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Report

Annual Monitoring Report EPL 229-03 (29th June 2023 – 28th June 2024)

PREPARED FOR:

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Glossary

ANZECC	Australian and New Zealand Environment & Conservation Council
ARMCANZ	Agriculture & Resource Management Council of Australia & New Zealand
CSM	Conceptual Site Model
DHWQO	Darwin Harbour Water Quality Objectives
EMP	Environmental Management Plan
EPL	Environmental Protection Licence
GME	Groundwater Monitoring Event
GWMP	Groundwater Monitoring Program
GRR	Global Resource Recovery
GMP	Groundwater Management Plan
IBC	Intermediate Bulk Container
RLWTF	Darwin Recycling and Liquid Waste Treatment Facility
NT EPA	Northern Territory Environmental Protection Authority
NATA	National Accredited Testing Authority
PFAS	Per- and polyfluoroalkyl substances
SWMP	Surface Water Monitoring Plan
TOR	Terms of Reference

Section 1 Introduction

The Darwin Recycling and Liquid Waste Treatment Facility (RLWTF) is located within East Arm Industrial Precinct, Northern Territory (Figure 1-1). The facility is owned Global Resource Recovery (NT) Pty Ltd (GRR) and licenced by the Northern Territory Environment Protection Authority (NT EPA) under the *Waste Management and Pollution Control Act* and the *Water Act 1998*. The facility receives chemicals and liquid wastes as defined in the Act, from maritime, mining, oil and gas industries in the Darwin region and other parts of Australia.

The business was sold to Global Resources Recovery (NT) in July 2023 and since then, the operational profile of the site has been modified to focus on reprocessing of Glycols, Amines and Oils, but also has the capacity to handle acids/alkaline materials. The facility has the capacity to recycle up to 24 million litres of Glycol per annum, up to 10 million litres of used oil per annum.

The facility and regulatory obligations are primarily managed under the Environment Protection Licence (EPL) 229-03 (Appendix A), and Global Resource Recovery Environmental Management Plan (Global Resource Recovery, July 2023). An environmental monitoring program is administered by GRR. The environmental program includes the monitoring of groundwater, surface waters and air emissions.

Conditions 62 and 63 of the Licence requires GRR to provide an annual monitoring report to the NT EPA. The annual monitoring report must be provided to the NT EPA within ten (10) days after the anniversary of the date of the licence. This report includes the environmental monitoring results in relation to the Licence for the period between 29 June 2023 and 28 June 2024 (herein referred to as the reporting period).

As per the requirements of Condition 63 of the Licence, this report:

- is prepared in accordance with the requirements of the NT EPA 'Guideline for Reporting on Environmental Monitoring';
- reports on surface water, groundwater, stormwater transferred from bunded areas and stack emission monitoring undertaken for this licence and as part of the environmental monitoring program for the site;
- includes a tabulation of all monitoring data required as a condition of this licence. Data must be provided electronically in Microsoft Excel format;
- 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;
- provides an assessment on groundwater levels, including groundwater contours and tidal influence;
- reports on all exceedances and investigations undertaken for this licence; and
- includes an assessment of environmental impact from the activity.

1.1 NT EPA Licence

The Licence commenced on 29 June 2022 and will expire on 28 June 2027. The boundary of the Licence is shown in Figure 1-2. The licence is available on the NT EPA website at https://ntepa.nt.gov.au/your-business/public-registers/licences-and-approvals-register/environment-protection-licences/listed-waste-handlers/smorgen-fuels-pty-ltd

Figure 1-1 Darwin Recycling and Liquid Waste Treatment Facility Location (sourced from GRR EMP)

Figure 1-2 Detail of the RLWTF showing boundary of the Leases Area (sourced from GRR EMP)

1.2 GRR Environmental Monitoring

Several aspects of the operation of the GRR facility may impact upon the environment. The EPL licence requires that GRR undertake environmental monitoring of these aspects and the environmental receptors that may be impacted. These are outlined in the GRR facility environmental management plan (EMP) and include:

- Discharges to water, including:
  - Stormwater discharge
  - Bund water discharge
- Discharges to air, including:
  - Stack emission monitoring
- Discharges to land and surrounding environment, including:
  - Groundwater monitoring

GRR has developed and implements several routine monitoring programs to meet the requirements of the Licence. The objectives, methods and results of these monitoring programs have been included in the relevant sections of this report.

