Response Plan that addresses procedures for responding to emergencies associated with the activity that may cause environmental harm.

EARLY SURRENDER OF LICENCE

- 18 Any reports, records or other information required or able to be provided by the licensee under this licence must be submitted to the NT EPA prior to the licensee surrendering the licence. If the date on which a report, record or other information is required falls after the date the licensee requests to surrender this licence, the licensee must provide the report, record or information as far as possible using data available to the licensee up to and including the date the request to surrender the licence is made.

OPERATIONAL

- 19 The licensee must, without limiting any other condition of this licence, in conducting the activity, do all things reasonable and practicable to ensure the activity does not adversely affect the Declared Beneficial Uses and Objectives as declared from time to time, including those applying to:
- *Darwin Harbour Region*

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- 20 The licensee must not collect, transport, store, recycle, treat or dispose of listed waste other than the listed waste specified in Table 1.
- 21 The licensee must ensure any plant and equipment used by the licensee in conducting the activity:
- 21.1 is reasonably fit for the purpose and use to which it is put;
 - 21.2 is maintained;
 - 21.3 is operated by a person trained to use the plant and equipment; and
- 22 The licensee must ensure that wastewater generated from washing plant and equipment associated with the activity does not cause pollution.
- 23 The licensee must ensure that all listed waste being transported to the premises is transported by a person licenced under section 30 of the WMPC Act to transport the listed waste.
- 24 The licensee must notify the NT EPA, two weeks in advance, of the proposed dates for the application of listed waste to the track at the premises.

DISCHARGES AND EMISSIONS

- 25 The licensee must not allow a contaminant or waste, which causes or may cause environmental harm, to enter water.
- 26 The licensee must ensure there is no migration or overflow of a contaminant or waste, which causes or may cause environmental harm, beyond the boundary of the land on which the premises are located. (For the avoidance of doubt, this condition is not intended to authorise the discharge of a contaminant or waste to any land or water which discharge has not been specifically authorised by another condition of this licence.)
- 27 The licensee must ensure that stormwater does not come into contact with a contaminant or waste, which causes or may cause environmental harm.
- 28 The licensee must ensure that discharges from the premises do not:
- 28.1 contain any floating debris, oil, grease, petroleum hydrocarbon sheen, scum, litter or other objectionable matter;
 - 28.2 cause or generate odours which would adversely affect the use of surrounding waters;
 - 28.3 cause visible change in the behaviour of fish or other aquatic organisms in the receiving water;
 - 28.4 cause algal blooms in the receiving water;
 - 28.5 cause mortality of fish or other aquatic organisms; or
 - 28.6 cause adverse impacts on plants.
- 29 The activity must not cause or release, beyond the boundary of the premises offensive odour.

MONITORING

- 30 The licensee must conduct air and groundwater monitoring in accordance with section 9 of the EMP referred to in Table 2.

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- 31 The licensee must conduct surface water and soil monitoring in accordance with the programs developed under conditions 32 and 33.
- 32 The licensee must develop a surface water quality monitoring program to monitor for total recoverable hydrocarbons and benzene, toluene, ethylbenzene and xylene (BTEX) in surface water leaving the premises. A copy of the surface water quality program must be submitted to the NT EPA by 30 September 2022.
- 33 The licensee must develop a soil monitoring program and provide it to the NT EPA by 30 September 2022.
- 34 Prior to the application of listed waste (per Table 1) to the Fannie Bay Racecourse, the licensee must analyse a representative sample of the listed waste to be applied. The sample must:
- 34.1 be representative to the extent practicable; and
 - 34.2 test for other listed waste, including polychlorinated biphenyls (PCBs) and per-and polyfluoroalkyl substances (PFAS).
- 35 The licensee must provide the results of the sampling taken under condition 34 to the NT EPA within two business days of receipt.
- 36 The licensee must ensure any samples collected in accordance with the Monitoring Plan or in connection with the activity or this licence, are obtained by, or under the supervision of a qualified sampler.
- 37 The licensee must ensure that all monitoring samples are analysed at a laboratory with current NATA accreditation or equivalent, for the parameters to be measured.
- 38 The licensee must ensure that, for each sample collected in accordance with the Monitoring Plan or the activity the following information must be recorded and retained:
- 38.1 the date on which the sample was collected;
 - 38.2 the time at which the sample was collected;
 - 38.3 the location at which the sample was collected;
 - 38.4 the name of the person who collected the sample;
 - 38.5 the chain of custody forms relating to the sample;
 - 38.6 the field measurements (if any) and analytical results (if any) relating to the sample; and
 - 38.7 laboratory quality assurance and quality control documentation.
- 39 The NT EPA may require the licensee to revise or amend and resubmit the Monitoring Plan. Where the NT EPA requires the Monitoring Plan to be resubmitted, the licensee must submit it to the NT EPA by the date specified by the NT EPA.
- 40 The licensee must ensure that any proposed revisions to the Monitoring Plan (other than typographical changes or revisions to formatting or referencing) are:
- 40.1 reviewed by a suitably qualified professional;
 - 40.2 submitted to the NT EPA with justification for revisions; and
 - 40.3 submitted to the NT EPA, in electronic form (with a complete copy of the qualified professional's written review), 20 business days prior to the proposed implementation date.

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RECORDING AND REPORTING

- 41 The licensee must keep and maintain records relating to the activity undertaken and the listed waste handled by the licensee in each successive 12 month period following the commencement of this licence, which include:
- 41.1 the date of collection;
 - 41.2 the source of the listed waste;
 - 41.3 the name of the transport company, if not the licensee;
 - 41.4 the vehicle registration;
 - 41.5 a description of the listed waste;
 - 41.6 the quantity of the listed waste;
 - 41.7 the final destination of the listed waste; and
 - 41.8 whether the listed waste was stored, recycled, treated or disposed of.
- 42 The licensee must retain records relating to waste, including listed waste, as required by the conditions of this licence, for a period of 2 years after the end of the 12 month period to which the record relates.
- 43 The licensee must keep records of all non-compliances with this licence. These records must be adequate to enable the licensee to comply with the non-compliance notification conditions of this licence.
- 44 The licensee must notify the NT EPA of any non-compliance with this licence by completing the Non-Compliance Notification via NT EPA Online (or by emailing waste@nt.gov.au), as soon as practicable after (and in any case within 24 hours after) first becoming aware of the non-compliance.
- 45 The licensee must include in the notification of non-compliance the following information:
- 45.1 when the non-compliance was detected and by whom;
 - 45.2 the date and time of the non-compliance;
 - 45.3 the actual and potential causes and contributing factors to the non-compliance;
 - 45.4 the risk of environmental harm arising from the non-compliance;
 - 45.5 the action(s) that have or will be undertaken to mitigate any environmental harm arising from the non-compliance;
 - 45.6 corrective actions that have or will be undertaken to ensure the non-compliance does not reoccur;
 - 45.7 if no action was taken, why no action was taken; and
 - 45.8 a date when an incident investigation report will be submitted to the NT EPA.
- 46 A non-compliance with this licence includes:
- 46.1 an exceedance of a trigger value specified in Attachment 1 on three consecutive sampling occasions; or
 - 46.2 an exceedance of a trigger value specified in Attachment 1 on a single occasion where the parameter measures greater than or equal to three times or more the trigger value.

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- 47 The licensee must keep records of all exceedances of trigger values specified in Attachment 1. These records must be adequate to enable the licensee to comply with the exceedance notification conditions of this licence.
- 48 The licensee must submit a completed Annual Return form to waste@nt.gov.au within 10 business days after each anniversary date of this licence, which relates to the preceding 12 month period.
- 49 The licensee must complete and provide to the NT EPA a Monitoring Report, as prescribed by this licence, within 10 business days after each anniversary date of this licence.
- 50 The licensee must ensure that each Monitoring Report:
- 50.1 is prepared in accordance with the requirements of the NT EPA 'Guideline for Reporting on Environmental Monitoring';
 - 50.2 includes a tabulation of all monitoring data required as a condition of this licence and any additional data used as part of the analysis and interpretation undertaken in the report, to be submitted in electronic Microsoft® Excel® format;
 - 50.3 includes long term trend analysis of monitoring data to demonstrate any environmental impact associated with the activity over a minimum period of three years (where the data is available). Data used in this analysis must be provided electronically in Microsoft® Excel® format; and
 - 50.4 includes an assessment of environmental impact from the activity.
- 51 The NT EPA may require the licensee to revise or amend and resubmit any Monitoring Report. Where the NT EPA requires the Monitoring Report to be resubmitted, the licensee must submit it to the NT EPA by the date specified by the NT EPA.

END OF LICENCE CONDITIONS

This licence is not valid unless signed below:



Peter Vasel
Director Environmental Operations
Delegate of the Northern Territory
Environment Protection Authority
Dated: 23/08/2022

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DEFINITIONS

All terms in the Licence which are defined in the *Waste Management and Pollution Control Act* have the meaning given in that Act unless otherwise or further defined in this section.

DEFINITION	In this licence, unless a contrary intention appears:
24 hour emergency contact	the phone number of a person who can be contacted at any time and be capable of responding to and providing information about any incident associated with the activity.
Activity	the Scheduled activity as described on the covering page of this licence.
Air	includes any layer of the atmosphere.
Annual fee	yearly fee payable in respect of the activity as specified in the WMPC Act and the Regulations.
Annual Return	an NT EPA prescribed format for demonstrating and reporting compliance with the conditions of this licence and providing information on waste volumes for the preceding 12 month period.
ANZECC/ARMCANZ	Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, 2000: National Water Quality Management Strategy: Australian Guidelines for Water Quality Monitoring and Reporting.
Asbestos containing material	any material that contains asbestos.
Business days	a day not Saturday, Sunday or a public holiday, in the Northern Territory.
Community feedback number	a telephone number enabling members of the public to contact, at any time, a person or voice mail system that can accept, on behalf of the licensee, enquiries or complaints about the activity, and to which the licensee must respond.
Complaint Log	a register of complaints to be maintained by the Licensee that records the details of each complaint received in relation to the activity.
Consultation and Communication Plan	a written plan documenting proposed consultation and communications for the activity before, during and after the activity which includes a strategy for communicating with members of the public who are likely to have a real interest in, or be affected by, the activity.
Contact details	includes the 24 hour emergency contact, and name, position title and phone number of a representative of the licensee who can be contacted about the licence and activity.
Contaminant	a solid, liquid or gas or any combination of such substances and includes: (a) noise, odour, heat and electromagnetic radiation; (b) a prescribed substance or prescribed class of substances; and (c) a substance having a prescribed property or prescribed class of properties.
Discharges	allow a liquid, gas or other substance to flow out from where it has been confined.
Disposal schedule	a plan for disposing of asbestos containing material such that asbestos containing material is not stored in perpetuity.

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Emergency Response Plan	a written plan documenting the licensee's procedures for responding to emergencies caused by, resulting from or associated with the activity and that may cause environmental harm.
Environmental audit	has the meaning given in section 47 of the WMPC Act.
Environmental harm	(a) any harm to or adverse effect on the environment; or (b) any potential harm (including the risk of harm and future harm) to or potential adverse effect on the environment, of any degree or duration and includes environmental nuisance.
Environmental nuisance	means: (a) an adverse effect on the amenity of an area that: (i) is caused by noise, smoke, dust, fumes or odour; and (ii) unreasonably interferes with or is likely to unreasonably interfere with the enjoyment of the area by persons who occupy a place within the area or are otherwise lawfully in the area; or (b) an unsightly or offensive condition caused by contaminants or waste.
Incident	includes: (a) an accident, emergency or malfunction; and (b) a deliberate action, whether or not that action was taken by the person conducting the activity in the course of which the incident occurred.
Land	includes water and air on, above or under land.
Landfill cell	a purpose built area for the disposal of waste within a landfill.
Landfill Closure and Post Closure Plan	a written plan which specifies the landfill closure and post-closure activities as set out in the NT EPA Guidelines for the Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory.
Leachate	any liquid produced by the action of water percolating through waste, and that contains contaminants.
Listed waste	a waste included under Schedule 2 of the Regulations.
Litter	litter, garbage, rubbish, refuse or waste matter, and includes the body of a dead animal.
Maintain	kept in a manner that it does not present or cause a risk of environmental harm or a hazard to persons or property or, for the purposes of documents including plans, a process of reviewing and amending documentation to ensure it is relevant.
Material environmental harm	environmental harm that: (a) is not trivial or negligible in nature; (b) consists of an environmental nuisance of a high impact or on a wide scale; (c) results, or is likely to result, in not more than \$50,000 or the prescribed amount (whichever is greater) being spent in taking appropriate action to prevent or minimise the environmental harm or rehabilitate the environment; or (d) results in actual or potential loss or damage to the value of not more than \$50,000 or the prescribed amount (whichever is greater).
Monitoring Plan	the monitoring programs required by conditions 30 and 31.
NATA	National Association of Testing Authorities, Australia.
Non-compliance	failure or refusal to comply, whether by act or omission, with obligations or requirements and includes any exceedance of a licence limit.

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Non-compliance notification	an NT EPA prescribed format for notifying the NT EPA of a non-compliance.
NT EPA Online	online system for Environment Protection Licence (EPL), Environment Protection Approval (EPA) and Waste Discharge Licence (WDL) lodgement and maintenance.
NT EPA Online Vehicle Register	the vehicle register found at NT EPA Online.
Plant and equipment	all material items used in association with the activity, including (but not limited to) storage vessels and containers, pipe work and hosing, vehicles (including vessels), tools, and measuring equipment.
Point source discharge	means any discernible, confined or discrete conveyance from which contaminants or waste are or may be discharged.
Pollute	(a) emit, discharge, deposit, or disturb, directly or indirectly, a contaminant or waste; or (b) cause, permit, or fail to prevent, directly or indirectly, the emission, discharge, deposition, disturbance or escape of a contaminant or waste.
Pollution	(a) a contaminant or waste that is emitted, discharged, deposited or disturbed or that escapes; or (b) a contaminant or waste, effect or phenomenon, that is present in the environment as a consequence of an emission, discharge, deposition, escape or disturbance or a contaminant or waste.
Premises	the premises identified in this licence which includes equipment, plant and structures, whether stationary or portable, and the land on which premises are situated.
Public entrance	access to the premises that is utilised by the public.
Putrescible waste	the component of the waste stream liable to become putrid. For example, organic matter that has the potential to decompose with the formation of malodorous substances, usually refers to vegetative, food and animal products.
Qualified person	a person registered under Section 68 of the WMPC Act.
Qualified sampler	a person who has training and experience in obtaining samples from the relevant environmental medium.
Regulations	<i>Waste Management and Pollution Control (Administration) Regulations.</i>
Rehabilitation Plan	a written plan to ensure that the objectives of rehabilitation are achieved as set out in the NT EPA Guidelines for the Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory.
Serious environmental harm	environmental harm that is more serious than material environmental harm and includes environmental harm that: (a) is irreversible or otherwise of a high impact or on a wide scale; (b) damages an aspect of the environment that is of a high conservation value, high cultural value or high community value or is of special significance; (c) results or is likely to result in more than \$50,000 or the prescribed amount (whichever is greater) being spent in taking appropriate action to prevent or minimise the environmental harm or rehabilitate the environment; or (d) results in actual or potential loss or damage to the value of more than \$50,000 or the prescribed amount (whichever is greater).

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Solid inert waste	solid waste that has no active chemical or biological properties. These wastes do not undergo environmentally significant physical, chemical or biological transformation.
Stormwater	water flowing over ground surfaces, in natural streams and drains as a direct result of rainfall over a catchment and consists primarily of rainfall runoff.
Trigger values	assigned value for each indicator used to assess the risk to an environmental value, a value that initiates some type of pre-defined management action.
Waste	(a) a solid, a liquid or a gas; or (b) a mixture of such substances, that is or are left over, surplus or an unwanted by-product from any activity (whether or not the substance is of value) and includes a prescribed substance or class of substances.
Waste transport certificate	the NT EPA waste tracking documentation used to track listed waste being transported interstate as required in accordance with the National Environment Protection (Movement of Controlled Waste Between States and Territories) Measure.
Wastewater	water that contains a contaminant or waste.
Water	includes: (a) surface water, ground water and tidal waters; (b) coastal waters of the Territory, within the meaning of the <i>Coastal Waters (Northern Territory Powers) Act 1980</i> of the Commonwealth; and (c) water containing an impurity.
WMPC Act	the Northern Territory <i>Waste Management and Pollution Control Act</i> .

Appendix C

Field Results

Bore ID: MWO 1

Job Information		Sampling Information		Bore Information	
Client: DTC	Purge Method:	SWL(mbTOC): 2.44	m	Logic Check:	
Project: DTC EPL	Sample Method: Perc.	Screen: From: to: m		Stick Up: m	
Proj. No.: 12618429	WQ Meter Type:	NAPL Check:		Bore Diam.: mm	
Sampler: KG	Flow Cell: Y N	Pump Depth: m		Ref.datum:	Well Cap Secure?
Date: 24/4/24	WLevel Meter Type: Dip / Fox / Int.Fce / Gge	Bore Depth: 3.01	m		
Round: 2	Field Filtered Y N (filter vessel, disposable filter/syringe)				

[illegible]

Field QA Checks:											
Air bubbles in vials? Y / ☒ N	Any violent reactions? Y / ☒ N										
Decontamination as per GHD procedure? (Y) / N											
Was sampling equipment pre-cleaned? ☒ N											
COC updated? ☒ N											

Parameters	BTEX	TPH	PAH	CHC	PCB	OCF	OPP	Tot. Metal	Biol.					
Preservatives														

Purge Volumes

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

Comment: Duplicate samples collected, bottles used, access, container used.
 PID=0.8 Final SWL=2.44

Purge Volumes			
Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7
*Double for gravel pack			

Purging and Sampling Record

Bore ID: MW02

Job Information		Sampling Information		Bore Information	
Client: DTC		Purge Method:		SWL(mbTOC): 2495	m Logic Check:
Project: DTC EP2		Sample Method: Perc		Screen: From:.....to:.....	m Stick Up: m
Proj. No.: 2618429		WQ Meter Type:		NAPL Check:.....	Bore Diam.: mm
Sampler: K5		Flow Cell: ☒ Y / N	Pump Depth:.....m	Ref.datum:	Well Cap Secure?.....
Date: 2/4/24		WLevel Meter Type: ☒ Dip / Fox / Int.Fce / Gge		Bore Depth: 4.29	m
Round: 1		Field Filtered ☒ Y / N (filter vessel, disposable filter/syringe)			

[illegible]

Field QA Checks:											
Air bubbles in vials?	(N)	Any violent reactions?	Y	(N)							
Decontamination as per GHD procedure?	(Y)	(N)									
Was sampling equipment pre-cleaned?	(Y)	(N)									
COC updated?	(Y)	(N)									

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.				
Preservatives													

Purge Volumes

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

Comment: Duplicate sample
PID = 0.5 Final SWL.