The environmental monitoring is carried out in general accordance with:

- Australian and New Zealand Guidelines for Water Quality: Sampling, AS/NZS 5667.1, 1998.
- National Environment Protection Council (NEPC) National Environment Protection (Assessment of Site Contamination) Measure (NEPM), 1999, as amended in 2013 (ASC NEPM).
- National Environment Protection Council (NEPC) National Environment Protection (Air Toxics) Measure (NEPM), 1999, as amended in 2013 (ASC NEPM).
- NT EPA, 2018. Guideline for Reporting on Environmental Monitoring, (May 2016).

1.3 Site context

1.3.1 Climate

The climate of Darwin is characterised by a tropical monsoonal climate with a distinct Dry Season (May to September) and Wet Season (October to April). The Dry Season is dominated by dry, cool weather with little rain, low humidity and wide-ranging temperatures. The onset and duration of the Wet Season varies between years, however most rainfall in the Northern Territory is associated with monsoonal troughs and/or from isolated convective storms (BoM 2022). High precipitation rates are commonly experienced during storm events in the wet season.

The Darwin Airport Bureau of Meteorology station is located approximately 7.5 km northwest of the Project area. The average annual rainfall for Darwin is 1,722.5 mm. Most of the annual rainfall occurs between November and March. The mean minimum temperature is 23.2ºC and the mean maximum temperature is 32.1ºC (BoM 2024) (Appendix B).

Synoptic winds during the dry season tend to be dominated by the southeast trade winds, while light west to north-westerlies predominate during the wet season. Sea breezes from the northwest occur on most afternoons throughout the year.

Tropical cyclones occur in the Darwin region on average about once per year.

1.3.2 Storm Surge and High Tide Inundation

The site is located above the highest tides and the Palmerston Area Storm Surge Inundation mapping shows that the site is above the flood level estimate until year 2100.

Section 2 Groundwater Monitoring

In accordance with EPL requirements, the Groundwater Monitoring Events (GMEs) are undertaken as per EPL229-03 Attachment B which outlines the groundwater monitoring scope and analytical program. The purpose of the GMEs is to measure standing water level (SWL) and collect groundwater samples for laboratory analysis from the two existing on site monitoring bores and three off site monitoring bores. The bore locations are presented in Figure 2-1.

The GMEs during this annual reporting period were undertaken on the following dates:

- 23 June 2023 - Quarterly
- 26 July 2023 – Monthly
- 25 August 2023 - Monthly
- 12 October 2023– Quarterly
- 31 October 2023 – Monthly
- 29 November 2023 – Monthly
- 20 December 2023 – Quarterly
- 17 January 2024 – Monthly
- 21 February 2024 - Monthly
- 22 March 2024 – Annual
- 01 May 2024 (April Event) – Monthly

Specific details on the methodologies implemented for each GME are described within the individual monitoring reports attached as Appendix C. A summary of the typical groundwater sampling programme and testing schedule is described in Table 2-1.