Purge Volumes			
Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7
*Double for gravel pack			

Purging and Sampling Record

Bore ID: MW03

Job Information	Sampling Information	Bore Information
Client: DTC	Purge Method:	SWL(mbTOC): 2685 m
Project: DTC EP2	Sample Method: P.S.	Screen: From: to: m
Proj. No.: 12618429	WQ Meter Type:	Stick Up: m
Sampler: 66	Flow Cell: ☒ / N	NAPL Check: Bore Diam.: mm
Date: 24/4/4	Pump Depth: m	Ref. datum: Well Cap Secure?
Round: 1	WLevel Meter Type: ☒ Dip / Fox / Int.Fce / Gge	Bore Depth: 4.62 m
	Field Filtered ☒ / N (filter vessel, disposable filter/syringe)	

[illegible]

Field QA Checks:

Air bubbles in vials? Y ☒ N ☐ Any violent reactions? Y ☒ N ☐
Decontamination as per GHD procedure? Y ☒ N ☐
Was sampling equipment pre-cleaned? Y ☒ N ☐
COC updated? Y ☒ N ☐

[illegible]

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

$P \pm D = 0.2$ Final SWL = 2.65

Purge Volumes

Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7

*Double for gravel pack



Purging and Sampling Record

Bore ID: MW04

Job Information Client: <u>DIC</u> Project: <u>DIC EPL</u> Proj. No.: <u>12618429</u> Sampler: <u>KG</u> Date: <u>24/4/24</u> Round: <u>3</u>		Sampling Information Purge Method: Sample Method: <u>Peri</u> WQ Meter Type: Flow Cell: <u>Q</u> N Pump Depth: m WLevel Meter Type: <u>Dip</u> / Fox / Int.Fce / Gge Field Filtered: <u>Y</u> / N (filter vessel, disposable filter/syringe)		Bore Information SWL(mbTOC): <u>2.24</u> m Logic Check: Screen: From: to: m Stick Up: m NAPL Check: Bore Diam.: mm Ref.datum: Well Cap Secure?: Bore Depth: <u>5.095</u> m	
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Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (.....)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	SWL (m TOC)	<u>NTU</u> (.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV	stable		
11:38	0.5	34.6	4.81	17529	0.20	-514.5	37.40	2.36	Clear, no odour.
11:41	1	34.7	4.63	17428	-0.02	-508.3	2.36	101.27	
11:44	1.5	34.7	4.64	17812	-0.05	-497.5	2.32	107.79	" "
11:47	2	34.6	4.69	16628	0.01	-404.2	2.32	496.79	Clear, white floating particles. NO Odor.
11:50	2.5	34.8	4.75	15935	0.025	-264.9	2.31	760.0	" "
11:53	3	34.9	4.73	15711	0.32	-255.6	2.314	810.91	" "
11:56	3.5	34.9	4.70	15659	0.36	-259.9	2.313	1124.20	
11:59	4	34.9	4.68	15583	0.37	-269.3	2.32	1227.15	~~Sampled~~ " "
12:02	4.5	35.0	4.70	14890	0.27	-300.7	2.32	1362.05	Sampled

Field QA Checks: Air bubbles in vials? Y / <u>N</u> Any violent reactions? Y / <u>N</u> Decontamination as per GHD procedure? Y / <u>N</u> Was sampling equipment pre-cleaned? Y / <u>N</u> COC updated? Y / <u>N</u>		<table border="1"> <tr> <th>Parameters</th><th>BTEX</th><th>TPH</th><th>PAH</th><th>CHC</th><th>PCB</th><th>OCF</th><th>OPP</th><th>Tot. Metal</th><th>Biol.</th><th></th><th></th><th></th><th></th></tr> <tr> <td>Preservatives</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>	Parameters	BTEX	TPH	PAH	CHC	PCB	OCF	OPP	Tot. Metal	Biol.					Preservatives													
Parameters	BTEX	TPH	PAH	CHC	PCB	OCF	OPP	Tot. Metal	Biol.																					
Preservatives																														

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

PID = 0.7 Final SWL = 2.23.

Purge Volumes
 Casing Int. Dia (mm) 50 100 150
 Vol (L/m of casing) 2.0 7.9 17.7
 *Double for gravel pack

Purging and Sampling Record

Bore ID: MWOS

Job Information		Sampling Information		Bore Information	
Client: <u>DTC</u>	Purge Method:	SWL(mbTOC): <u>4.885</u>		m	Logic Check:
Project: <u>DTC EPL</u>	Sample Method: <u>Pc pump</u>	Screen: From: to: m			Stick Up: m
Proj. No.: <u>12618429</u>	WQ Meter Type:	NAPL Check:			Bore Diam.: mm
Sampler: <u>KC</u>	Flow Cell: <u>D</u> / N	Ref.datum:			Well Cap Secure?
Date: <u>24/4/24</u>	Pump Depth: m	Bore Depth: <u>6.49</u>		m	
Round: <u>1</u>	WLevel Meter Type: <u>Dip</u> / Fox / Int.Fce / Gge				
	Field Filtered? <u>D</u> N (filter vessel, disposable filter/syringe)				

[illegible]

Field QA Checks:

Air bubbles in vials? Y / N Any violent reactions? Y / N

Decontamination as per GHD procedure? ☒ Y / NWas sampling equipment pre-cleaned? ☒ Y / N

COC updated? (Y) / N

[illegible]

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

$PFD = 0.3$ Final 4.54 m.

Purge Volumes

Large Volumes			
Casing Int. Dia (mm)	50	100	150

Vol (L/m of casing)	2.0	7.9	17.7
---------------------	-----	-----	------

*Double for gravel pack



Purging and Sampling Record

Bore ID: MW06

Job Information Client: <u>DTC</u> Project: <u>12618429 DTC EP</u> Proj. No.: Sampler: <u>KG</u> Date: <u>24/04/24</u> Round: <u>1</u>		Sampling Information Purge Method: <u>Per</u> Sample Method: WQ Meter Type: Flow Cell: <u>0</u> N Pump Depth: WLevel Meter Type: <u>Dip</u> Fox / Int.Fce / Gge Field Filtered? <u>Y</u> N (filter vessel, disposable filter/syringe)		Bore Information SWL(mbTOC): <u>5.50</u> m Logic Check: Screen: From: to: m Stick Up: m NAPL Check: Bore Diam.: mm Ref.datum: Well Cap Secure? <u>X</u> Bore Depth: <u>7.70</u> m	
---	--	--	--	---	--

Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (.....)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	SWL (m TOC)	<u>NTU</u>	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV	stable		
9:48	0.5	32.0	5.47	643	0.93	-581.6	5:50	32.82	Clear
9:51	1	32.3	5.37	621	0.85	-578.6	5:49	36.54	Clear
9:54	1.5	32.4	5.32	576	0.27	-575.0	5:49	~~32.82~~	209.24, Turbid. Brown. No odour.
9:57	2	32.5	5.28	576	0.12	-566.2	5.485	526.78/19	Clear
10:00	2.5	32.1	5.26	577	0.10	-556.8	5.48	3164.96	
10:03	3	32.4	5.24	577	0.11	-552.9	5.48	63.4	Clear
10:07	3.5	32.4	5.26	578	0.11	-549.2	5.48	76.83	
10:10	4	32.4	5.25	578	0.08	-536.1	5.48	63.71	Sampled Clear

Field QA Checks: Air bubbles in vials? Y <u>N</u> Any violent reactions? Y <u>N</u> Decontamination as per GHD procedure? Y <u>N</u> Was sampling equipment pre-cleaned? Y <u>N</u> COC updated? Y <u>N</u>		<table border="1"> <tr> <th>Parameters</th><th>BTEX</th><th>TPH</th><th>PAH</th><th>CHC</th><th>PCB</th><th>OCP</th><th>OPP</th><th>Tot. Metal</th><th>Biol.</th><th></th><th></th><th></th><th></th></tr> <tr> <td>Preservatives</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>	Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.					Preservatives													
Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.																					
Preservatives																														

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

PID = 0.1 Fired SWL = 5.48 FP-01 taken

Purge Volumes
 Casing Int. Dia (mm) 50 100 150
 Vol (L/m of casing) 2.0 7.9 17.7
 *Double for gravel pack



Purging and Sampling Record

Bore ID: MW07

Job Information Client: <u>DIC</u> Project: <u>DIC EPL</u> Proj. No.: <u>2618429</u> Sampler: <u>LEG</u> Date: <u>24/1/24</u> Round: <u>1</u>		Sampling Information Purge Method: <u>Per</u> Sample Method: <u>Per</u> WQ Meter Type: <u>Flow Cell: γ N</u> Pump Depth: <u>.....</u> m WLevel Meter Type: <u>dp) Fox / Int.Fce / Gge</u> Field Filtered? <u>(X) N</u> (filter vessel, disposable filter/syringe)		Bore Information SWL(mbTOC): <u>3.04</u> m Logic Check: <u>.....</u> Screen: From: <u>.....</u> to: <u>.....</u> m Stick Up: <u>.....</u> m NAPL Check: <u>.....</u> Bore Diam.: <u>.....</u> mm Ref.datum: <u>.....</u> Well Cap Secure? <u>NO - loose</u> Bore Depth: <u>6.06</u> m	
--	--	---	--	---	--

Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (.....)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	SWL (m TOC)	NTU (.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):	-	-	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV	stable		
15:05	0.5	31.7	4.21	4432	-0.02	-345.4	3.085	52.01	Clear, white particulates, no o ocs.
15:08	1	31.7	4.0	3633	-0.12	-385.6	3.065	46.34	" "
15:11	1.5	31.5	4.06	3024	-0.14	-401.4	3.085	84.62	" "
15:14	2	31.3	3.95	2480	-0.14	-403.7	3.085	156.94	" "
15:17	2.5	31.3	3.81	2239	-0.12	-375.9	3.085	285.14	" "
15:20	3	31.4	3.75	1921	0.13	-254.3	3.085	299.30	" "
15:23	3.5	31.5	3.84	1613	0.55	-212.3	3.083	345.50	" "
15:26	4	31.5	3.88	1337	0.75	-204.3	3.085	331.04	" "
15:29	4.5	31.3	3.90	1215	0.87	-192.3	3.083	366.26	" "
15:32	5	31.3	3.86	1129	0.91	-187.7	3.085	352.76	Sampled

Field QA Checks:
 Air bubbles in vials? Y / (N) Any violent reactions? Y / (N)
 Decontamination as per GHD procedure? (X) N
 Was sampling equipment pre-cleaned? (X) N
 COC updated? (X) N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.					
Preservatives														

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

PID = 0.3 Final SWL = 3.085

Purge Volumes
 Casing Int. Dia (mm) 50 100 150
 Vol (L/m of casing) 2.0 7.9 17.7
 *Double for gravel pack

Bore ID: MW01

Job Information		Sampling Information		Bore Information	
Client: <u>DTC</u>	Purge Method: <u>Peri</u>	SWL(mbTOC): <u>2.51</u>	Logic Check:		
Project: <u>DTC FPL</u>	Sample Method:	Screen: From: to:	Stick Up: m		
Proj. No.: <u>12618429</u>	WQ Meter Type:	NAPL Check:	Bore Diam.: mm		
Sampler: <u>KG</u>	Flow Cell: <u>Y</u> N Pump Depth: m	Ref. datum:	Well Cap Secure?		
Date: <u>1/5/24</u>	WL Level Meter Type: <u>Dip</u> Fox / Int.Fce / Gge	Bore Depth: <u>3 m.</u>	m		
Round <u>2</u>	Field Filtered? <u>Y</u> N (filter vessel, disposable filter/syringe)				

[illegible]

Field QA Checks:

Air bubbles in vials? Y ☒ N ☒ Any violent reactions? Y ☒ N ☒

Decontamination as per GHD procedure? ☒ Y ☒ N ☒

Was sampling equipment pre-cleaned? ☒ Y ☒ N ☒

COC updated? ☒ Y ☒ N ☒

[illegible]

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

PTD=0.2 Foral SWL=2.52

Purge Volumes			
Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7
*Double for gravel pack			

Bore ID: MW02

Job Information		Sampling Information		Bore Information	
Client: DTC		Purge Method: Per		SWL(mbTOC): 2.568	m
Project: DTC EPL		Sample Method:		Screen: From: to: m	Stick Up: m
Proj. No.: 12618429		WQ Meter Type:		NAPL Check:	Bore Diam.: mm
Sampler: V6		Flow Cell: ① N	Pump Depth: m	Ref.datum:	Well Cap Secure?
Date: 1/8/24		WLevel Meter Type: ① Fox / Int.Fce / Gge		Bore Depth: 4.28	m
Round: 2		Field Filtered ① N (filter vessel, disposable filter/syringe)			

[illegible][illegible]

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

$PID = 0.2$ Final SWt = 2.57

<i>Purge Volumes</i>			
Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7
*Double for gravel pack			

Bore ID: MW03

Job Information		Sampling Information		Bore Information	
Client: DTC		Purge Method: Perc		SWL(mbTOC): 2.73	
Project: DTC EPL		Sample Method:		Screen From: to m	Logic Check: m
Proj. No.: 12618429		WQ Meter Type:		NAPL Check:	Bore Diam.: mm
Sampler: CG		Flow Cell ☒ N	Pump Depth: m	Ref.datum:	Well Cap Secure?
Date: 1/5/24		WLevel Meter Type: ☒ Dip / Int.Fce / Gge		Bore Depth: 4.62	m
Round: 2		Field Filtered ☒ N (filter vessel, disposable filter/syringe)			

[illegible]

Field QA Checks:

Air bubbles in vials? Y/N Any violent reactions? Y/N
Decontamination as per GHD procedure? Y/N
Was sampling equipment pre-cleaned? Y/N
COC updated? Y/N

[illegible]

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

$P_{TD} = 0.3$ Final Sub = 2.73

Purge Volumes

Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7

*Double for gravel pack

Bore ID: MWOS

Job Information		Sampling Information		Bore Information	
Client: <u>DTC</u>		Purge Method: <u>Puri</u>		SWL(mbTOC): <u>3.41</u>	m
Project: <u>DTC EPL</u>		Sample Method:		Screen: From: to: m	Stick Up: m
Proj. No.: <u>2618429</u>		WQ Meter Type:		NAPL Check:	Bore Diam.: mm
Sampler: <u>KG</u>		Flow Cell: <u>Y</u> / N	Pump Depth: m	Ref.datum:	Well Cap Secure?
Date: <u>1/5/24</u>		WLevel Meter Type: <u>Dip</u> / Fox / Int.Fce / Gge		Bore Depth: <u>5.50</u>	m
Round: <u>2</u>		Field Filtered: <u>Y</u> / N (filter vessel, disposable filter/syringe)			

[illegible]

Field QA Checks:
 Air bubbles in vials? Y / ☒ N Any violent reactions? Y / ☒ N
 Decontamination as per GHD procedure? ☒ Y / N
 Was sampling equipment pre-cleaned? ☒ Y / N
 COC updated? ☒ Y / N

[illegible]

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

PID = 0.3 Free SWL: 3.06

Purge Volumes

Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7

*Double for gravel pack



Purging and Sampling Record

Bore ID: MW06

Job Information Client: <u>DTC</u> Project: <u>DTC EPL</u> Proj. No.: <u>128 12618429</u> Sampler: <u>KG</u> Date: <u>1/5/24</u> Round: <u>2</u>		Sampling Information Purge Method: <u>Peri</u> Sample Method: <u></u> WQ Meter Type: <u></u> Flow Cell: <u>Q/N</u> Pump Depth: <u></u> m WLevel Meter Type: <u>Q/N</u> / Fox / Int.Fce / Gge Field Filtered? <u>Q/N</u> (filter vessel, disposable filter/syringe)		Bore Information SWL(mbTOC): <u>4.68</u> m Logic Check: <u></u> Screen: From: <u></u> to: <u></u> m Stick Up: <u></u> m NAPL Check: <u></u> Bore Diam.: <u></u> mm Ref.datum: <u></u> Well Cap Secure? <u>Y</u> Bore Depth: <u>16.66</u> m	
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Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (.....)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	SWL (m TOC)	NTU (.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV	stable		
10:03	0.5	32.0	5.15	640	0.22	-510.2	4.62	26.18	Clear, white fleecy particulates, no OorS.
10:06	1	32.2	4.87	611	0.12	-502.87	4.61	17.14	" "
10:09	1.5	32.2	4.81	643	0.06	-499.6	4.61	18.94	" "
10:12	2	32.2	4.78	643	0.05	-494.1	4.61	19.20	" " ~~Sampled~~
10:15	2.5	32.2	4.77	644	0.03	-486.1	4.61	21.93	" " Sampled.

Field QA Checks: Air bubbles in vials? <u>Q/N</u> Any violent reactions? <u>Y</u> <u>Q/N</u> Decontamination as per GHD procedure <u>Q/N</u> Was sampling equipment pre-cleaned? <u>Q/N</u> COC updated? <u>Q/N</u>		<table border="1"> <tr> <th>Parameters</th><th>BTEX</th><th>TPH</th><th>PAH</th><th>CHC</th><th>PCB</th><th>OCF</th><th>OPP</th><th>Tot. Metal</th><th>Biol.</th><th></th><th></th><th></th><th></th><th></th></tr> <tr> <th>Preservatives</th><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>	Parameters	BTEX	TPH	PAH	CHC	PCB	OCF	OPP	Tot. Metal	Biol.						Preservatives														
Parameters	BTEX	TPH	PAH	CHC	PCB	OCF	OPP	Tot. Metal	Biol.																							
Preservatives																																

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

P20=0.2 Finest SWL=4.61

Purge Volumes
 Casing Int. Dia (mm) 50 100 150
 Vol (L/m of casing) 2.0 7.9 17.7
 *Double for gravel pack



Purging and Sampling Record

Bore ID: MW07

Job Information Client: <u>DTC</u> Project: <u>DTC EPL</u> Proj. No.: <u>12618429</u> Sampler: <u>K.G.</u> Date: <u>1/5/24</u> Round: <u>2</u>		Sampling Information Purge Method: <u>Per.</u> Sample Method: WQ Meter Type: Flow Cell: <u>Q</u> / N Pump Depth: m WLevel Meter Type: <u>Dip</u> Fox / Int.Fce / Gge Field Filtered? <u>(Y)</u> / N (filter vessel, disposable filter/syringe)		Bore Information SWL(mbTOC): <u>3.128</u> m Logic Check: Screen: From: to: m Stick Up: m NAPL Check: Bore Diam.: mm Ref.datum: Well Cap Secure? Bore Depth: <u>6.05</u> m	
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Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (.....)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	SWL (m TOC)	<u>NTU</u> (.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV	stable		
9:15	0.5	30.5	4.45	3864	0.15	-595.1	3.24	890.71	Clear, white floating particulates, No Sor O.
9:18	1.5	30.5	4.14	~~33307~~ 33307	0.02	-555.5	3.24	886.46	" "
9:21	1.5	30.5	4.05	3007	-0.05	-529.9	3.23	845.67	" "
9:24	2	30.5	4.04	2827	-0.06	-525.7	3.23	1012.51	" "
9:27	2.5	30.5	4.03	2557	-0.13	-520.3	3.22	1049.78	" "
9:30	3	30.6	4.05	2402	-0.16	-518.6	3.23	1172.68	" " Sampled.

Field QA Checks: Air bubbles in vials? Y <u>(N)</u> Any violent reactions? Y <u>(N)</u> Decontamination as per GHD procedure? <u>(Y)</u> / N Was sampling equipment pre-cleaned? <u>(Y)</u> / N COC updated? <u>(Y)</u> / N		<table border="1"> <tr> <th>Parameters</th><th>BTEX</th><th>TPH</th><th>PAH</th><th>CHC</th><th>PCB</th><th>OCP</th><th>OPP</th><th>Tot. Metal</th><th>Biol.</th><th></th><th></th><th></th><th></th><th></th></tr> <tr> <th>Preservatives</th><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>	Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.						Preservatives														
Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.																							
Preservatives																																

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

FD-02 collected. Final SWL ~ 8.24. PFD-0

Purge Volumes
 Casing Int. Dia (mm) 50 100 150
 Vol (L/m of casing) 2.0 7.9 17.7
 *Double for gravel pack

Appendix D

Laboratory Results



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES2413470**

Client : **GHD PTY LTD**
Contact : **JO LAVERS**
Address : **Level 7 24 Mitchell Street**
DARWIN NT, AUSTRALIA 0800

E-mail : **jo.lavers@ghd.com**
Telephone : **----**
Facsimile : **----**

Project : **12618429**
Order number : **12618429**
C-O-C number : **----**
Site :
Sampler : **KIERAN GURUNG**

Laboratory : **Environmental Division Sydney**
Contact : **Samiksha Sathish**
Address : **277-289 Woodpark Road Smithfield**
NSW Australia 2164

E-mail : **samiksha.sathish@alsglobal.com**
Telephone : **+61-2-8784 8555**
Facsimile : **+61-2-8784 8500**

Page : **1 of 3**
Quote number : **EB2020GHDSE0038 (EN/000)**
QC Level : **NEPM 2013 B3 & ALS QC Standard**

Dates

Date Samples Received : **30-Apr-2024 15:30**
Client Requested Due : **07-May-2024**
Date

Issue Date : **01-May-2024**
Scheduled Reporting Date : **07-May-2024**

Delivery Details

Mode of Delivery : **Client Drop Off**
No. of coolers/boxes : **1**
Receipt Detail :

Security Seal : **Not Available**
Temperature : **13.8°C - Ice present**
No. of samples received / analysed : **9 / 9**

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

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

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP066-PCB-WA Polychlorinated Biphenyls (PCB)	WATER - EP231 PFAS - Short Suite (12 analytes)	WATER - W-05 TRH/BTEXN/8 Metals	WATER - W-18 TRH(C6 - C9)/BTEXN
ES2413470-001	24-Apr-2024 00:00	MW01	✓	✓	✓	
ES2413470-002	24-Apr-2024 00:00	MW02	✓	✓	✓	
ES2413470-003	24-Apr-2024 00:00	MW03	✓	✓	✓	
ES2413470-004	24-Apr-2024 00:00	MW04	✓	✓	✓	
ES2413470-005	24-Apr-2024 00:00	MW05	✓	✓	✓	
ES2413470-006	24-Apr-2024 00:00	MW06	✓	✓	✓	
ES2413470-007	24-Apr-2024 00:00	MW07	✓	✓	✓	
ES2413470-008	24-Apr-2024 00:00	FD_01	✓	✓	✓	
ES2413470-009	23-Apr-2024 00:00	Trip Blank				✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.



Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)

Email accountspayableAU@ghd.com

Accounts Payable Australia

- A4 - AU Tax Invoice (INV)

Email accountspayableAU@ghd.com

GHD LAB REPORTS

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- EDI Format - ESDAT (ESDAT)
- Electronic SRN for ESDat (ESRN ESDAT)

[illegible]

JO LAVERS

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- A4 - AU Tax Invoice (INV)
- Chain of Custody (CoC) (COC)
- EDI Format - ESDAT (ESDAT)
- EDI Format - XTab (XTAB)
- Electronic SRN for ESDat (ESRN ESDAT)

[illegible]

KIERAN GURUNG

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - ESDAT (ESDAT)
- EDI Format - XTab (XTAB)
- Electronic SRN for ESDat (ESRN ESDAT)

[illegible]



CERTIFICATE OF ANALYSIS

Work Order : ES2413470
Client : GHD PTY LTD
Contact : JO LAVERS
Address : Level 7 24 Mitchell Street
DARWIN NT, AUSTRALIA 0800
Telephone : ----
Project : 12618429
Order number : 12618429
C-O-C number : ----
Sampler : KIERAN GURUNG
Site :
Quote number : EN/000
No. of samples received : 9
No. of samples analysed : 9

Page : 1 of 10
Laboratory : Environmental Division Sydney
Contact : Samiksha Sathish
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 30-Apr-2024 15:30
Date Analysis Commenced : 01-May-2024
Issue Date : 07-May-2024 16:04



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	Position	Accreditation Category
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20mL or 125mL bottles have been tested in accordance with the QSM5.4 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration or as per tables in USEPA 1633 where listed. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS and also conform to QSM 5.4 (US DoD) requirements.



Analytical Results

Sub-Matrix: TRIP BLANK
 (Matrix: WATER)

Sample ID

				Trip Blank	----	----	----	----
Sampling date / time				23-Apr-2024 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2413470-009	-----	-----	-----	-----
				Result	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	----	----	----	----
[^] C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	----	----	----
Toluene	108-88-3	2	µg/L	<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	----	----
[^] Total Xylenes	----	2	µg/L	<2	----	----	----	----
[^] Sum of BTEX	----	1	µg/L	<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	109	----	----	----	----
Toluene-D8	2037-26-5	2	%	102	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	101	----	----	----	----

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW01	MW02	MW03	MW04	MW05
Sampling date / time				24-Apr-2024 00:00	24-Apr-2024 00:00	24-Apr-2024 00:00	24-Apr-2024 00:00	24-Apr-2024 00:00	
Compound	CAS Number	LOR	Unit	ES2413470-001	ES2413470-002	ES2413470-003	ES2413470-004	ES2413470-005	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	0.002	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	<0.001	0.002	0.002	0.003	0.007	
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.002	0.047	0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.003	
Zinc	7440-66-6	0.005	mg/L	0.006	0.006	0.006	0.155	0.007	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls		----	1	µg/L	<1	<1	<1	<1	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction		----	20	µg/L	<20	<20	<20	<20	
C10 - C14 Fraction		----	50	µg/L	<50	<50	<50	<50	
C15 - C28 Fraction		----	100	µg/L	<100	<100	<100	<100	
C29 - C36 Fraction		----	50	µg/L	<50	<50	<50	<50	
^ C10 - C36 Fraction (sum)		----	50	µg/L	<50	<50	<50	<50	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction		C6_C10	20	µg/L	<20	<20	<20	<20	
^ C6 - C10 Fraction minus BTEX (F1)		C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	
>C10 - C16 Fraction		----	100	µg/L	<100	<100	<100	<100	
>C16 - C34 Fraction		----	100	µg/L	<100	<100	<100	<100	
>C34 - C40 Fraction		----	100	µg/L	<100	<100	<100	<100	
^ >C10 - C40 Fraction (sum)		----	100	µg/L	<100	<100	<100	<100	
^ >C10 - C16 Fraction minus Naphthalene (F2)		----	100	µg/L	<100	<100	<100	<100	
EP080: BTEXN									

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW01	MW02	MW03	MW04	MW05
Sampling date / time				24-Apr-2024 00:00	24-Apr-2024 00:00	24-Apr-2024 00:00	24-Apr-2024 00:00	24-Apr-2024 00:00	
Compound	CAS Number	LOR	Unit	ES2413470-001	ES2413470-002	ES2413470-003	ES2413470-004	ES2413470-005	
				Result	Result	Result	Result	Result	
EP080: BTEXN - Continued									
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1	
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2	
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2	
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2	
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2	
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2	
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1	
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.01	0.01	<0.01	<0.01	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.02	0.02	0.04	0.02	0.01	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.13	0.15	0.12	0.05	<0.02	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.07	0.07	0.06	<0.02	<0.02	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.03	0.03	0.03	<0.02	<0.02	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EP231P: PFAS Sums									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW01	MW02	MW03	MW04	MW05
Sampling date / time					24-Apr-2024 00:00	24-Apr-2024 00:00	24-Apr-2024 00:00	24-Apr-2024 00:00	24-Apr-2024 00:00
Compound	CAS Number	LOR	Unit		ES2413470-001	ES2413470-002	ES2413470-003	ES2413470-004	ES2413470-005
					Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		0.02	0.03	0.05	0.02	0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		0.25	0.28	0.26	0.07	0.01
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	1	%		113	95.7	119	106	102
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		113	106	118	129	116
Toluene-D8	2037-26-5	2	%		102	99.1	110	117	112
4-Bromofluorobenzene	460-00-4	2	%		107	98.8	116	117	111
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		100	99.9	95.5	98.6	100
13C8-PFOA	----	0.02	%		108	106	101	106	104

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW06	MW07	FD_01	----	----
Sampling date / time				24-Apr-2024 00:00	24-Apr-2024 00:00	24-Apr-2024 00:00	----	----	
Compound	CAS Number	LOR	Unit	ES2413470-006	ES2413470-007	ES2413470-008	-----	-----	
				Result	Result	Result	----	----	
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.001	<0.001	----	----	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----	
Copper	7440-50-8	0.001	mg/L	0.003	0.001	0.002	----	----	
Nickel	7440-02-0	0.001	mg/L	0.003	0.002	0.003	----	----	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----	
Zinc	7440-66-6	0.005	mg/L	0.019	0.007	0.019	----	----	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----	
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls		----	1	µg/L	<1	<1	<1	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction		----	20	µg/L	<20	<20	<20	----	----
C10 - C14 Fraction		----	50	µg/L	<50	<50	<50	----	----
C15 - C28 Fraction		----	100	µg/L	<100	<100	<100	----	----
C29 - C36 Fraction		----	50	µg/L	<50	<50	<50	----	----
^ C10 - C36 Fraction (sum)		----	50	µg/L	<50	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction		C6_C10	20	µg/L	<20	<20	<20	----	----
^ C6 - C10 Fraction minus BTEX (F1)		C6_C10-BTEX	20	µg/L	<20	<20	<20	----	----
>C10 - C16 Fraction		----	100	µg/L	<100	<100	<100	----	----
>C16 - C34 Fraction		----	100	µg/L	<100	<100	<100	----	----
>C34 - C40 Fraction		----	100	µg/L	<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)		----	100	µg/L	<100	<100	<100	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)		----	100	µg/L	<100	<100	<100	----	----
EP080: BTEXN									

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW06	MW07	FD_01	----	----
Sampling date / time				24-Apr-2024 00:00	24-Apr-2024 00:00	24-Apr-2024 00:00	----	----	
Compound	CAS Number	LOR	Unit	ES2413470-006	ES2413470-007	ES2413470-008	-----	-----	
				Result	Result	Result	----	----	
EP080: BTEXN - Continued									
Benzene	71-43-2	1	µg/L	<1	<1	<1	----	----	
Toluene	108-88-3	2	µg/L	<2	<2	<2	----	----	
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	----	----	
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	----	----	
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	----	----	
^ Total Xylenes	----	2	µg/L	<2	<2	<2	----	----	
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	----	----	
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	----	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	----	----	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	----	----	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.02	0.01	0.02	----	----	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	----	----	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	----	----	
EP231P: PFAS Sums									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW06	MW07	FD_01	----	----
Sampling date / time					24-Apr-2024 00:00	24-Apr-2024 00:00	24-Apr-2024 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2413470-006	ES2413470-007	ES2413470-008	-----	-----
					Result	Result	Result	----	----
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		0.02	0.01	0.02	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		0.02	0.01	0.02	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	1	%		104	106	109	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		124	120	117	----	----
Toluene-D8	2037-26-5	2	%		108	110	109	----	----
4-Bromofluorobenzene	460-00-4	2	%		109	113	111	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		97.1	96.8	93.9	----	----
13C8-PFOA	----	0.02	%		103	105	102	----	----



Surrogate Control Limits

Sub-Matrix: TRIP BLANK		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	72	143
Toluene-D8	2037-26-5	75	131
4-Bromofluorobenzene	460-00-4	73	137

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	45	134
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	72	143
Toluene-D8	2037-26-5	75	131
4-Bromofluorobenzene	460-00-4	73	137
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120



QUALITY CONTROL REPORT

Work Order : **ES2413470**

Page : 1 of 7

Client : **GHD PTY LTD**

Contact : **JO LAVERS**

Address : Level 7 24 Mitchell Street
DARWIN NT, AUSTRALIA 0800

Telephone : ----

Project : 12618429

Order number : 12618429

C-O-C number : ----

Sampler : **KIERAN GURUNG**

Site :

Quote number : EN/000

No. of samples received : 9

No. of samples analysed : 9

Laboratory : Environmental Division Sydney

Contact : Samiksha Sathish

Address : 277-289 Woodpark Road Smithfield NSW Australia 2164

Telephone : +61-2-8784 8555

Date Samples Received : 30-Apr-2024

Date Analysis Commenced : 01-May-2024

Issue Date : 07-May-2024



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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC

* = The final LOR has been raised due to dilution or other sample specific cause; adjusted LOR is shown in brackets. The duplicate ranges for Acceptable RPD% are applied to the final LOR where applicable.

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 5764492)									
ES2413470-001	MW01	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.006	<0.005	21.7	No Limit
ES2413895-004	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.009	0.009	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.048	0.049	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 5765281)									
ES2413822-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.021	0.021	0.0	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.010	0.010	0.0	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 5765281) - continued									
ES2413822-001	Anonymous	EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.325	0.335	3.2	0% - 20%
ES2414253-002	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001 (0.0010)*	mg/L	<0.0010	<0.0010	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001 (0.010) *	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001 (0.010) *	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001 (0.010) *	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001 (0.010) *	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001 (0.010) *	mg/L	0.017	0.017	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005 (0.050) *	mg/L	<0.050	<0.050	0.0	No Limit
		EG035F: Dissolved Mercury by FIMS (QC Lot: 5764493)							
ES2413470-002	MW02	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
ES2413895-003	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 5765282)									
ES2414269-003	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
ES2413987-024	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 5760589)									
ES2413470-001	MW01	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
ES2413654-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 5760589)									
ES2413470-001	MW01	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
ES2413654-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 5760589)									
ES2413470-001	MW01	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
ES2413654-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080: BTEXN (QC Lot: 5760589) - continued									
ES2413654-001	Anonymous	EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit



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

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

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG020F: Dissolved Metals by ICP-MS (QCLot: 5764492)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	107	85.0	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.3	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	95.2	85.0	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	96.9	81.0	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	95.8	83.0	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	94.9	82.0	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	103	81.0	117
EG020F: Dissolved Metals by ICP-MS (QCLot: 5765281)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	114	85.0	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	93.9	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.3	85.0	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	92.0	81.0	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	92.8	83.0	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	89.2	82.0	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	107	81.0	117
EG035F: Dissolved Mercury by FIMS (QCLot: 5764493)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	89.9	83.0	105
EG035F: Dissolved Mercury by FIMS (QCLot: 5765282)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	94.2	83.0	105
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 5760385)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	10 µg/L	93.2	68.9	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5760384)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	65.3	53.7	97.0
EP071: C15 - C28 Fraction	----	100	µg/L	<100	600 µg/L	87.1	63.3	107
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	96.7	58.3	120
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5760589)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	99.5	75.0	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5760384)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	500 µg/L	74.2	53.9	95.5
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	700 µg/L	97.6	57.8	110

Matrix Spike (MS) Report

Sub-Matrix: WATER

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 5764492)							



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 5764492) - continued							
ES2413470-002	MW02	EG020A-F: Arsenic	7440-38-2	2 mg/L	96.3	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.5 mg/L	77.2	70.0	130
		EG020A-F: Chromium	7440-47-3	2 mg/L	81.3	70.0	130
		EG020A-F: Copper	7440-50-8	2 mg/L	84.2	70.0	130
		EG020A-F: Lead	7439-92-1	2 mg/L	83.1	70.0	130
		EG020A-F: Nickel	7440-02-0	2 mg/L	77.9	70.0	130
		EG020A-F: Zinc	7440-66-6	2 mg/L	91.2	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 5765281)							
ES2413795-001	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	117	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	100	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	109	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	101	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	103	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	93.2	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	112	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 5764493)							
ES2413470-001	MW01	EG035F: Mercury	7439-97-6	0.01 mg/L	86.6	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 5765282)							
ES2413470-008	FD_01	EG035F: Mercury	7439-97-6	0.01 mg/L	87.5	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5760589)							
ES2413470-001	MW01	EP080: C6 - C9 Fraction	----	325 µg/L	99.0	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5760589)							
ES2413470-001	MW01	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	97.8	70.0	130
EP080: BTEXN (QCLot: 5760589)							
ES2413470-001	MW01	EP080: Benzene	71-43-2	25 µg/L	110	70.0	130
		EP080: Toluene	108-88-3	25 µg/L	92.9	70.0	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	93.9	70.0	130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	94.0	70.0	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	25 µg/L	94.3	70.0	130
		EP080: Naphthalene	91-20-3	25 µg/L	89.1	70.0	130



QA/QC Compliance Assessment to assist with Quality Review

Work Order : ES2413470

Page : 1 of 7

Client : GHD PTY LTD
Contact : JO LAVERS
Project : 12618429
Site :
Sampler : KIERAN GURUNG
Order number : 12618429

Laboratory : Environmental Division Sydney
Telephone : +61-2-8784 8555
Date Samples Received : 30-Apr-2024
Issue Date : 07-May-2024
No. of samples received : 9
No. of samples analysed : 9

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Matrix: WATER

Analysis Holding Time Compliance

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

Evaluation: ✖ = Holding time breach : ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) MW01, MW03, MW05, MW07 MW02, MW04, MW06,	24-Apr-2024	----	----	----	02-May-2024	21-Oct-2024	✓
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) FD_01	24-Apr-2024	----	----	----	03-May-2024	21-Oct-2024	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG035F) MW01, MW03, MW05, MW07 MW02, MW04, MW06, FD_01	24-Apr-2024	----	----	----	06-May-2024	22-May-2024	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP066: Polychlorinated Biphenyls (PCB)								
Amber Glass Bottle - Unpreserved (EP066) MW01, MW02	24-Apr-2024	01-May-2024	01-May-2024	✓	05-May-2024	10-Jun-2024	✓	
Amber Glass Bottle - Unpreserved (EP066) MW03, MW04, MW05, MW06, MW07, FD_01	24-Apr-2024	01-May-2024	01-May-2024	✓	06-May-2024	10-Jun-2024	✓	
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071) MW01, MW02, MW03, MW04, MW05, MW06, MW07, FD_01	24-Apr-2024	01-May-2024	01-May-2024	✓	06-May-2024	10-Jun-2024	✓	
Amber TOC Vial - Sulfuric Acid (EP080) Trip Blank	23-Apr-2024	01-May-2024	07-May-2024	✓	01-May-2024	07-May-2024	✓	
Amber VOC Vial - Sulfuric Acid (EP080) MW01, MW02, MW03, MW04, MW06, MW07, FD_01	24-Apr-2024	01-May-2024	08-May-2024	✓	01-May-2024	08-May-2024	✓	
Amber VOC Vial - Sulfuric Acid (EP080) MW05	24-Apr-2024	01-May-2024	08-May-2024	✓	02-May-2024	08-May-2024	✓	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber Glass Bottle - Unpreserved (EP071) MW01, MW02, MW03, MW04, MW05, MW06, MW07, FD_01	24-Apr-2024	01-May-2024	01-May-2024	✓	06-May-2024	10-Jun-2024	✓	
Amber TOC Vial - Sulfuric Acid (EP080) Trip Blank	23-Apr-2024	01-May-2024	07-May-2024	✓	01-May-2024	07-May-2024	✓	
Amber VOC Vial - Sulfuric Acid (EP080) MW01, MW02, MW03, MW04, MW06, MW07, FD_01	24-Apr-2024	01-May-2024	08-May-2024	✓	01-May-2024	08-May-2024	✓	
Amber VOC Vial - Sulfuric Acid (EP080) MW05	24-Apr-2024	01-May-2024	08-May-2024	✓	02-May-2024	08-May-2024	✓	

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Amber TOC Vial - Sulfuric Acid (EP080) Trip Blank	23-Apr-2024	01-May-2024	07-May-2024	✓	01-May-2024	07-May-2024	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW01, MW03, MW06, FD_01	24-Apr-2024	01-May-2024	08-May-2024	✓	01-May-2024	08-May-2024	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW05	24-Apr-2024	01-May-2024	08-May-2024	✓	02-May-2024	08-May-2024	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X) MW01, MW03, MW05, MW07,	24-Apr-2024	02-May-2024	21-Oct-2024	✓	07-May-2024	21-Oct-2024	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) MW01, MW03, MW05, MW07,	24-Apr-2024	02-May-2024	21-Oct-2024	✓	07-May-2024	21-Oct-2024	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) MW01, MW03, MW05, MW07,	24-Apr-2024	02-May-2024	21-Oct-2024	✓	07-May-2024	21-Oct-2024	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X) MW01, MW03, MW05, MW07,	24-Apr-2024	02-May-2024	21-Oct-2024	✓	07-May-2024	21-Oct-2024	✓



Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Dissolved Mercury by FIMS	EG035F	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	30	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	18	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	8	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	8	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Dissolved Mercury by FIMS	EG035F	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	30	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Dissolved Mercury by FIMS	EG035F	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	30	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Dissolved Mercury by FIMS	EG035F	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	30	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	18	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	8	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	8	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Polychlorinated Biphenyls (PCB)	EP066	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.4, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.



Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.



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QUACKAY 20 Hutton Road Mackay QLD 4740
Ph: 08 3309 0940 E: mackay@alsglobal.com
CHURCHILL 37 Silver Street Seaford QLD 4051
Ph: 07 3243 7222 E: seaford@alsglobal.com
GLADSTONE 40 Cadell Road Gladstone QLD 4700
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Ph: 07 4796 0900 E: lyonsville@alsglobal.com

CLIENT: GHD Pty Ltd	TURNAROUND REQUIREMENTS: ☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):		FOR LABORATORY USE ONLY (Circle) Custody Seal intact? Yes No N/A Free ice / frozen ice bricks present upon receipt? Yes No N/A Random Sample Temperature on Receipt: °C Other comment:	
OFFICE: Level 7, 24 Mitchell St	ALS QUOTE NO.:	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7		
PROJECT: 12618429	PROJECT MANAGER: Jo Lavers		RECEIVED BY: Lana Les	RECEIVED BY: Jonathan
ORDER NUMBER: 12618429	CONTACT PH: +61 457 472 439		DATE/TIME: 11/5/24 1:58pm	DATE/TIME: 21/5/24 1530
SAMPLER: Kieran Gurung	SAMPLER MOBILE: 0431311229	RELINQUISHED BY: Kieran Gurung	DATE/TIME: 11/5/24 1400	
COC emailed to ALS? NO	EDD FORMAT (or default):			
Email Reports to (will default to PM if no other addresses are listed): jo.lavers@ghd.com, GHDlabreports@ghd.com, kieran.gurung@ghd.com				
Email Invoice to (will default to PM if no other addresses are listed): jo.lavers@ghd.com, accounts.payableAU@ghd.com				

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

All metals containers were field filtered

ALS USE	SAMPLE DETAILS			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).										Additional Information	
	MATRIX: SOLID (S) WATER (W)																
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE <i>below</i>	(refer to codes)	TOTAL CONTAINERS	TRH/C6-C40/BTEX/VB Dissolved Metals	PCB Total - Standard level	PFAS - Short Suite (12 analytes)	W-18 (TRH C6-C10) / BTEX							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	MW01	23/4/24 11/5/24	W	Ice		6	X	X	X								
2	MW02	27/4/24	W	Ice		6	x	x	x								
3	MW03	27/4/24	W	Ice		6	x	x	x								
4	MW04	27/4/24	W	Ice		6	x	x	x								
5	MW05	27/4/24	W	Ice		6	x	x	x								
6	MW06	27/4/24	W	Ice		6	x	x	x								
7	MW07	27/4/24	W	Ice		6	x	x	x								
8	FD_02	27/4/24	W	Ice		6	x	x	x								
9	Trip Blank	23/4/24	W	Ice						x							
TOTAL																	

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

V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde

Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag

Environmental Division
Sydney

Work Order Reference

ES2414019



Telephone : + 61-2-8784 8555



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES2414019**

Client : **GHD PTY LTD**
Contact : **JO LAVERS**
Address : **Level 7 24 Mitchell Street**
DARWIN NT, AUSTRALIA 0800

E-mail : **jo.lavers@ghd.com**
Telephone : **----**
Facsimile : **----**

Project : **12618429**
Order number : **12618429**
C-O-C number : **----**
Site : **----**
Sampler : **KIERAN GURUNG**

Laboratory : **Environmental Division Sydney**
Contact : **Samiksha Sathish**
Address : **277-289 Woodpark Road Smithfield**
NSW Australia 2164

E-mail : **samiksha.sathish@alsglobal.com**
Telephone : **+61-2-8784 8555**
Facsimile : **+61-2-8784 8500**

Page : **1 of 3**
Quote number : **EB2020GHDSE0038 (EN/000)**
QC Level : **NEPM 2013 B3 & ALS QC Standard**

Dates

Date Samples Received : **02-May-2024 08:30**
Client Requested Due : **09-May-2024**
Date : **----**

Issue Date : **02-May-2024**
Scheduled Reporting Date : **09-May-2024**

Delivery Details

Mode of Delivery : **Client Drop Off**
No. of coolers/boxes : **1**
Receipt Detail : **----**

Security Seal : **Not Available**
Temperature : **10.9°C - Ice present**
No. of samples received / analysed : **9 / 9**

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months $\pm$ 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

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

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP066-PCB-WA Polychlorinated Biphenyls (PCB)	WATER - EP231 PFAS - Short Suite (12 analytes)	WATER - W-05 TRH/BTEXN/8 Metals	WATER - W-18 TRH(C6 - C9)/BTEXN
ES2414019-001	01-May-2024 00:00	MW01	✓	✓	✓	
ES2414019-002	01-May-2024 00:00	MW02	✓	✓	✓	
ES2414019-003	01-May-2024 00:00	MW03	✓	✓	✓	
ES2414019-004	01-May-2024 00:00	MW04	✓	✓	✓	
ES2414019-005	01-May-2024 00:00	MW05	✓	✓	✓	
ES2414019-006	01-May-2024 00:00	MW06	✓	✓	✓	
ES2414019-007	01-May-2024 00:00	MW07	✓	✓	✓	
ES2414019-008	01-May-2024 00:00	FD_02	✓	✓	✓	
ES2414019-009	23-Apr-2024 00:00	Trip Blank				✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

ACCOUNTS PAYABLE

- Email accountspayableAU@ghd.com

Email accountspayableAU@ghd.com

Email ghdlabreports@ghd.com

- | | |
|-------|-----------------------|
| Email | ghdlabreports@ghd.com |
| Email | ghdlabreports@ghd.com |
| Email | ghdlabreports@ghd.com |
| Email | ghdlabreports@ghd.com |
| Email | ghdlabreports@ghd.com |

Email io.lavers@ghd.com

- [illegible]

Email kieran.gurung@ghd.com

- [illegible]



CERTIFICATE OF ANALYSIS

Work Order : ES2414019
Client : GHD PTY LTD
Contact : JO LAVERS
Address : Level 7 24 Mitchell Street
DARWIN NT, AUSTRALIA 0800
Telephone : ----
Project : 12618429
Order number : 12618429
C-O-C number : ----
Sampler : KIERAN GURUNG
Site :
Quote number : EN/000
No. of samples received : 9
No. of samples analysed : 9

Page : 1 of 9
Laboratory : Environmental Division Sydney
Contact : Samiksha Sathish
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 02-May-2024 08:30
Date Analysis Commenced : 02-May-2024
Issue Date : 09-May-2024 10:59



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	Position	Accreditation Category
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20mL or 125mL bottles have been tested in accordance with the QSM5.4 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration or as per tables in USEPA 1633 where listed. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS and also conform to QSM 5.4 (US DoD) requirements.

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW01	MW02	MW03	MW04	MW05
Sampling date / time				01-May-2024 00:00	01-May-2024 00:00	01-May-2024 00:00	01-May-2024 00:00	01-May-2024 00:00	
Compound	CAS Number	LOR	Unit	ES2414019-001	ES2414019-002	ES2414019-003	ES2414019-004	ES2414019-005	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	0.003	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0001	0.0002	<0.0001	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	<0.001	0.001	0.001	0.002	0.004	
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.002	0.113	<0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.002	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	0.356	0.012	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls		----	1	µg/L	<1	<1	<1	<1	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction		----	20	µg/L	<20	<20	<20	<20	
C10 - C14 Fraction		----	50	µg/L	<50	<50	<50	<50	
C15 - C28 Fraction		----	100	µg/L	<100	<100	<100	<100	
C29 - C36 Fraction		----	50	µg/L	<50	<50	<50	<50	
^ C10 - C36 Fraction (sum)		----	50	µg/L	<50	<50	<50	<50	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction		C6_C10	20	µg/L	<20	<20	<20	<20	
^ C6 - C10 Fraction minus BTEX (F1)		C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	
>C10 - C16 Fraction		----	100	µg/L	<100	<100	<100	<100	
>C16 - C34 Fraction		----	100	µg/L	<100	<100	<100	<100	
>C34 - C40 Fraction		----	100	µg/L	<100	<100	<100	<100	
^ >C10 - C40 Fraction (sum)		----	100	µg/L	<100	<100	<100	<100	
^ >C10 - C16 Fraction minus Naphthalene (F2)		----	100	µg/L	<100	<100	<100	<100	
EP080: BTEXN									

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW01	MW02	MW03	MW04	MW05
Sampling date / time				01-May-2024 00:00	01-May-2024 00:00	01-May-2024 00:00	01-May-2024 00:00	01-May-2024 00:00	
Compound	CAS Number	LOR	Unit	ES2414019-001	ES2414019-002	ES2414019-003	ES2414019-004	ES2414019-005	
				Result	Result	Result	Result	Result	
EP080: BTEXN - Continued									
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1	
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2	
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2	
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2	
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2	
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2	
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1	
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.02	0.01	0.02	<0.01	0.01	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.19	0.07	0.15	<0.02	<0.02	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.09	0.04	0.08	<0.02	<0.02	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.04	0.02	0.03	<0.02	<0.02	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EP231P: PFAS Sums									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW01	MW02	MW03	MW04	MW05
Sampling date / time					01-May-2024 00:00	01-May-2024 00:00	01-May-2024 00:00	01-May-2024 00:00	01-May-2024 00:00
Compound	CAS Number	LOR	Unit		ES2414019-001	ES2414019-002	ES2414019-003	ES2414019-004	ES2414019-005
					Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		0.03	0.01	0.02	<0.01	0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		0.35	0.14	0.28	<0.01	0.01
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	1	%		107	106	101	110	114
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		106	107	106	108	91.1
Toluene-D8	2037-26-5	2	%		104	104	105	106	91.7
4-Bromofluorobenzene	460-00-4	2	%		116	117	119	118	95.5
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		97.1	93.2	96.8	97.8	94.5
13C8-PFOA	----	0.02	%		94.0	94.4	92.6	92.8	93.4

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW06	MW07	FD_02	Trip Blank	----
Sampling date / time				01-May-2024 00:00	01-May-2024 00:00	01-May-2024 00:00	23-Apr-2024 00:00	----	
Compound	CAS Number	LOR	Unit	ES2414019-006	ES2414019-007	ES2414019-008	ES2414019-009	-----	
				Result	Result	Result	Result	----	
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.0002	0.0002	----	----	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----	
Copper	7440-50-8	0.001	mg/L	<0.001	0.002	<0.001	----	----	
Nickel	7440-02-0	0.001	mg/L	0.002	0.004	0.003	----	----	
Lead	7439-92-1	0.001	mg/L	<0.001	0.005	0.004	----	----	
Zinc	7440-66-6	0.005	mg/L	0.010	0.009	0.005	----	----	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----	
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls		----	1	µg/L	<1	<1	<1	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction		----	20	µg/L	<20	<20	<20	<20	----
C10 - C14 Fraction		----	50	µg/L	<50	<50	<50	----	----
C15 - C28 Fraction		----	100	µg/L	<100	<100	<100	----	----
C29 - C36 Fraction		----	50	µg/L	<50	<50	<50	----	----
^ C10 - C36 Fraction (sum)		----	50	µg/L	<50	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction		C6_C10	20	µg/L	<20	<20	<20	<20	----
^ C6 - C10 Fraction minus BTEX (F1)		C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	----
>C10 - C16 Fraction		----	100	µg/L	<100	<100	<100	----	----
>C16 - C34 Fraction		----	100	µg/L	<100	<100	<100	----	----
>C34 - C40 Fraction		----	100	µg/L	<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)		----	100	µg/L	<100	<100	<100	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)		----	100	µg/L	<100	<100	<100	----	----
EP080: BTEXN									

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW06	MW07	FD_02	Trip Blank	----
Sampling date / time				01-May-2024 00:00	01-May-2024 00:00	01-May-2024 00:00	23-Apr-2024 00:00	----	
Compound	CAS Number	LOR	Unit	ES2414019-006	ES2414019-007	ES2414019-008	ES2414019-009	-----	
				Result	Result	Result	Result	----	
EP080: BTEXN - Continued									
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	----	
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	----	
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	----	
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	----	
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	----	
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	----	
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	----	
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	----	----	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.01	0.07	----	----	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.02	0.02	0.10	----	----	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	----	----	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.03	0.04	----	----	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.03	----	----	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.03	----	----	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.01	----	----	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.06	----	----	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	----	----	
EP231P: PFAS Sums									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW06	MW07	FD_02	Trip Blank	----
Sampling date / time					01-May-2024 00:00	01-May-2024 00:00	01-May-2024 00:00	23-Apr-2024 00:00	----
Compound	CAS Number	LOR	Unit		ES2414019-006	ES2414019-007	ES2414019-008	ES2414019-009	-----
					Result	Result	Result	Result	----
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		0.02	0.03	0.17	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		0.02	0.06	0.34	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	1	%		109	113	108	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		112	114	114	108	----
Toluene-D8	2037-26-5	2	%		111	112	112	107	----
4-Bromofluorobenzene	460-00-4	2	%		116	118	119	114	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		94.7	90.3	94.7	----	----
13C8-PFOA	----	0.02	%		93.4	96.2	92.9	----	----



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	45	134
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	72	143
Toluene-D8	2037-26-5	75	131
4-Bromofluorobenzene	460-00-4	73	137
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120



QUALITY CONTROL REPORT

Work Order : **ES2414019**

Page : 1 of 6

Client : **GHD PTY LTD**

Contact : **JO LAVERS**

Address : Level 7 24 Mitchell Street
DARWIN NT, AUSTRALIA 0800

Telephone : ----

Project : 12618429

Order number : 12618429

C-O-C number : ----

Sampler : **KIERAN GURUNG**

Site :

Quote number : EN/000

No. of samples received : 9

No. of samples analysed : 9

Laboratory : Environmental Division Sydney

Contact : Samiksha Sathish

Address : 277-289 Woodpark Road Smithfield NSW Australia 2164

Telephone : +61-2-8784 8555

Date Samples Received : 02-May-2024

Date Analysis Commenced : 02-May-2024

Issue Date : 09-May-2024



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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 5769261)									
ES2414019-001	MW01	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
ES2414128-003	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.015	0.015	0.0	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 5769262)									
ES2414019-002	MW02	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
ES2414128-002	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 5764996)									
ES2413440-006	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
ES2414019-004	MW04	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 5764996)									
ES2413440-006	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 5764996) - continued									
ES2414019-004	MW04	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 5764996)									
ES2413440-006	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
ES2414019-004	MW04	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit



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

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

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 5769261)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	98.6	85.0	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.8	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	106	85.0	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	97.2	81.0	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	104	83.0	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	97.1	82.0	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	97.4	81.0	117
EG035F: Dissolved Mercury by FIMS (QCLot: 5769262)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	91.3	83.0	105
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 5764449)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	10 µg/L	91.6	68.9	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5764448)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	70.3	53.7	97.0
EP071: C15 - C28 Fraction	----	100	µg/L	<100	600 µg/L	65.8	63.3	107
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	65.8	58.3	120
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5764996)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	94.6	75.0	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5764448)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	500 µg/L	67.4	53.9	95.5
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	700 µg/L	60.8	57.8	110
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	300 µg/L	58.8	50.5	115
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5764996)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	92.0	75.0	127
EP080: BTEXN (QCLot: 5764996)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	100	68.3	119
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	104	73.5	120
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	100	73.8	122
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	107	73.0	122
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	111	76.4	123



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EP080: BTEXN (QCLot: 5764996) - continued								
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	113	75.5	124
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5770469)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	87.5	72.0	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	91.4	68.0	131
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	91.6	65.0	140
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5770469)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	95.1	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	97.3	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	92.1	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	97.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	92.4	71.0	133
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5770469)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	88.4	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	96.2	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	88.6	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	80.4	71.4	144

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 5769261)							
ES2414019-004	MW04	EG020A-F: Arsenic	7440-38-2	1 mg/L	113	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	102	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	97.9	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	104	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	100	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	105	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	108	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 5769262)							
ES2414019-003	MW03	EG035F: Mercury	7439-97-6	0.01 mg/L	82.0	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5764996)							
ES2413440-006	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	89.5	70.0	130



Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
Laboratory sample ID	Sample ID	Method: Compound	CAS Number				
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5764996)							
ES2413440-006	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	89.0	70.0	130
EP080: BTEXN (QCLot: 5764996)							
ES2413440-006	Anonymous	EP080: Benzene	71-43-2	25 µg/L	91.0	70.0	130
		EP080: Toluene	108-88-3	25 µg/L	90.6	70.0	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	94.7	70.0	130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	99.0	70.0	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	25 µg/L	97.3	70.0	130
		EP080: Naphthalene	91-20-3	25 µg/L	86.6	70.0	130



QA/QC Compliance Assessment to assist with Quality Review

Work Order : ES2414019

Page : 1 of 7

Client : GHD PTY LTD
Contact : JO LAVERS
Project : 12618429
Site :
Sampler : KIERAN GURUNG
Order number : 12618429

Laboratory : Environmental Division Sydney
Telephone : +61-2-8784 8555
Date Samples Received : 02-May-2024
Issue Date : 09-May-2024
No. of samples received : 9
No. of samples analysed : 9

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Matrix: WATER

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)						
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	17	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	8	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	8	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)						
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	17	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	8	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	8	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

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

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

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

Matrix: WATER

Evaluation: ✖ = Holding time breach : ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)		01-May-2024	----	----	----	06-May-2024	28-Oct-2024	✓
MW01,	MW02,							
MW03,	MW04,							
MW05,	MW06,							
MW07,	FD_02							
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Filtered; Lab-acidified (EG035F)		01-May-2024	----	----	----	08-May-2024	29-May-2024	✓
MW01,	MW02,							
MW03,	MW04,							
MW05,	MW06,							
MW07,	FD_02							
EP066: Polychlorinated Biphenyls (PCB)								
Amber Glass Bottle - Unpreserved (EP066)		01-May-2024	07-May-2024	08-May-2024	✓	09-May-2024	16-Jun-2024	✓
MW01,	MW02,							
MW03,	MW04,							
MW05,	MW06,							
MW07,	FD_02							

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071) MW01, MW03, MW05, MW07, MW02, MW04, MW06, FD_02	01-May-2024	07-May-2024	08-May-2024	✓	08-May-2024	16-Jun-2024	✓	
Amber VOC Vial - Sulfuric Acid (EP080) MW01, MW03, MW05, MW07, MW02, MW04, MW06, FD_02	01-May-2024	02-May-2024	15-May-2024	✓	03-May-2024	15-May-2024	✓	
Amber VOC Vial - Sulfuric Acid (EP080) Trip Blank	23-Apr-2024	02-May-2024	07-May-2024	✓	03-May-2024	07-May-2024	✓	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber Glass Bottle - Unpreserved (EP071) MW01, MW03, MW05, MW07, MW02, MW04, MW06, FD_02	01-May-2024	07-May-2024	08-May-2024	✓	08-May-2024	16-Jun-2024	✓	
Amber VOC Vial - Sulfuric Acid (EP080) MW01, MW03, MW05, MW07, MW02, MW04, MW06, FD_02	01-May-2024	02-May-2024	15-May-2024	✓	03-May-2024	15-May-2024	✓	
Amber VOC Vial - Sulfuric Acid (EP080) Trip Blank	23-Apr-2024	02-May-2024	07-May-2024	✓	03-May-2024	07-May-2024	✓	
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080) MW01, MW03, MW05, MW07, MW02, MW04, MW06, FD_02	01-May-2024	02-May-2024	15-May-2024	✓	03-May-2024	15-May-2024	✓	
Amber VOC Vial - Sulfuric Acid (EP080) Trip Blank	23-Apr-2024	02-May-2024	07-May-2024	✓	03-May-2024	07-May-2024	✓	
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X) MW01, MW03, MW05, MW07, MW02, MW04, MW06, FD_02	01-May-2024	07-May-2024	28-Oct-2024	✓	08-May-2024	28-Oct-2024	✓	

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)		01-May-2024	07-May-2024	28-Oct-2024	✓	08-May-2024	28-Oct-2024	✓
MW01,	MW02,							
MW03,	MW04,							
MW05,	MW06,							
MW07,	FD_02							
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)		01-May-2024	07-May-2024	28-Oct-2024	✓	08-May-2024	28-Oct-2024	✓
MW01,	MW02,							
MW03,	MW04,							
MW05,	MW06,							
MW07,	FD_02							
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)		01-May-2024	07-May-2024	28-Oct-2024	✓	08-May-2024	28-Oct-2024	✓
MW01,	MW02,							
MW03,	MW04,							
MW05,	MW06,							
MW07,	FD_02							



Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Dissolved Mercury by FIMS	EG035F	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	17	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	8	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	8	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Dissolved Mercury by FIMS	EG035F	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Dissolved Mercury by FIMS	EG035F	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Dissolved Mercury by FIMS	EG035F	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	17	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	8	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	8	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Polychlorinated Biphenyls (PCB)	EP066	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.4, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.



Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.



CHAIN OF CUSTODY RECORD

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☐ Melbourne Laboratory

6 Monterey Road Dandenong South VIC 3175
+61 3 8564 5000 EnviroSampleVic@eurofins.com

Company	GHD	Project No	~~12021043~~ 12618429	Project Manager	~~John Lavers~~ JO Lavers	Sampler(s)	Kieran G							
Address	Level 7, 24 Mitchell St, Darwin 0800 NT	Project Name	Robertson MTR DTK	EDD Format	ESdat	Handed over by	Kieran G							
Contact Name	JO Lavers	Analyses Where models are requested, please specify 'Total' or 'Filtered' (SU) (E code must be used to show SU/TE piping)	05 Oil-PCB + PFAS full			Email for Invoice	jo.lavers@ghd.com.							
Phone No	+61 7 4044 2267					Email for Results	jo.lavers@ghd.com							
Special Directions	Please analyse ASAP!					Containers Change container type & size if necessary		Required Turnaround Time (TAT) Default will be 5 days if not ticked.						
Purchase Order						500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4984, WA Guidelines)	☒ Overnight (reporting by 9am) ☐ Same day ☐ 1 day ☐ 2 days ☐ 3 days ☐ 5 days (Standard) ☐ Other ()
Quote ID No						Sample Comments / Dangerous Goods Hazard Warning								
No	Client Sample ID	Sampled Date/Time	Matrix Solid (S) Water (W)											
1	Track oil		Oil	+	+						XX	Analyse ASAP!		
2														
3														
4														
5														
6														
7														
8														
9														
10														
Total Counts														
Method of Shipment	☐ Courier (#) ☐ Hand Delivered ☐ Postal	Name	Kieran	Signature	Kiering	Date		Time						
Laboratory Use Only	Received By	Donna Lisa	SYD BNE MEL PER ADL NTL DRW	Signature	Donna Lisa	Date	24/04/24	Time	8:45	Temperature	25.3			
	Received By		SYD BNE MEL PER ADL NTL DRW	Signature		Date		Time		Report No	1090621			

Eurofins Environment Testing Australia Pty Ltd

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Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
6 Monterey Road Dandenong South VIC 3175 +61 3 8564 5000 NATA# 1261 Site# 1254	19/8 Lewalan Street Grovedale VIC 3216 +61 3 8564 5000 NATA# 1261 Site# 25403	179 Magowar Road Girraween NSW 2145 +61 2 9900 8400 NATA# 1261 Site# 18217	Unit 1,2 Dacre Street Mitchell ACT 2911 +61 2 6113 8091 NATA# 1261 Site# 25466	1/21 Smallwood Place Murarie QLD 4172 T: +61 7 3902 4600 NATA# 1261 Site# 20794	1/2 Frost Drive Mayfield West NSW 2304 +61 2 4968 8448 NATA# 1261 Site# 25079 & 25289

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ABN: 47 009 120 549

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Sample Receipt Advice

Company name:	GHD Pty Ltd NT
Contact name:	Jo Lavers
Project name:	DTC
Project ID:	12618429
Turnaround time:	1 Day
Date/Time received	Apr 24, 2024 8:45 AM
Eurofins reference	1090621

Sample Information

- ✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ✓ All samples have been received as described on the above COC.
- ✓ COC has been completed correctly.
- ✗ Attempt to chill was evident.
- ✓ Appropriately preserved sample containers have been used.
- ✓ All samples were received in good condition.
- ✗ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ✓ Appropriate sample containers have been used.
- ✓ Sample containers for volatile analysis received with zero headspace.
- ✗ Split sample sent to requested external lab.
- ✗ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Harry Bacalis on phone : +61 3 8564 5064 or by email: HarryBacalis@eurofins.com

Results will be delivered electronically via email to Jo Lavers - jo.lavers@ghd.com.

Note: A copy of these results will also be delivered to the general GHD Pty Ltd NT email address.



Eurofins Environment Testing Australia Pty Ltd

ABN: 50 005 085 521

Melbourne 6 Monterey Road Dandenong South VIC 3175 +61 3 8564 5000 NATA# 1261 Site# 1254	Geelong 19/8 Lewalan Street Grovedale VIC 3216 +61 3 8564 5000 NATA# 1261 Site# 25403	Sydney 179 Magowar Road Girraween NSW 2145 +61 2 9900 8400 NATA# 1261 Site# 18217	Canberra Unit 1,2 Dacre Street Mitchell ACT 2911 +61 2 6113 8091 NATA# 1261 Site# 25466	Brisbane 1/21 Smallwood Place Murarie QLD 4172 T: +61 7 3902 4600 NATA# 1261 Site# 20794	Newcastle 1/2 Frost Drive Mayfield West NSW 2304 +61 2 4968 8448 NATA# 1261 Site# 25079 & 25289
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Eurofins ProMicro Pty Ltd

ABN: 47 009 120 549

Perth ProMicro 46-48 Banksia Road Welshpool WA 6106 +61 8 6253 4444 NATA# 2561 Site# 2554
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Eurofins Environment Testing NZ Ltd

NZBN: 9429046024954

Auckland 35 O'Rorke Road Penrose, Auckland 1061 +64 9 526 4551 IANZ# 1327	Auckland (Focus) Unit C1/4 Pacific Rise, Mount Wellington, Auckland 1061 +64 9 525 0568 IANZ# 1308	Christchurch 43 Detroit Drive Rolleston, Christchurch 7675 +64 3 343 5201 IANZ# 1290	Tauranga 1277 Cameron Road, Gate Pa, Tauranga 3112 +64 9 525 0568 IANZ# 1402
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Company Name:

Address:

Project Name:

Project ID:

GHD Pty Ltd NT

Level 7, 24 Mitchell Street

Darwin

NT 0800

DTC

12618429

Order No.:

Report #:

Phone:

Fax:

1090621

08 8982 0100

08 8981 1075

Received:

Due:

Priority:

Contact Name:

Apr 24, 2024 8:45 AM

Apr 26, 2024

1 Day

Jo Lavers

Eurofins Analytical Services Manager : Harry Bacalis

Sample Detail						Polychlorinated Biphenyls in Oils & Greases	Per- and Polyfluoroalkyl Substances (PFASs) - Trace
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X
External Laboratory							
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	Track oil	Not Provided		Oil	M24-Ap0062267	X	X
Test Counts						1	1

GHD Pty Ltd NT
Level 7, 24 Mitchell Street
Darwin
NT 0800



NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition
Arrangement for the mutual recognition of the
equivalence of testing, medical testing, calibration,
inspection, proficiency testing scheme providers and
reference materials producers reports and certificates.

Attention: **Jo Lavers**

Report **1090621-S**
Project name **DTC**
Project ID **12618429**
Received Date **Apr 24, 2024**

Client Sample ID			G01 Track oil
Sample Matrix			Oil
Eurofins Sample No.			M24- Ap0062267
Date Sampled			Not Provided¹²
Test/Reference	LOR	Unit	
Polychlorinated Biphenyls in Oils & Greases			
Aroclor-1016	1	mg/kg	< 10
Aroclor-1221	1	mg/kg	< 10
Aroclor-1232	1	mg/kg	< 10
Aroclor-1242	1	mg/kg	< 10
Aroclor-1248	1	mg/kg	< 10
Aroclor-1254	1	mg/kg	< 10
Aroclor-1260	1	mg/kg	< 10
Total PCB*	1	mg/kg	< 10
Decachlorobiphenyl (surr.)	1	%	int
PFASs Summations			
Sum (PFHxS + PFOS)*	0.1	ug/kg	< 0.5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.1	ug/kg	< 0.5
Sum of PFASs (n=30)*	0.5	ug/kg	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	0.1	ug/kg	< 0.5
Sum of WA DWER PFAS (n=10)*	0.5	ug/kg	< 5
Perfluoroalkyl sulfonamido substances- Trace			
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.5	ug/kg	< 0.5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.5	ug/kg	< 0.5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.5	ug/kg	< 0.5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	0.5	ug/kg	< 0.5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	0.5	ug/kg	< 0.5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.5	ug/kg	< 0.5
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.5	ug/kg	< 0.5
13C8-FOSA (surr.)	1	%	17
D3-N-MeFOSA (surr.)	1	%	38
D5-N-EtFOSA (surr.)	1	%	69
D7-N-MeFOSE (surr.)	1	%	17
D9-N-EtFOSE (surr.)	1	%	45
D5-N-EtFOSAA (surr.)	1	%	58
D3-N-MeFOSAA (surr.)	1	%	47

Client Sample ID			G01Track oil Oil M24- Ap0062267 Not Provided¹²
Sample Matrix			
Eurofins Sample No.			
Date Sampled			
Test/Reference	LOR	Unit	
Perfluoroalkyl carboxylic acids (PFCAs) - Trace			
Perfluorobutanoic acid (PFBA) ^{N11}	0.5	ug/kg	< 0.5
Perfluoropentanoic acid (PFPeA) ^{N11}	0.1	ug/kg	< 0.1
Perfluorohexanoic acid (PFHxA) ^{N11}	0.1	ug/kg	< 0.1
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.1	ug/kg	< 0.1
Perfluorooctanoic acid (PFOA) ^{N11}	0.1	ug/kg	< 0.1
Perfluorononanoic acid (PFNA) ^{N11}	0.1	ug/kg	< 0.1
Perfluorodecanoic acid (PFDA) ^{N11}	0.1	ug/kg	< 0.1
Perfluorotridecanoic acid (PFTrDA) ^{N15}	0.1	ug/kg	< 0.5
Perfluoroundecanoic acid (PFUnDA) ^{N11}	0.1	ug/kg	G01< 0.5
Perfluorododecanoic acid (PFDoDA) ^{N11}	0.1	ug/kg	< 0.5
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.1	ug/kg	< 0.5
13C4-PFBA (surr.)	1	%	21
13C5-PFPeA (surr.)	1	%	53
13C5-PFHxA (surr.)	1	%	19
13C4-PFHpA (surr.)	1	%	29
13C8-PFOA (surr.)	1	%	26
13C5-PFNA (surr.)	1	%	11
13C6-PFDA (surr.)	1	%	13
13C2-PFUnDA (surr.)	1	%	54
13C2-PFDoDA (surr.)	1	%	82
13C2-PFTeDA (surr.)	1	%	60
Perfluoroalkyl sulfonic acids (PFSA)s- Trace			
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.1	ug/kg	G01< 5
Perfluorononanesulfonic acid (PFNS) ^{N15}	0.1	ug/kg	< 0.5
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	0.1	ug/kg	< 0.5
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	0.1	ug/kg	< 0.1
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.1	ug/kg	< 0.1
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	0.1	ug/kg	< 0.5
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.1	ug/kg	< 0.5
Perfluorodecanesulfonic acid (PFDS) ^{N15}	0.1	ug/kg	< 0.5
13C3-PFBS (surr.)	1	%	96
18O2-PFHxS (surr.)	1	%	18
13C8-PFOS (surr.)	1	%	39
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)s- Trace			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	0.1	ug/kg	< 0.1
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) ^{N11}	0.5	ug/kg	< 0.5
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	0.1	ug/kg	< 0.1
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	0.1	ug/kg	< 0.5
13C2-4:2 FTSA (surr.)	1	%	19
13C2-6:2 FTSA (surr.)	1	%	20
13C2-8:2 FTSA (surr.)	1	%	15
13C2-10:2 FTSA (surr.)	1	%	51

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Polychlorinated Biphenyls in Oils & Greases - Method: LTM-ORG-2080 PCBs in Oil (USEPA 8082 and Vic EPA 6013)	Melbourne	Apr 24, 2024	14 Days
Per- and Polyfluoroalkyl Substances (PFASs) - Trace			
PFASs Summations - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level	Melbourne	Apr 24, 2024	28 Days
Perfluoroalkyl sulfonamido substances- Trace - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level	Melbourne	Apr 26, 2024	28 Days
Perfluoroalkyl carboxylic acids (PFCAs) - Trace - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level	Melbourne	Apr 26, 2024	28 Days
Perfluoroalkyl sulfonic acids (PFASs)- Trace - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level	Melbourne	Apr 26, 2024	28 Days
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level	Melbourne	Apr 26, 2024	28 Days



☐ **Melbourne Laboratory**
6 Monterey Road Dandenong South VIC 3175
+61 3 8564 5000 EnviroSampleVic@eurofins.com

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | Environment Testing Standard Terms and Conditions unless agreed otherwise. A copy is available on request.

Eurofins Environment Testing Australia Pty Ltd

ABN: 50 005 085 521

Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
6 Monterey Road Dandenong South VIC 3175 +61 3 8564 5000 NATA# 1261 Site# 1254	19/8 Lewalan Street Grovedale VIC 3216 +61 3 8564 5000 NATA# 1261 Site# 25403	179 Magowar Road Girraween NSW 2145 +61 2 9900 8400 NATA# 1261 Site# 18217	Unit 1,2 Dacre Street Mitchell ACT 2911 +61 2 6113 8091 NATA# 1261 Site# 25466	1/21 Smallwood Place Murarie QLD 4172 T: +61 7 3902 4600 NATA# 1261 Site# 20794	1/2 Frost Drive Mayfield West NSW 2304 +61 2 4968 8448 NATA# 1261 Site# 25079 & 25289

Eurofins ARL Pty Ltd

ABN: 91 05 0159 898

Perth
46-48 Banksia Road Welshpool WA 6106 +61 8 6253 4444 NATA# 2377 Site# 2370

Eurofins ProMicro Pty Ltd

ABN: 47 009 120 549

Perth ProMicro
46-48 Banksia Road Welshpool WA 6106 +61 8 6253 4444 NATA# 2561 Site# 2554

Eurofins Environment Testing NZ Ltd

NZBN: 9429046024954

Auckland	Auckland (Focus)	Christchurch	Tauranga
35 O'Rorke Road Penrose, Auckland 1061 +64 9 526 4551 IANZ# 1327	Unit C1/4 Pacific Rise, Mount Wellington, Auckland 1061 +64 9 525 0568 IANZ# 1308	43 Detroit Drive Rolleston, Christchurch 7675 +64 3 343 5201 IANZ# 1290	1277 Cameron Road, Gate Pa, Tauranga 3112 +64 9 525 0568 IANZ# 1402

Sample Receipt Advice

Company name:	GHD Pty Ltd NT
Contact name:	Jo Lavers
Project name:	Darwin Turf Club - EPL Management
Project ID:	12618429
Turnaround time:	5 Day
Date/Time received	May 1, 2024 2:19 PM
Eurofins reference	1092570

Sample Information

- ✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ✓ All samples have been received as described on the above COC.
- ✓ COC has been completed correctly.
- ✓ Attempt to chill was evident.
- ✓ Appropriately preserved sample containers have been used.
- ✓ All samples were received in good condition.
- ✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ✓ Appropriate sample containers have been used.
- ✓ Sample containers for volatile analysis received with zero headspace.
- ✗ Split sample sent to requested external lab.
- ✗ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Harry Bacalis on phone : +61 3 8564 5064 or by email: HarryBacalis@eurofins.com

Results will be delivered electronically via email to Jo Lavers - jo.lavers@ghd.com.

Note: A copy of these results will also be delivered to the general GHD Pty Ltd NT email address.



web: www.eurofins.com.au
email: EnviroSales@eurofins.com

ABN: 50 005 085 521

Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
6 Monterey Road	19/8 Lewalan Street	179 Magowar Road	Unit 1,2 Dacre Street	1/21 Smallwood Place	1/2 Frost Drive
Dandenong South	Grovedale	Girraween	Mitchell	Murarie	Mayfield West
VIC 3175	VIC 3216	NSW 2145	ACT 2911	QLD 4172	NSW 2304
+61 3 8564 5000	+61 3 8564 5000	+61 2 9900 8400	+61 2 6113 8091	T: +61 7 3902 4600	+61 2 4968 8448
NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794	Site# 25079 & 25289

ABN: 91 05 0159 898

Perth
46-48 Banksia Road
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NATA# 2377
Site# 2370

ABN: 47 009 120 549

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Welshpool
WA 6106
+61 8 6253 4444
NATA# 2561
Site# 2554

NZBN: 9429046024954

Auckland	Auckland (Focus)	Christchurch	Tauranga
35 O'Rorke Road	Unit C1/4 Pacific Rise,	43 Detroit Drive	1277 Cameron Road,
Penrose,	Mount Wellington,	Rolleston,	Gate Pa,
Auckland 1061	Auckland 1061	Christchurch 7675	Tauranga 3112
+64 9 526 4551	+64 9 525 0568	+64 3 343 5201	+64 9 525 0568
IANZ# 1327	IANZ# 1308	IANZ# 1290	IANZ# 1402

Company Name: GHD Pty Ltd NT
Address: Level 7, 24 Mitchell Street
Darwin
NT 0800

Project Name: Darwin Turf Club - EPL Management
Project ID: 12618429

Order No.:
Report #: 1092570
Phone: 08 8982 0100
Fax: 08 8981 1075

Received: May 1, 2024 2:19 PM
Due: May 8, 2024
Priority: 5 Day
Contact Name: Jo Lavers

Eurofins Analytical Services Manager : Harry Bacalis

Sample Detail						Polychlorinated Biphenyls in Oils & Greases	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X
External Laboratory							
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	Oil	Apr 30, 2024		Oil	M24-My0001488	X	X
Test Counts						1	1



☐ **Melbourne Laboratory**
6 Monterey Road Dandenong South VIC 3175
+61 3 8564 5000 EnviroSampleVic@eurofins.com

Eurofins Environment Testing Australia Pty Ltd EnviroSales@eurofins.com

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | Environment Testing Standard Terms and Conditions unless agreed otherwise. A copy is available on request.