Table 2-1 Groundwater sampling programme 2023-2024

Sample Round	Environmental Monitoring Bores	Analysis
Monthly	EMB 7 EMB 12 EMB 15	Standing Water Levels
	EMB 13 EMB 14	Standing Water Levels In-situ parameters (pH, temp, ORP, EC, TDS. DO)
Quarterly	EMB 7 EMB 12 EMB 15	Standing Water Levels

Sample Round	Environmental Monitoring Bores	Analysis
	EMB 13 EMB 14	Standing Water Levels In-situ parameters (pH, temp, ORP, EC, TDS. DO) Nutrients (NH_3, NOx, TKN, TN, TP) Major Anions (Alkalinity, Sulfate, Chloride, total) Major Cations (Ca, Mg, K, Na total) Dissolved Metals (Sb, As, Ba, Be, Bo, Cd, Cr, Cu, Co, Cu, Pb. Mn, Mo, Ni, Se, Ag, Sn, V, Zn, Hg) Total Recoverable Hydrocarbons BTEXN Polycyclic Aromatic Hydrocarbons PFAS Phenolic Compounds Glycols
Annual	EMB 7 EMB 12 EMB 15 EMB 13 EMB 14	Standing Water Levels In-situ parameters (pH, temp, ORP, EC, TDS. DO) Nutrients (NH_3, NOx, TKN, TN, TP) Major Anions (Alkalinity, Sulfate, Chloride, total) Major Cations (Ca, Mg, K, Na total) Dissolved Metals (Sb, As, Ba, Be, Bo, Cd, Cr, Cu, Co, Cu, Pb. Mn, Mo, Ni, Se, Ag, Sn, V, Zn, Hg) Total Recoverable Hydrocarbons BTEXN Polycyclic Aromatic Hydrocarbons PFAS Phenolic Compounds Glycols

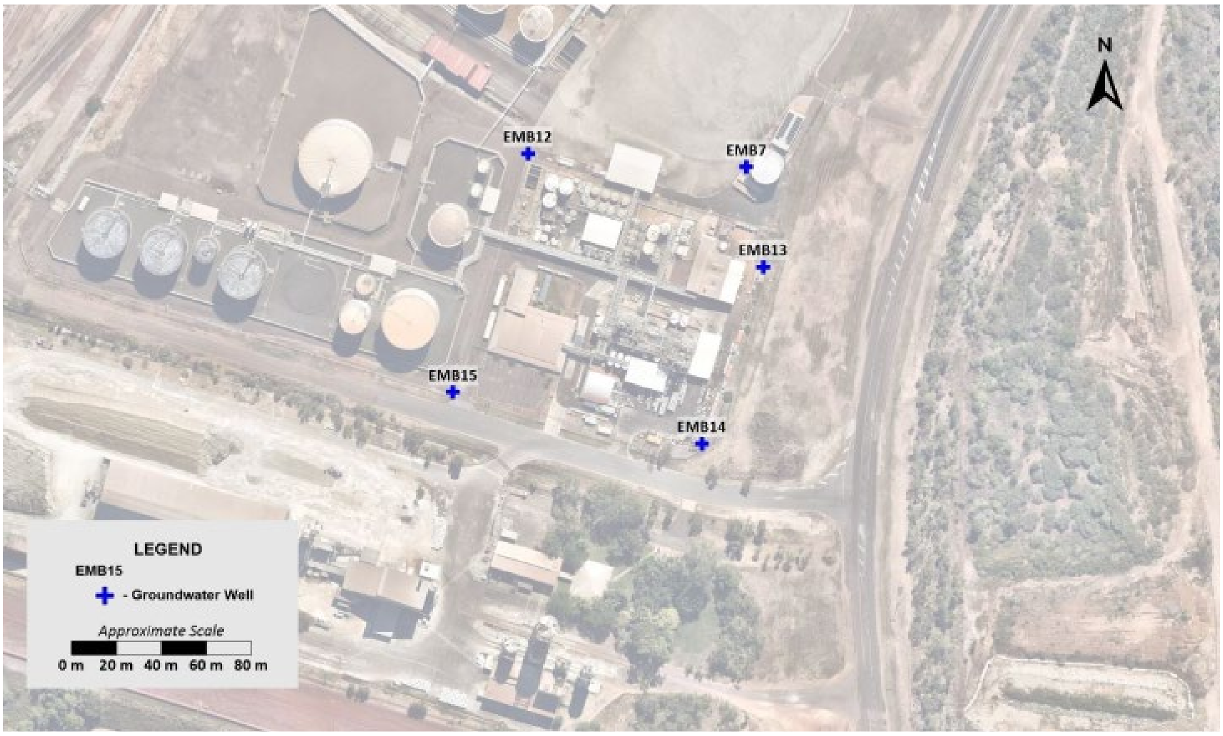

Figure 2-1 Darwin Recycling and Liquid Waste Treatment Facility Groundwater Bore Location

2.1 Groundwater Sampling Methodology

Groundwater sampling events were conducted by Greencap up until the August event and Agon Environmental delivered the remainder of the events, including the annual report. Groundwater sampled using an industry standard low flow groundwater sampling techniques with dedicated tubing and in accordance with AS/NZS 5667.1:1998, AS/NZS 5667.11:1998 and https://www.waterquality.gov.au/anz-guidelines. The flow rate was monitored and regulated using an interface probe to maintain a stable water level during purging and sampling of groundwater.

The following methodology was applied:

- Measuring standing water levels (SWLs) from the surveyed point at the top of the casings using water/product interface water level meter prior to sampling.
- Monitoring physio-chemical parameters (pH, temperature, dissolved oxygen, electrical conductivity, salinity, total dissolved solids, turbidity and oxidation-reduction potential) during purging using a calibrated water quality meter. Sampling occurred when the drawdown and these parameters had stabilised within the ranges presented in *NT Department of Mines and Energy Methodology for the Sampling of Ground Waters (2009)*.
- The sampler wore a clean pair of disposable nitrile gloves when collecting each sample.
- All groundwater samples collected in appropriate bottles/containers provided by analytical laboratories and placed in a chilled esky for transportation immediately after collection.
- Field observations were recorded during sampling including aesthetic evidence of contamination such as sheen, colour and odour.

- Sample containers were systematically labelled, immediately stored in a chilled portable container, and accompanied by completed Chain of Custody (CoC) forms for dispatch to National Association of Testing Authorities (NATA) accredited laboratories within acceptable holding times for the scheduled analyses.
- Collection of appropriate quality assurance/quality control (QA/QC) samples including intra- and inter-laboratory duplicates and rinsate and trip blanks.

2.2 Groundwater Assessment Criteria

There are no specific assessment criteria outlines in EPL 229-03 for Groundwater. Attachment B of EPL229-03 outlines the parameters to be analysed and the frequency of analysis for each bore.

2.3 Quality Assurance/Quality Control

Quality Assurance / Quality Control (QA/QC) measures for this investigation were based on AS4482.1–2005 and included:

- Appropriate sample labelling, preservation, storage and transport under chain of custody procedures.
- Laboratory analyses conducted within appropriate holding times.
- Analysis of laboratory QA/QC samples including duplicates, blanks, matrix spikes, matrix spike duplicates, and surrogates.
- The use of laboratories that hold NATA accreditation for the analyses undertaken. The laboratories used for the analyses were Eurofins and ALS. The laboratories are approved by the National Association of Testing Authorities (NATA), and the analyses conducted are within the NATA registration of the laboratories.
- Collection and analysis of field QA/QC samples including duplicates and blanks.

The QA/QC controls are considered adequate as per the relevant standards and guidelines.

2.3.1 Internal Laboratory QA/QC

The results of the internal quality assurance programs of the laboratory are presented with the NATA test certificates (Appendix C). Appropriate internal laboratory QA/QC was reported by both laboratories.

2.3.2 Field parameters

The methodologies described in Section 2.1 were implemented during each of the GMEs during this annual reporting period. Bore conditions were recorded and are presented within each monitoring report. Generally, the bore network is of acceptable condition.

While gauging the standing water level (SWL) in each of the suitable wells with an interface probe, there was no reported non-aqueous phase liquid (NAPL) in any of the monitoring wells. As described in Section 2.1, field water quality parameter measurements were measured in each of the sampled wells during purging using a calibrated water quality meter.