Eurofins Environment Testing Australia Pty Ltd

ABN: 50 005 085 521

Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
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Eurofins ARL Pty Ltd

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Perth
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Eurofins ProMicro Pty Ltd

ABN: 47 009 120 549

Perth ProMicro
46-48 Banksia Road Welshpool WA 6106 +61 8 6253 4444 NATA# 2561 Site# 2554

Eurofins Environment Testing NZ Ltd

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Sample Receipt Advice

Company name:	GHD Pty Ltd NT
Contact name:	Jo Lavers
Project name:	Darwin Turf Club
Project ID:	12618429
Turnaround time:	5 Day
Date/Time received	May 1, 2024 2:22 PM
Eurofins reference	1092569

Sample Information

- ✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ✓ All samples have been received as described on the above COC.
- ✗ COC has been completed correctly.
- ✗ Attempt to chill was evident.
- ✓ Appropriately preserved sample containers have been used.
- ✓ All samples were received in good condition.
- ✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ✓ Appropriate sample containers have been used.
- ✓ Sample containers for volatile analysis received with zero headspace.
- ✗ Split sample sent to requested external lab.
- ✗ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

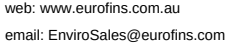
Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Harry Bacalis on phone : +61 3 8564 5064 or by email: HarryBacalis@eurofins.com

Results will be delivered electronically via email to Jo Lavers - jo.lavers@ghd.com.

Note: A copy of these results will also be delivered to the general GHD Pty Ltd NT email address.



ABN: 50 005 085 521

Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
6 Monterey Road	19/8 Lewallan Street	179 Magowar Road	Unit 1/2 Dacre Street	1/21 Smallwood Place	1/2 Frost Drive
Dandenong South	Grovedale	Girraween	Mitchell	Murarie	Murwill West
VIC 3175	VIC 3216	NSW 2145	ACT 2911	QLD 4172	NSW 2304
+61 3 8564 5000	+61 3 8564 5000	+61 2 9900 8400	+61 2 6113 8091	T: +61 7 3902 4600	+61 2 4968 8448
NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794	Site# 25079 & 25289

ABN: 91 05 0159 898

Perth
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Welshpool
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NATA# 2377
Site# 2370

ABN: 47 009 120 549

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NATA# 2561
Site# 2554

NZBN: 9429046024954

Auckland	Auckland (Focus)	Christchurch	Tauranga
35 O'Rorke Road	Unit C1/4 Pacific Rise,	43 Detroit Drive	12777 Cameron Road,
Penrose,	Mount Wellington,	Rollston,	Gate Pa,
Auckland 1061	Auckland 1061	Christchurch 7675	Tauranga 3112
+64 9 526 4551	+64 9 525 0568	+64 3 343 5201	+64 9 525 0568
IANZ# 1327	IANZ# 1308	IANZ# 1290	IANZ# 1402

Received: May 1, 2024 2:22 PM
Due: May 8, 2024
Priority: 5 Day
Contact Name: Jo Lavers

Eurofins Analytical Services Manager : Harry Bacalis

Sample Detail						Canister Certification and Supply fee	Dilution Factor	Final Pressure (psi)	Receipt Vac./Pressure (in Hg)	BTEXN (TO15)
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X	X	X	X
External Laboratory										
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID					
1	AQM01	Apr 30, 2024		6L Passivated Canister	M24-My0001509	x	x	x	x	x
2	AQM02	Apr 30, 2024		6L Passivated Canister	M24-My0001510	x	x	x	x	x
3	AQM03	Apr 30, 2024		6L Passivated Canister	M24-My0001511	x	x	x	x	x
Test Counts						3	3	3	3	3

GHD Pty Ltd NT
Level 7, 24 Mitchell Street
Darwin
NT 0800



NATA Accredited
Accreditation Number 1261
Site Number 20794

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition
Arrangement for the mutual recognition of the
equivalence of testing, medical testing, calibration,
inspection, proficiency testing scheme providers and
reference materials producers reports and certificates.

Attention: **Jo Lavers**

Report **1092569-TO**
Project name **Darwin Turf Club**
Project ID **12618429**
Received Date **May 01, 2024**

Client Sample ID			AQM01	AQM02	AQM03
Sample Matrix			6L Passivated Canister	6L Passivated Canister	6L Passivated Canister
Eurofins Sample No.			M24-My0001509	M24-My0001510	M24-My0001511
Date Sampled			Apr 30, 2024	Apr 30, 2024	Apr 30, 2024
Receipt Vac./Pressure (inHg)			9.4	16	8.9
Final Pressure (psi)			5.2	5.2	5.2
Test/Reference	LOR	Unit			
Dilution Factor	0.1		1.5	3.0	1.9
BTEXN (TO15)					
Benzene	1.6	ug/m3	< 2	< 5	< 3
Ethylbenzene	2.2	ug/m3	< 3	< 7	< 4
m,p-Xylene	4.4	ug/m3	< 7	< 13	< 8
o-Xylene	2.2	ug/m3	< 3	< 7	< 4
Toluene	7.5	ug/m3	< 11	< 22	< 14
Naphthalene	10.5	ug/m3	< 16	< 32	< 20
4-Bromofluorobenzene (surr.)	1	%	85	84	87

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description

BTEXN (TO15)

Testing Site

Brisbane

Extracted

May 09, 2024

Holding Time

30 Days

- Method: SOP #6 Analysis of Volatile Organic Compounds in Summa Polished Canisters EPA Method TO-15 And Modified EPA Method TO-14A



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email: EnviroSales@eurofins.com

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Melbourne 6 Monterey Road Dandenong South VIC 3175 +61 3 8564 5000 NATA# 1261 Site# 1254	Geelong 19/8 Lewalan Street Grovedale VIC 3216 +61 3 8564 5000 NATA# 1261 Site# 25403	Sydney 179 Magowar Road Girraween NSW 2145 +61 2 9900 8400 NATA# 1261 Site# 18217	Canberra Unit 1,2 Dacre Street Mitchell ACT 2911 +61 2 6113 8091 NATA# 1261 Site# 25466	Brisbane 1/21 Smallwood Place Murarrie QLD 4172 T: +61 7 3902 4600 NATA# 1261 Site# 20794	Newcastle 1/2 Frost Drive Mayfield West NSW 2304 +61 2 4968 8448 NATA# 1261 Site# 25079 & 25289
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ABN: 47 009 120 549

Perth ProMicro 46-48 Banksia Road Welshpool WA 6106 +61 8 6253 4444 NATA# 2561 Site# 2554
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NZBN: 9429046024954

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Company Name: GHD Pty Ltd NT
Address: Level 7, 24 Mitchell Street
Darwin
NT 0800

Project Name: Darwin Turf Club
Project ID: 12618429

Order No.:
Report #: 1092569
Phone: 08 8982 0100
Fax: 08 8981 1075

Received: May 1, 2024 2:22 PM
Due: May 8, 2024
Priority: 5 Day
Contact Name: Jo Lavers

Eurofins Analytical Services Manager : Harry Bacalis

Sample Detail						Canister Certification and Supply fee	Dilution Factor	Final Pressure (psi)	Receipt Vac./Pressure (in Hg)	BTEXN (TO15)
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X	X	X	X
External Laboratory										
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID					
1	AQM01	Apr 30, 2024		6L Passivated Canister	M24-My0001509	X	X	X	X	X
2	AQM02	Apr 30, 2024		6L Passivated Canister	M24-My0001510	X	X	X	X	X
3	AQM03	Apr 30, 2024		6L Passivated Canister	M24-My0001511	X	X	X	X	X
Test Counts						3	3	3	3	3

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. Dilutions are performed on samples due to the presence of high level target species or the presence of high level non-target species.
3. Results are uncorrected for surrogate recoveries.
4. All QC limit exceedances and affected sample results are noted by flags. Each qualifying flag is defined below in section entitled 'Definition of Data Qualifying Flags' and additionally on individual sample results (where relevant).
5. "100% certification" is defined as evaluating the sampling system with humid zero air/N₂ and humid calibration gases that pass through all active components of the sampling system. The system is "100% certified" if no significant additions or deletions (less than 0.2 ppbv each of target compounds) have occurred when challenged with the test gas stream.
6. The conversion equation from ppbv to g/m³ uses a temperature of 25 °C and an ambient sea level atmospheric pressure of 1 atmosphere (101.325 kPa) is assumed.
7. All canister samples are only analysed once temperature equilibrium with the laboratory has been achieved.
8. Safe Sampling Volume (SSV) - calculated by taking two-thirds of the breakthrough volume (direct method) and Appendix 1 of Method T0-17.
9. Samples were analysed on an 'as received' basis.
10. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
11. This report replaces any interim results previously issued.

Definition of Data Qualifying Flags

Qualifiers may have been used on the data analysis sheets and indicates as follows:

- A01 Compound present in laboratory blank greater than reporting limit (background subtraction not performed).
- A02 Estimated value.
- A03 Exceeds instrument calibration range.
- A04 Saturated peak.
- A05 Exceeds quality control limits.
- A06 Compound analysed for but not detected above the Limit of Reporting (LOR). See data page for project specific U-flag definition.
- A07 Non-detected compound associated with low bias in the CCV.
- A08 The identification is based on presumptive evidence.
- A09 SSV has been exceeded for this compound. It is likely that this compound has been underestimated.
- A10 LORs cited do not take into account sample dilution due to canister pressurisation.
- A11 Naphthalene elutes outside the >C10-C12 range on the system used for sample analysis. As a result, >C10-C12 TRH value is equivalent to the modified F2 value.

Holding Times

Under conditions of normal usage for sampling ambient air, most Volatile Organic Compounds (VOCs) can be recovered from canisters near their original concentrations after storage times of up to thirty days. For thermal desorption tubes (TDT) samples should be refrigerated at <4°C in a clean environment during storage and analysed within 30 days of sample collection (within one week for limonene, carene, bis-chloromethyl ether and labile sulfur or nitrogen containing volatiles).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

Units

ppbv: parts per billion by volume

kPa: kilopascal

ug/m³: micrograms per cubic metre

psig: pounds per square inch gauge

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
BTEXN (TO15)							
Benzene	ug/m3	< 1.6			1.6	Pass	
Ethylbenzene	ug/m3	< 2.2			2.2	Pass	
m.p-Xylene	ug/m3	< 4.4			4.4	Pass	
o-Xylene	ug/m3	< 2.2			2.2	Pass	
Toluene	ug/m3	< 7.5			7.5	Pass	
Naphthalene	ug/m3	< 10.5			10.5	Pass	
LCS - % Recovery							
BTEXN (TO15)							
Benzene	%	123			70-130	Pass	
Ethylbenzene	%	121			70-130	Pass	
m.p-Xylene	%	128			70-130	Pass	
o-Xylene	%	124			70-130	Pass	
Toluene	%	120			70-130	Pass	
Naphthalene	%	123			70-130	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	No
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised by:

Harry Bacalis	Analytical Services Manager
Jonathon Angell	Senior Analyst-Air



Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

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

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Appendix E

Results Tables



	BTEXN				
	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)
	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3
EQL	0.0016	0.0075	0.0022	0.0022	0.0044
Environment Protection Licence Trigger Levels (EPL218) - Appendix C (2018-2020)	0.01	3.766		1.085	2.17

Location Code	Date	Field ID	Lab Report Number					
AQM01	30 Apr 2024	AQM01	1092569	<0.002	<0.011	<0.003	<0.003	<0.007
AQM02	30 Apr 2024	AQM02	1092569	<0.005	<0.022	<0.007	<0.007	<0.013
AQM03	30 Apr 2024	AQM03	1092569	<0.003	<0.014	<0.004	<0.004	<0.008

Statistics					
Number of Results	3	3	3	3	3
Number of Detects	0	0	0	0	0
Minimum Concentration	<0.002	<0.011	<0.003	<0.003	<0.007
Minimum Detect	ND	ND	ND	ND	ND
Maximum Concentration	<0.005	<0.022	<0.007	<0.007	<0.013
Maximum Detect	ND	ND	ND	ND	ND
Average Concentration *	0.0017	0.0078	0.0023	0.0023	0.0047
Geometric Average *	0.0016	0.0075	0.0022	0.0022	0.0045
Median Concentration *	0.0015	0.007	0.002	0.002	0.004
Standard Deviation *	0.00076	0.0028	0.001	0.001	0.0016
Geometric Standard Deviation *	1.6	1.4	1.5	1.5	1.4
95% UCL (Student's-t) *	0.00295	0.0126	0.00409	0.00409	0.00738
% of Detects	0	0	0	0	0
% of Non-Detects	100	100	100	100	100

* A Non Detect Multiplier of 0.5 has been applied.



	Metals								BTEXN						
	Arsenic (filtered)	Cadmium (filtered)	Chromium (III+VI) (filtered)	Copper (filtered)	Lead (filtered)	Mercury (filtered)	Nickel (filtered)	Zinc (filtered)	Naphthalene (value used in F2 calc)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.001	0.0001	0.001	0.001	0.001	0.0001	0.001	0.005	5	1	2	2	2	2	2
ANZG (2018) - FW - 95% (updated 26 July 2021)	0.013 ^{#1}	0.0002	0.001 ^{#2}	0.0014	0.0034	0.0006	0.011	0.008		950	180	80	350		
PFAS NEMP 2.0 2020 Freshwater - 95% - slightly to moderately disturbed systems															

Location Code	Date	Field ID	Lab Report Number														
MW01	24 Apr 2024	MW01	ES2413470	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.0001	<0.001	0.006	<5	<1	<2	<2	<2	<2
MW01	01 May 2024	MW01	ES2414019	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.0001	<0.001	<0.005	<5	<1	<2	<2	<2	<2
MW02	24 Apr 2024	MW02	ES2413470	<0.001	<0.0001	<0.001	0.002	<0.001	<0.0001	<0.001	0.006	<5	<1	<2	<2	<2	<2
MW02	01 May 2024	MW02	ES2414019	<0.001	<0.0001	<0.001	0.001	<0.001	<0.0001	<0.001	<0.005	<5	<1	<2	<2	<2	<2
MW03	24 Apr 2024	MW03	ES2413470	<0.001	<0.0001	<0.001	0.002	<0.001	<0.0001	0.002	0.006	<5	<1	<2	<2	<2	<2
MW03	01 May 2024	MW03	ES2414019	<0.001	0.0001	<0.001	0.001	<0.001	<0.0001	0.002	<0.005	<5	<1	<2	<2	<2	<2
MW04	24 Apr 2024	MW04	ES2413470	0.002	<0.0001	<0.001	0.003	<0.001	<0.0001	0.047	0.155	<5	<1	<2	<2	<2	<2
MW04	01 May 2024	MW04	ES2414019	0.003	0.0002	<0.001	0.002	<0.001	<0.0001	0.113	0.356	<5	<1	<2	<2	<2	<2
MW05	24 Apr 2024	MW05	ES2413470	<0.001	<0.0001	<0.001	0.007	0.003	<0.0001	0.001	0.007	<5	<1	<2	<2	<2	<2
MW05	01 May 2024	MW05	ES2414019	<0.001	<0.0001	<0.001	0.004	0.002	<0.0001	<0.001	0.012	<5	<1	<2	<2	<2	<2
MW06	24 Apr 2024	MW06	ES2413470	<0.001	<0.0001	<0.001	0.003	<0.001	<0.0001	0.003	0.019	<5	<1	<2	<2	<2	<2
MW06	01 May 2024	MW06	ES2414019	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.0001	0.002	0.010	<5	<1	<2	<2	<2	<2
MW07	24 Apr 2024	MW07	ES2413470	0.001	<0.0001	<0.001	0.001	<0.001	<0.0001	0.002	0.007	<5	<1	<2	<2	<2	<2
MW07	01 May 2024	MW07	ES2414019	<0.001	0.0002	<0.001	0.002	0.005	<0.0001	0.004	0.009	<5	<1	<2	<2	<2	<2

Statistics																	
Number of Results	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
Number of Detects	3	3	0	11	3	0	9	11	0	0	0	0	0	0	0	0	0
Minimum Concentration	0.001	0.0001	<0.001	0.001	<0.001	<0.0001	0.001	<0.005	<5	<1	<2	<2	<2	<2	<2	<2	<2
Minimum Detect	0.001	0.0001	ND	0.001	0.002	ND	0.001	0.006	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration	0.003	0.0002	<0.001	0.007	0.005	<0.0001	0.113	0.356	<5	<1	<2	<2	<2	<2	<2	<2	<2
Maximum Detect	0.003	0.0002	ND	0.007	0.005	ND	0.113	0.356	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration *	0.00082	0.000075	0.0005	0.0021	0.0011	0.00005	0.013	0.043	2.5	0.5	1	1	1	1	1	1	1
Geometric Average *	0.00066	0.000064	0.0005	0.0016	0.00074	0.00005	0.0021	0.01	2.5	0.5	1	1	1	1	1	1	1
Median Concentration *	0.0005	0.00005	0.0005	0.002	0.0005	0.00005	0.002	0.007	2.5	0.5	1	1	1	1	1	1	1
Standard Deviation *	0.00075	0.000055	0	0.0018	0.0013	0	0.031	0.098	0	0	0	0	0	0	0	0	0
Geometric Standard Deviation *	1.8	1.7	1	2.3	2.2	1	5.4	4.3	1	1	1	1	1	1	1	1	1
95% UCL (Student's-t) *	0.00118	0.00010084	0.0005	0.00294	0.00174	0.00005	0.0276	0.0895	2.5	0.5	1	1	1	1	1	1	1
% of Detects	21	21	0	79	21	0	64	79	0	0	0	0	0	0	0	0	0
% of Non-Detects	79	79	100	21	79	100	36	21	100	100	100	100	100	100	100	100	100

* A Non Detect Multiplier of 0.5 has been applied.

Comments

#1 In absence of total As guideline, As (V) guideline has been adopted.
#2 In absence of total Cr guideline, Cr (VI) guideline has been adopted.

Environmental Standards

Department of Agriculture and Water Resources, 2018 updated July 2021, ANZG (2018) - FW - 95% (updated 26 July 2021)
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Freshwater - 95% - slightly to moderately disturbed systems



	TRH - NEPM 2013								TRH - NEPM 1999					PCBs	PFAS - Per
	BTEX (Sum of Total) - Lab Calc	F1 (C6-C10 minus BTEX)	C6-C10 Fraction	F2 (>C10-C16 minus Naphthalene)	>C10-C16 Fraction	F3 (>C16-C34 Fraction)	F4 (>C34-C40 Fraction)	>C10-C40 (Sum of Total)	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 (Sum of Total)	PCBs (Total)	Perfluorobutane sulfonic acid (PFBS)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	1	20	20	100	100	100	100	100	20	50	100	50	50	1	0.02
ANZG (2018) - FW - 95% (updated 26 July 2021)															
PFAS NEMP 2.0 2020 Freshwater - 95% - slightly to moderately disturbed systems															

Location Code	Date	Field ID	Lab Report Number														
MW01	24 Apr 2024	MW01	ES2413470	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<1
MW01	01 May 2024	MW01	ES2414019	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<1
MW02	24 Apr 2024	MW02	ES2413470	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<1
MW02	01 May 2024	MW02	ES2414019	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<1
MW03	24 Apr 2024	MW03	ES2413470	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<1
MW03	01 May 2024	MW03	ES2414019	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<1
MW04	24 Apr 2024	MW04	ES2413470	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<1
MW04	01 May 2024	MW04	ES2414019	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<1
MW05	24 Apr 2024	MW05	ES2413470	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<1
MW05	01 May 2024	MW05	ES2414019	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<1
MW06	24 Apr 2024	MW06	ES2413470	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<1
MW06	01 May 2024	MW06	ES2414019	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<1
MW07	24 Apr 2024	MW07	ES2413470	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<1
MW07	01 May 2024	MW07	ES2414019	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<1

Statistics																	
Number of Results	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	<1	<20	<20	<100	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<1	<0.02	
Minimum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration	<1	<20	<20	<100	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<1	<0.02	
Maximum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration *	0.5	10	10	50	50	50	50	50	50	10	25	50	25	25	0.5	0.01	
Geometric Average *	0.5	10	10	50	50	50	50	50	50	10	25	50	25	25	0.5	0.01	
Median Concentration *	0.5	10	10	50	50	50	50	50	50	10	25	50	25	25	0.5	0.01	
Standard Deviation *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geometric Standard Deviation *	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
95% UCL (Student's-t) *	0.5	10	10	50	50	50	50	50	50	10	25	50	25	25	0.5	0.01	
% of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% of Non-Detects	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

* A Non Detect Multiplier of 0.5 has been applied.

Comments

- #1 In absence of total As guideline, As (V) guideline has been adopted.
#2 In absence of total Cr guideline, Cr (VI) guideline has been adopted.

Environmental Standards

Department of Agriculture and Water Resources, 2018 updated July 2021, ANZG (2018) - FW - 95% (updated :
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Freshwater - 95% - slightly to moderately disturbed systems



	fluoroalkyl Sulfonic Acids		PFAS - Perfluoroalkyl Carboxylic Acids					PFAS - Fluorotelomer Sulfonic Acids				PFAS - Sums	
	Perfluorooctane sulfonic acid (PFOS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluorobutanoic acid (PFBA)	Perfluoroheptanoic acid (PFHpA)	Perfluorohexanoic acid (PFHxA)	Perfluorooctanoic acid (PFOA)	Perfluoropentanoic acid (PFPeA)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	PFAS (Sum of Total)(WA DER List)	Sum of PFHxS and PFOS
EQL	0.01	0.01	0.1	0.02	0.02	0.01	0.02	0.05	0.05	0.05	0.05	0.01	0.01
ANZG (2018) - FW - 95% (updated 26 July 2021)													
PFAS NEMP 2.0 2020 Freshwater - 95% - slightly to moderately disturbed systems	0.13					220							

Location Code	Date	Field ID	Lab Report Number													
MW01	24 Apr 2024	MW01	ES2413470	0.02	<0.01	<0.1	0.03	0.07	<0.01	0.13	<0.05	<0.05	<0.05	<0.05	0.25	0.02
MW01	01 May 2024	MW01	ES2414019	0.02	0.01	<0.1	0.04	0.09	<0.01	0.19	<0.05	<0.05	<0.05	<0.05	0.35	0.03
MW02	24 Apr 2024	MW02	ES2413470	0.02	0.01	<0.1	0.03	0.07	<0.01	0.15	<0.05	<0.05	<0.05	<0.05	0.28	0.03
MW02	01 May 2024	MW02	ES2414019	0.01	<0.01	<0.1	0.02	0.04	<0.01	0.07	<0.05	<0.05	<0.05	<0.05	0.14	0.01
MW03	24 Apr 2024	MW03	ES2413470	0.04	0.01	<0.1	0.03	0.06	<0.01	0.12	<0.05	<0.05	<0.05	<0.05	0.26	0.05
MW03	01 May 2024	MW03	ES2414019	0.02	<0.01	<0.1	0.03	0.08	<0.01	0.15	<0.05	<0.05	<0.05	<0.05	0.28	0.02
MW04	24 Apr 2024	MW04	ES2413470	0.02	<0.01	<0.1	<0.02	<0.02	<0.01	0.05	<0.05	<0.05	<0.05	<0.05	0.07	0.02
MW04	01 May 2024	MW04	ES2414019	<0.01	<0.01	<0.1	<0.02	<0.02	<0.01	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01
MW05	24 Apr 2024	MW05	ES2413470	0.01	<0.01	<0.1	<0.02	<0.02	<0.01	<0.02	<0.05	<0.05	<0.05	<0.05	0.01	0.01
MW05	01 May 2024	MW05	ES2414019	0.01	<0.01	<0.1	<0.02	<0.02	<0.01	<0.02	<0.05	<0.05	<0.05	<0.05	0.01	0.01
MW06	24 Apr 2024	MW06	ES2413470	0.02	<0.01	<0.1	<0.02	<0.02	<0.01	<0.02	<0.05	<0.05	<0.05	<0.05	0.02	0.02
MW06	01 May 2024	MW06	ES2414019	0.02	<0.01	<0.1	<0.02	<0.02	<0.01	<0.02	<0.05	<0.05	<0.05	<0.05	0.02	0.02
MW07	24 Apr 2024	MW07	ES2413470	0.01	<0.01	<0.1	<0.02	<0.02	<0.01	<0.02	<0.05	<0.05	<0.05	<0.05	0.01	0.01
MW07	01 May 2024	MW07	ES2414019	0.02	0.01	<0.1	<0.02	<0.02	<0.01	0.03	<0.05	<0.05	<0.05	<0.05	0.06	0.03

Statistics															
Number of Results	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
Number of Detects	13	4	0	6	6	0	8	0	0	0	0	0	0	13	13
Minimum Concentration	0.01	0.01	<0.1	0.02	<0.02	<0.01	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.01	0.01
Minimum Detect	0.01	0.01	ND	0.02	0.04	ND	0.03	ND	ND	ND	ND	ND	ND	0.01	0.01
Maximum Concentration	0.04	0.01	<0.1	0.04	0.09	<0.01	0.19	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.35	0.05
Maximum Detect	0.04	0.01	ND	0.04	0.09	ND	0.19	ND	ND	ND	ND	ND	ND	0.35	0.05
Average Concentration *	0.017	0.0064	0.05	0.019	0.035	0.005	0.068	0.025	0.025	0.025	0.025	0.025	0.025	0.13	0.02
Geometric Average *	0.016	0.0061	0.05	0.016	0.022	0.005	0.036	0.025	0.025	0.025	0.025	0.025	0.025	0.055	0.017
Median Concentration *	0.02	0.005	0.05	0.01	0.01	0.005	0.04	0.025	0.025	0.025	0.025	0.025	0.025	0.065	0.02
Standard Deviation *	0.0085	0.0023	0	0.011	0.032	0	0.066	0	0	0	0	0	0	0.13	0.012
Geometric Standard Deviation *	1.7	1.4	1	1.8	2.7	1	3.5	1	1	1	1	1	1	4.7	1.8
95% UCL (Student's-t) *	0.0215	0.00754	0.05	0.0238	0.0501	0.005	0.0992	0.025	0.025	0.025	0.025	0.025	0.025	0.187	0.026
% of Detects	93	29	0	43	43	0	57	0	0	0	0	0	0	93	93
% of Non-Detects	7	71	100	57	57	100	43	100	100	100	100	100	100	7	7

* A Non Detect Multiplier of 0.5 has been applied.

Comments

#1 In absence of total As guideline, As (V) guideline has been adopted.
#2 In absence of total Cr guideline, Cr (VI) guideline has been adopted.

Environmental Standards

Department of Agriculture and Water Resources, 2018 updated July 2021, ANZG (2018) - FW - 95% (updated :
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Freshwater - 95% - slightly to moderately disturbed systems



	PCBs								PFAS - Perfluoroalkyl Sulfonic Acids							
	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (Total)	Perfluorobutane sulfonic acid (PFBS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorononane sulfonate (PFNS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluoropropanesulfonic acid (PFPrS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)
	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

Date	Field ID	Lab Report Number																
24/04/2024	Track oil	1090621	<10,000	<10,000	<10,000	<10,000	<10,000	<10,000	<10,000	<10,000	<10,000	<0.005 ^{#1}	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0001

Statistics																		
Number of Results	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	<10,000	<10,000	<10,000	<10,000	<10,000	<10,000	<10,000	<10,000	<10,000	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	<0.0001
Minimum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration	<10,000	<10,000	<10,000	<10,000	<10,000	<10,000	<10,000	<10,000	<10,000	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	<0.0001
Maximum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration *																		
Geometric Average *	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	0.0025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00005	0.00005	0.00005
Median Concentration *	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	0.0025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00005	0.00005	0.00005
Standard Deviation *																		
Geometric Standard Deviation *																		
95% UCL (Student's-t) *																		
% of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% of Non-Detects	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

* A Non Detect Multiplier of 0.5 has been applied.

Comments

#1 The LORs have been raised due to matrix interference



	PFAS - Perfluoroalkyl Carboxylic Acids											PFAS - Perfluoroalkyl Sulfonamide						
	Perfluorobutanoic acid (PFBA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDdDA)	Perfluoroheptanoic acid (PFHpA)	Perfluorohexanoic acid (PFHxA)	Perfluorononanoic acid (PFNA)	Perfluorooctanoic acid (PFOA)	Perfluoropentanoic acid (PFPeA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Methyl perfluorooctane sulfonamidoethanol (MEFOSE)	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
EQL	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	

Date	Field ID	Lab Report Number																
24/04/2024	Track oil	1090621	<0.0005	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005 ^{#1}	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Statistics																		
Number of Results	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	<0.0005	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Minimum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration	<0.0005	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Maximum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration *																		
Geometric Average *	0.00025	0.00005	0.00025	0.00005	0.00005	0.00005	0.00005	0.00005	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025
Median Concentration *	0.00025	0.00005	0.00025	0.00005	0.00005	0.00005	0.00005	0.00005	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025
Standard Deviation *																		
Geometric Standard Deviation *																		
95% UCL (Student's-t) *																		
% of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% of Non-Detects	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

* A Non Detect Multiplier of 0.5 has been applied.

Comments
#1 The LORs have been raised due to matrix interference



	PFAS - Fluorotelomer Sulfonic Acids					PFAS - Sums				
	Perfluorooctane sulfonamide (FOSA)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	PFAS (Sum of Total)	PFAS (Sum of Total)(WA DER List)	Sum of US EPA PFAS (PFOS + PFOA)*	Sum of PFHxS and PFOS	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*
EQL	mg/kg 0.0005	mg/kg 0.0001	mg/kg 0.0001	mg/kg 0.0005	mg/kg 0.0001	mg/kg 0.0005	mg/kg 0.0005	mg/kg 0.0001	mg/kg 0.0001	mg/kg 0.0001

Date	Field ID	Lab Report Number									
24/04/2024	Track oil	1090621	<0.0005	<0.0005	<0.0001	<0.0005	<0.0001	<0.005	<0.005	<0.0005	<0.0005

Statistics											
Number of Results	1	1	1	1	1	1	1	1	1	1	1
Number of Detects	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	<0.0005	<0.0005	<0.0001	<0.0005	<0.0001	<0.005	<0.005	<0.0005	<0.0005	<0.0005	<0.0005
Minimum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration	<0.0005	<0.0005	<0.0001	<0.0005	<0.0001	<0.005	<0.005	<0.0005	<0.0005	<0.0005	<0.0005
Maximum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration *											
Geometric Average *	0.00025	0.00025	0.00005	0.00025	0.00005	0.0025	0.0025	0.00025	0.00025	0.00025	0.00025
Median Concentration *	0.00025	0.00025	0.00005	0.00025	0.00005	0.0025	0.0025	0.00025	0.00025	0.00025	0.00025
Standard Deviation *											
Geometric Standard Deviation *											
95% UCL (Student's-t) *											
% of Detects	0	0	0	0	0	0	0	0	0	0	0
% of Non-Detects	100	100	100	100	100	100	100	100	100	100	100

* A Non Detect Multiplier of 0.5 has been applied.

Comments

#1 The LORs have been raised due to matrix interference



	PCBs								PFAS - Perfluoroalkyl Sulfonic Acids								
	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (Total)	Perfluorobutane sulfonic acid (PFBS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorononane sulfonate (PFNS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluoropropanesulfonic acid (PFPrS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluorobutanoic acid (PFBA)
	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0005

Date	Field ID	Lab Report Number																
30 Apr 2024	Track oil	1090621	<10,000	<10,000	<10,000	<10,000	<10,000	<10,000	<10,000	<10,000	<10,000	<0.005 ^{#1}	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0001

Statistics																		
Number of Results	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	<10,000	<10,000	<10,000	<10,000	<10,000	<10,000	<10,000	<10,000	<10,000	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	<0.0005
Minimum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration	<10,000	<10,000	<10,000	<10,000	<10,000	<10,000	<10,000	<10,000	<10,000	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	<0.0005
Maximum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration *																		
Geometric Average *	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	0.0025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00005	0.00005	0.00025
Median Concentration *	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	0.0025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00005	0.00005	0.00025
Standard Deviation *																		
Geometric Standard Deviation *																		
95% UCL (Student's-t) *																		
% of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% of Non-Detects	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

* A Non Detect Multiplier of 0.5 has been applied.

Comments
#1 The LORs have been raised due to matrix interference



	PFAS - Perfluoroalkyl Carboxylic Acids										PFAS - Perfluoroalkyl Sulfonamide							
	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluoroheptanoic acid (PFHpA)	Perfluorohexanoic acid (PFHxA)	Perfluorononanoic acid (PFNA)	Perfluorooctanoic acid (PFOA)	Perfluoropentanoic acid (PFPeA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTriDA)	Perfluoroundecanoic acid (PFUnDA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EFOSE)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Methyl perfluorooctane sulfonamidoethanol (MEFOSE)	Perfluorooctane sulfonamide (FOSA)	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
EQL	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	

Date	Field ID	Lab Report Number																
30 Apr 2024	Track oil	1090621	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005 ^{#1}	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Statistics																		
Number of Results	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Minimum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Maximum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration *																		
Geometric Average *	0.00005	0.00025	0.00005	0.00005	0.00005	0.00005	0.00005	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025
Median Concentration *	0.00005	0.00025	0.00005	0.00005	0.00005	0.00005	0.00005	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025
Standard Deviation *																		
Geometric Standard Deviation *																		
95% UCL (Student's-t) *																		
% of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% of Non-Detects	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

* A Non Detect Multiplier of 0.5 has been applied.

Comments

#1 The LORs have been raised due to matrix interference



	PFAS - Fluorotelomer Sulfonic Acids				PFAS - Sums				
	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	PFAS (Sum of Total)	PFAS (Sum of Total)(WA DER List)	Sum of US EPA PFAS (PFOS + PFOA)*	Sum of PFHxS and PFOS	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.0001	0.0001	0.0005	0.0001	0.0005	0.0005	0.0001	0.0001	0.0001

Date	Field ID	Lab Report Number								
30 Apr 2024	Track oil	1090621	<0.0005	<0.0001	<0.0005	<0.0001	<0.005	<0.005	<0.0005	<0.0005

Statistics										
Number of Results	1	1	1	1	1	1	1	1	1	1
Number of Detects	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	<0.0005	<0.0001	<0.0005	<0.0001	<0.005	<0.005	<0.0005	<0.0005	<0.0005	<0.0005
Minimum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration	<0.0005	<0.0001	<0.0005	<0.0001	<0.005	<0.005	<0.0005	<0.0005	<0.0005	<0.0005
Maximum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration *										
Geometric Average *	0.00025	0.00005	0.00025	0.00005	0.0025	0.0025	0.00025	0.00025	0.00025	0.00025
Median Concentration *	0.00025	0.00005	0.00025	0.00005	0.0025	0.0025	0.00025	0.00025	0.00025	0.00025
Standard Deviation *										
Geometric Standard Deviation *										
95% UCL (Student's-t) *										
% of Detects	0	0	0	0	0	0	0	0	0	0
% of Non-Detects	100	100	100	100	100	100	100	100	100	100

* A Non Detect Multiplier of 0.5 has been applied.

Comments

#1 The LORs have been raised due to matrix interference



Appendix D
Table 5
QA/QC Field Blank Results

Darwin Turf Club
Darwin Turf Club EPL Management
April 2024 Monitoring Report

			Date	23 Apr 2024	23 Apr 2024
			Lab Report Number	ES2413470	ES2414019
			Matrix Type	Water	Water
	Unit	EQL			
BTEXN					
Naphthalene (value used in F2 calc)	µg/L	5	<5	<5	
Benzene	µg/L	1	<1	<1	
Toluene	µg/L	2	<2	<2	
Ethylbenzene	µg/L	2	<2	<2	
Xylene (o)	µg/L	2	<2	<2	
Xylene (m & p)	µg/L	2	<2	<2	
Xylene Total	µg/L	2	<2	<2	
BTEX (Sum of Total) - Lab Calc	µg/L	1	<1	<1	
TRH - NEPM 2013					
F1 (C6-C10 minus BTEX)	µg/L	20	<20	<20	
C6-C10 Fraction	µg/L	20	<20	<20	
TRH - NEPM 1999					
C6-C9 Fraction	µg/L	20	<20	<20	

Appendix F

Calibration Certificates

PID Calibration Certificate

Instrument **PhoCheck Tiger**
Serial No. **T-118551**



Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments			
Battery	Charge Condition	✓				
	Fuses	✓				
	Capacity	✓				
	Recharge OK?	✓				
Switch/keypad	Operation	✓				
Display	Intensity	✓				
	Operation (segments)	✓				
Grill Filter	Condition	✓				
	Seal	✓				
Pump	Operation	✓				
	Filter	✓				
	Flow	✓				
	Valves, Diaphragm	✓				
PCB	Condition	✓				
Connectors	Condition	✓				
Sensor	PID	✓	10.6 ev			
Alarms	Beeper	✓	Low	High	TWA	STEL
	Settings	✓	50ppm	100ppm		
Software	Version	✓				
Data logger	Operation	✓				
Download	Operation	✓				
Other tests:						

Certificate of Calibration

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

Diffusion mode Aspirated mode

Sensor	Serial no	Calibration gas and concentration	Certified	Gas bottle No	Instrument Reading	
PID Lamp		100ppm Isobutylene	NATA	SA025	100.9 ppm	

Calibrated by: _____ Trent Chase

Calibration date: 12/04/2024

Next calibration due: 9/10/2024

Multi Parameter Water Meter

Instrument **YSI Pro DSS**
Serial No. **21C100547**



Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
	Recharge OK?	✓	
Switch/keypad	Operation	✓	
	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH/ORP	✓	
	2. Turbidity	✓	
	3. Conductivity	✓	
	4. D.O	✓	
	5. Temp	✓	
	6. Depth	x	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

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

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
Temp		19.6			20
pH 7		pH 7.00		410754	7.00
pH 4		pH 4.00		396889	4.00
EC		2760 uS/cm		388521	2760 uS/cm
ORP		234.88		406331/393193	234
DO		Zero		391223	0.0%
DO 100%		100%		Water Saturated Air	100.0%
Turbidity		0 NTU		Distilled water	0.05 NTU
Turbidity		100 NTU		402593	100 NTU

Calibrated by: _____ Trent Chase

Calibration date: 17/04/2024

Calibration due: 16/07/2024

Appendix G

Historical Field Data

Appendix G
Historical Field Data

Site	Well ID	Sampled Date/Time	Purge Vol L	Purge SWL m bTOC	pH Field pH Units	EC Field µS/cm	DO Field mg/L	DO Field %S	ORP Field mV	Temp Field °C	Turbidity Field NTU
Darwin Turf Club	MW01	20/04/2022 12:30 PM	1.5	3.994	5.66	302.2	1.49	21.2	175	34.2	
Darwin Turf Club	MW01	21/04/2022 12:30 PM	2.5	2.366	5.75	309.6	0.27	3.8	149.5	33.6	
Darwin Turf Club	MW01	24/04/2023 02:13 PM	2.5	3.8	5.09	886	0.28	3.9	148.3	33.2	
Darwin Turf Club	MW01	27/04/2023 11:21 AM	2	2.411	5.09	833	0.29	4	134.1	33.1	
Darwin Turf Club	MW01	24/04/2024 13:35 PM	3	2.44	5.09	628	-0.16	-2.24	-491.8	33.3	74.65
Darwin Turf Club	MW01	1/05/2024 13:02 PM	3	2.52	5.33	724	-0.06	-0.84	-394.5	33.5	45.94
Darwin Turf Club	MW02	17/01/2020 12:59 PM	6.0	0.959	5.86	505	1.87	27.4	11.3	34.8	
Darwin Turf Club	MW02	23/04/2020 11:45 AM	2.5	1.472	5.46	528	0.37	5.6	68.0	34.8	-0.44
Darwin Turf Club	MW02	28/04/2020 11:29 AM	3.0	1.521	5.45	490.1	0.59	8.3	84.1	34.2	-2.69
Darwin Turf Club	MW02	20/04/2022 01:15 PM	1.2	3.988	6.51	436.5	6.63	92.9	164.8	33.2	
Darwin Turf Club	MW02	11/05/2022 01:05 PM	4	2.803	5.58	319.5	0.31	4.4	157.5	33.4	
Darwin Turf Club	MW02	10/10/2022 01:07 PM	6	2.592	4.77	482	0.31	4.2	167.1	33.1	
Darwin Turf Club	MW02	12/10/2022 10:42 AM	5	2.56	4.7	466.1	0.19	2.5	108.3	32.6	
Darwin Turf Club	MW02	24/04/2023 01:40 PM	3	4.71	5.14	873	0.51	7.2	115.4	32.6	
Darwin Turf Club	MW02	27/04/2023 10:25 AM	2.5	2.479	5.1	813	0.92	12.7	146.6	32.7	
Darwin Turf Club	MW02	8/09/2023 11:13 AM	2.5	3.16	5.13			32.4	124.6	32.5	
Darwin Turf Club	MW02	12/09/2023 11:32 AM	1	3.08	5.46			35.5	136.4	32.2	
Darwin Turf Club	MW02	24/04/2024 12:49 AM	2	2.545	4.63	596	2.04	28.6	-235.3	33.4	1415
Darwin Turf Club	MW02	1/05/2024 12:15 AM	3.5	2.5	4.76	655	1.3	18.24	-243.8	33.4	461.41
Darwin Turf Club	MW03	23/04/2020 11:10 AM	2.0	2.158	4.76	582	0.93	13.2	209.4	34.0	20.90
Darwin Turf Club	MW03	28/04/2020 10:36 AM	2.5	2.264	4.67	586	0.36	5.0	236.7	33.8	-3.10
Darwin Turf Club	MW03	4/08/2020 11:46 AM	3.0	2.878	5.02	406.4	0.29	4.0	229.0	32.8	9.56
Darwin Turf Club	MW03	8/09/2020 10:54 AM	7	3.049	4.81	422.8	-3.7	-0.29	202.1		1.00
Darwin Turf Club	MW03	16/09/2020 10:08 AM	2.5	3.085	5.60			-0.30	-0.2		2197
Darwin Turf Club	MW03	20/04/2021 1:15 PM	2.5	4.696	5.22	481.1	0.03	0.5	183.2	32.8	0.79
Darwin Turf Club	MW03	28/04/2021 12:15 PM	3.5	2.793	5.21	491.5	0.06	0.8	204.2	32.8	1.8
Darwin Turf Club	MW03	7/09/2021 11:55 AM	3.5	3.26	5.85	545	0.22	2.9	133.6	32.1	
Darwin Turf Club	MW03	15/09/2021 12:30 PM	3	3.316		487.4	0.2			33.5	
Darwin Turf Club	MW03	20/04/2022 12:00 PM	2	2.314	6.17	324.4	2.3	31.9	154.1	32.9	
Darwin Turf Club	MW03	12/05/2022 01:40 PM	2.5	3.17	4.81	459.9	0.09	1.3	189.9	33	
Darwin Turf Club	MW03	8/09/2022 01:40 PM	2.5	2.58	5.58	333.8	0.11	1.5	140.5	33.5	
Darwin Turf Club	MW03	15/09/2022 12:00 AM	2	3.172	4.86	457.9	0.08	1.1	168.1	33.2	
Darwin Turf Club	MW03	10/10/2022 12:10 PM	4	2.473	5.01	495.1	2.01	28	198.5	33.6	
Darwin Turf Club	MW03	12/10/2022 11:40 AM	5	2.565	5.1	486.1	2.1	28.2	187.7	33.5	
Darwin Turf Club	MW03	24/04/2023 02:47 PM	2.5	2.609	4.9	904	0.26	3.7	189.2	33.3	
Darwin Turf Club	MW03	27/04/2023 12:12 PM	2.5	2.64	4.9	855	0.26	3.6	190.1	33.2	

Appendix G
Historical Field Data

Site	Well ID	Sampled Date/Time	Purge Vol L	Purge SWL m bTOC	pH Field pH Units	EC Field µS/cm	DO Field mg/L	DO Field %S	ORP Field mV	Temp Field °C	Turbidity Field NTU
Darwin Turf Club	MW03	8/09/2023 01:54 PM	2	3.28	4.9			24.7	144.7	33.5	
Darwin Turf Club	MW03	12/09/2023 12:00 PM	1	3.31	5.1			3.31	139.7	32.6	
Darwin Turf Club	MW03	24/04/2024 14:14 PM	2.5	2.65	4.42	639	0.02	0.28	-373.7	33.2	12.57
Darwin Turf Club	MW03	1/05/2024 13:31 PM	2.5	2.785	4.51	723	-0.11	-1.55	-383.3	33.7	14.21
Darwin Turf Club	MW04	17/01/2020 01:20 PM	11	2.830	5.11	12521	2.06	32.1	193.3	32.3	
Darwin Turf Club	MW04	23/04/2020 12:41 PM	4.0	1.966	5.23	6273	1.41	20.1	213.1	33.6	46.79
Darwin Turf Club	MW04	28/04/2020 12:24 PM	5.5	2.037	5.18	6729	1.04	14.8	229.2	33.3	5.06
Darwin Turf Club	MW04	4/08/2020 12:34 PM	4.0	2.899	5.11	9850	0.80	11.3	302.6	31.9	4.56
Darwin Turf Club	MW04	8/09/2020 11:39 AM	5		4.65	18810	2.81	0.17	247.2	32.5	301.9
Darwin Turf Club	MW04	16/09/2020 11:07 AM	3	3.376	4.52	20888	-2.39		225.9	33.2	63.10
Darwin Turf Club	MW04	20/04/2021 12:20 PM	4	2.280	5.63	7055	1.89	26.8	145.9	33.5	0.83
Darwin Turf Club	MW04	28/04/2021 11:30 AM	4.5	2.408	5.53	8828	1.42	20.2	229.3	33.2	1.63
Darwin Turf Club	MW04	7/09/2021 11:15 AM	1.2			24974			-9.1	32.2	
Darwin Turf Club	MW04	15/09/2021 11:40 AM	2.5	2.13	5.63	22088				32.6	
Darwin Turf Club	MW04	20/04/2022 11:30 PM	1.5	1.74	5.85	17431	2.68	38	42	35.3	
Darwin Turf Club	MW04	11/05/2022 01:35 PM	2.5	2.413	6.02	15605	0.76	11.5	-15	35.2	
Darwin Turf Club	MW04	8/09/2022 12:35 PM	5	3.84	5.11	22092	0.35	5.1	22	32.9	
Darwin Turf Club	MW04	15/09/2022 12:00 AM	3.58	3.428	5.04	21326	0.35	5.1	93.7	33.3	
Darwin Turf Club	MW04	10/10/2022 11:45 AM	6	2.509	5.7	1171	21.1	33.2	144.1	33.2	
Darwin Turf Club	MW04	12/10/2022 11:40 AM	5	2.933	5.47	4661	0.98	11.4	152	33.3	
Darwin Turf Club	MW04	24/04/2023 12:57 PM	3.5	2.24	4.99	11539	0.71	10.4	131.8	34.2	
Darwin Turf Club	MW04	27/04/2023 09:53 AM	3.5	2.295	5.08	9910	0.33	4.7	143.5	33.6	
Darwin Turf Club	MW04	8/09/2023 12:39 PM	2.5	3.59	5.01			21.9	72.4	32.7	
Darwin Turf Club	MW04	12/09/2023 11:06 AM	2.5	3.26	5.01			16.7	149	32.4	
Darwin Turf Club	MW04	24/04/2024 12:02 PM	4.5	2.32	4.7	14890	0.27	3.89	-300.7	35	1362.05
Darwin Turf Club	MW04	1/05/2024 11:33 AM	3	2.33	4.53	16598	0.59	8.42	-458.3	34.5	116.31
Darwin Turf Club	MW05	17/01/2020 01:50 PM	6.0	4.252	5.93	107.3	4.56	69.3	153.5	31.2	
Darwin Turf Club	MW05	23/04/2020 01:28 PM	2.5	4.151	5.59	95.1	5.92	81.7	205.4	32.5	-0.87
Darwin Turf Club	MW05	28/04/2020 01:14 PM	3.0	4.303	5.67	93.6	6.16	85.3	217.1	32.4	-1.31
Darwin Turf Club	MW05	4/08/2020 01:08 PM	1.50	4.177	6.28	77.4	7.11	95.7	262.4	31.0	2.26
Darwin Turf Club	MW05	16/09/2020 11:46 AM	2.0	4.219	6.04		96.8	6.95	116.9	33.1	1.27
Darwin Turf Club	MW05	8/09/2020 12:11 PM	3	4.323	5.96	112.0	89.1	6.80	171.0	32.3	4.86
Darwin Turf Club	MW05	20/04/2021 11:40 AM	2.5	4.404	4.89	230.5	3.76	51.8	241.4	32.3	1.96
Darwin Turf Club	MW05	28/04/2021 10:50 AM	2.5	4.076	5.66	99.4	5.91	80.7	212.6	31.8	0.67
Darwin Turf Club	MW05	7/09/2021 10:50 AM	1	5.212	6.61	96.6	5.87	78.4	161.2	30.6	
Darwin Turf Club	MW05	15/09/2021 10:55 AM	2		6.39	85.8	6.24	83.6	151.2	31.3	

Appendix G
Historical Field Data

Site	Well ID	Sampled Date/Time	Purge Vol L	Purge SWL m bTOC	pH Field pH Units	EC Field µS/cm	DO Field mg/L	DO Field %S	ORP Field mV	Temp Field °C	Turbidity Field NTU
Darwin Turf Club	MW05	20/04/2022 11:30 PM	1.5	3.556	5.58	145.2	5.48	74.8	147.6	32.1	
Darwin Turf Club	MW05	11/05/2022 02:00 PM	2	4.041	5.75	144.4	4.13	57.4	150.5	32.9	
Darwin Turf Club	MW05	8/09/2022 11:56 AM	2	3.706	5.89	79	7	91.7	192.1	29.4	
Darwin Turf Club	MW05	15/09/2022 12:00 AM	2	3.74	5.91	87.2	6.48	87.2	222.5	30.3	
Darwin Turf Club	MW05	10/10/2022 02:05 PM	4	4.391	5.85	101.1	31.4	81.4	181.2	31.4	
Darwin Turf Club	MW05	12/10/2022 10:22 AM	4	4.211	5.69	97.2	5.81	77.5	178.2	30.7	
Darwin Turf Club	MW05	24/04/2023 12:17 PM	2.5	4.485	3.81	903	3.12	43.1	294.6	32.5	
Darwin Turf Club	MW05	27/04/2023 12:02 AM	2.5	2.496	3.84	847	3.69	50.8	280.7	32.2	
Darwin Turf Club	MW05	24/04/2024 11:05 AM	3.5	4.54	3.92	602	4.41	60.91	-131.3	32.5	22.07
Darwin Turf Club	MW05	1/05/2024 10:53 AM	2	3.66	3.57	690	4.83	66.6	-72.1	32.4	7.45
Darwin Turf Club	MW06	17/01/2020 02:30 PM	6.0	3.510	5.05	232.2	4.28	60.0	221.5	32.5	
Darwin Turf Club	MW06	23/04/2020 09:33 AM	3.5	4.382	4.63	353.4	0.34	4.7	208.1	33.0	-0.6
Darwin Turf Club	MW06	28/04/2020 09:11 AM	2.5	4.423	4.69	290.9	0.33	4.6	201.9	32.4	1.56
Darwin Turf Club	MW06	4/08/2020 09:35 AM	1.75	5.763	4.61	109.8	0.42	5.9	283.1	31.7	11.02
Darwin Turf Club	MW06	8/09/2020 12:58 PM	2.5	5.745	4.35	107.9	7.79	0.57	245.1	33.5	7.94
Darwin Turf Club	MW06	20/04/2021 11:08 AM	4	4.410	4.90	355.0	0.52	7.4	215.5	31.6	1.87
Darwin Turf Club	MW06	28/04/2021 9:22 AM	3.0	4.547	4.97	338.3	0.13	1.8	219.9	31.2	2.10
Darwin Turf Club	MW06	7/09/2021 12:40 PM	1.2	6.07	5.6	111.3	1.51	20.8	195.5	32.4	
Darwin Turf Club	MW06	15/09/2021 9:40 AM	4	5.837	5.56		1.63	22.6	181.9	32.3	
Darwin Turf Club	MW06	20/04/2022 03:00 PM	1.5	4.145	5.33	343.8	2.66	36.5	195	32.4	
Darwin Turf Club	MW06	11/05/2022 02:25 PM	2.5	4.42	5.55	170.7	0.19	2.6	170.7	32.2	
Darwin Turf Club	MW06	8/09/2022 09:50 AM	4.5	5.175	4.67	290	1.41	19	208.6	31.4	
Darwin Turf Club	MW06	15/09/2022 11:15 AM	3.5	5.955	4.37	215.8	0.59	8.1	238.3	31.7	
Darwin Turf Club	MW06	10/10/2022 11:08 AM	5	4.811	4.73	316.1	2.83	38.8	250.2	31.1	
Darwin Turf Club	MW06	12/10/2022 09:50 AM	5	4.668	4.58	335	1.3	17.6	185.2	31.6	
Darwin Turf Club	MW06	24/04/2023 10:42 AM	4.5	4.315	4.68	874	0.67	9.2	236.4	32.4	
Darwin Turf Club	MW06	27/04/2023 08:11 AM	2.5	4.395	4.73	817	0.48	6.4	187.3	30.8	
Darwin Turf Club	MW06	11/09/2023 06:00 PM	5	4.36	4.4			25.3	196.3	31.2	
Darwin Turf Club	MW06	12/09/2023 09:15 AM	1	5.72	4.85			42.5	154.2	30.3	
Darwin Turf Club	MW06	24/04/2024 10:10 AM	4	5.48	5.25	578	0.08	1.1	-535.1	32.4	63.71
Darwin Turf Club	MW06	1/05/2024 10:15 AM	2.5	4.61	4.77	644	0.03	0.41	-486.1	32.2	21.93
Darwin Turf Club	MW07	23/04/2020 10:17 AM	2.5	2.932	4.24	176.4	2.32	31.3	236.0	31.1	-1.2
Darwin Turf Club	MW07	28/04/2020 09:53 AM	2.5	3.023	4.17	186.4	2.0	28.3	256.7	31.1	-2.97
Darwin Turf Club	MW07	4/08/2020 10:48 AM	3.0	4.264	4.81	1651	0.48	6.5	179.9	30.8	6.66
Darwin Turf Club	MW07	8/09/2020 01:43 PM	2.0	4.121	4.53	2599	1.30		179.0	32.5	35.96
Darwin Turf Club	MW07	16/09/2020 01:26 PM	2.0	4.263	4.07	1710	25.6	1.72		32.7	20.11

Appendix G
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Site	Well ID	Sampled Date/Time	Purge Vol L	Purge SWL m bTOC	pH Field pH Units	EC Field µS/cm	DO Field mg/L	DO Field %S	ORP Field mV	Temp Field °C	Turbidity Field NTU
Darwin Turf Club	MW07	20/04/2021 10:32 AM	4.5	3.037	4.46	281.8	1.54	20.5	199.9	30.3	2.18
Darwin Turf Club	MW07	28/04/2021 10:10 AM	4.0	3.399	4.45	331.4	2.32	31.6	233.5	30.4	2.14
Darwin Turf Club	MW07	7/09/2021 9:40 AM	1.6	4.361	5.46	2261	0.89	11.9	210.5	30.2	
Darwin Turf Club	MW07	15/09/2021 8:30 AM	6.5	4.405	5.04	1925	1.52		216	31.1	
Darwin Turf Club	MW07	20/04/2022 11:30 AM	1.2	2.64	4.9	149.1	3.27	43.7	225.6	30.7	
Darwin Turf Club	MW07	11/05/2022 02:55 PM	2.5	3.007	5.11	127	2.13	28.7	198.3	31.1	
Darwin Turf Club	MW07	8/09/2022 11:09 AM	5	4.912	4.54	3118	0.18	2.4	140.3	30.7	
Darwin Turf Club	MW07	15/09/2022 10:20 AM	3.5	4.513	4.1	1639	30.5	2.07	296.7	30.5	
Darwin Turf Club	MW07	10/10/2022 11:08 AM	4.5	2.75	4.34	177.9	5.6	76	245.1	31.5	
Darwin Turf Club	MW07	12/10/2022 12:50 PM	5	2.737	4.39	206.1	5.37	72.5	244.9	31.3	
Darwin Turf Club	MW07	24/04/2023 11:33 AM	3.5	3.03	4.31	1074	1.02	13.5	182.1	30.6	
Darwin Turf Club	MW07	27/04/2023 01:22 PM	3	3.05	4.26	813	1.57	21.2	241.5	31.1	
Darwin Turf Club	MW07	8/09/2023 11:13 AM	3	4.42	4.84			21.9	100.7	31.1	
Darwin Turf Club	MW07	12/09/2023 10:00 AM	3	4.705	4.22			20.5	172.9	29.6	
Darwin Turf Club	MW07	24/04/2024 15:52 PM	5	3.085	3.88	1129	0.91	12.32	-187.7	31.3	352.76
Darwin Turf Club	MW07	1/05/2024 09:30 AM	3	3.24	4.05	2402	-0.16	-2.14	-518.6	30.6	1117.68



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