Water quality observations made throughout the GMEs during this monitoring period are available in the individual GME reports, attached as Appendix C. A summary of the water quality parameters and field observations from this annual reporting period are provided in Table 2-2.

Standing water levels remain consistent with previous years of monitoring (Figure 2-2), with EMB14 reporting a slightly higher SWL than previous years, however, follows the historical trend. The distinct seasonal trend is in response to the typical wet and dry season, with groundwater levels being predominantly influenced by rainfall recharge. During the wet season, groundwater levels rise and then dissipates in the dry season. Data loggers are not present in the groundwater wells, therefore the recorded SWL's have been recorded during sampling events to provide an insight to these trends. A GME was undertaken for the month of May, however the results and associated report was not available at the time this report was issued. For completeness, the data is proposed to be included in the 2024/2025 Annual Monitoring Report.

Note: SWL data for the offsite groundwater bores (EMB7, EMB12 and EMB15) was only available for late 2020 onwards, whereas onsite bore (EMB13, EMB14) SWL data has been available since 2018.

Table 2-2 Groundwater quality parameters – 23rd June 2023 – 1st May 2024

Well ID	SWL (mb TOC)	SWL (mBGL)	SWL (mAHD)	In-situ Parameters					
				pH	Temp (°C)	ORP (mv)	EC (µS/cm)	TDS (mg/L)	DO (%)
Quarterly – 23 June 2023									
EMB 7	2.699	2.699	3.729						
EMB 12	2.421	2.421	4.157						
EMB 13	4.341	2.541	5.105	3.59	32.8	66.1	263.8	151.55	37.9
EMB 14	4.573	3.873	4.673	6.41	33.3	65.1	242.8	164.25	19.8
EMB 15	2.047	2.047	5.337						
Monthly – 26 July 2023									
EMB 7	3.365	3.365	3.063						
EMB 12	3.059	3.059	3.519						
EMB 13	5.037	4.237	4.409	3.63	33.1	11.8	278.6	187.95	51.2
EMB 14	5.282	4.582	3.964	6.37	33.4	19.1	254.3	161.35	63.7
EMB 15	2.497	2.497	4.887						
Monthly – 25 August 2023									
EMB 7	3.964	3.964	2.464						
EMB 12	3.584	3.584	2.994						
EMB 13	5.632	4.832	3.814	3.52	32.5	37.8	283.6	193.7	42.9
EMB 14	5.902	5.202	3.344	6.21	33.1	6.9	257.1	174.25	68.3
EMB 15	2.851	2.851	4.533						
Quarterly – 12 October 2023									

Well ID	SWL (mb TOC)	SWL (mBGL)	SWL (mAHD)	In-situ Parameters					
				pH	Temp (°C)	ORP (mv)	EC (µS/cm)	TDS (mg/L)	DO (%)
EMB 7	4.588	4.588	1.84						
EMB 12	4.227	4.227	2.351						
EMB 13	6.286	5.486	3.160	3.51	32.5	196.3	288.7	173.1	17
EMB 14	6.640	5.940	2.606	6.12	33.9	201.5	236.8	128.6	22.1
EMB 15	3.203	3.203	4.181						
Monthly – 31 October 2023									
EMB 7	4.823	4.823	1.605						
EMB 12	4.506	4.506	2.072						
EMB 13	6.512	5.712	2.934	3.40	30.2	233	237.7	163.7	37.1
EMB 14	6.883	6.183	2.363	5.70	31.8	160	210.7	144.8	49.7
EMB 15	3.346	3.346	4.038						
Monthly – 29 November 2023									
EMB 7	4.198	4.198	2.23						
EMB 12	3.807	3.807	2.771						
EMB 13	5.863	5.063	3.583	3.38	32.9	-6.5	214.9	139.7	57.2
EMB 14	6.403	5.703	2.843	5.83	34.4	-46.4	192.7	124.2	58.6
EMB 15	2.999	2.999	4.385						
Quarterly – 20 December 2023									
EMB 7	2.247	2.247	4.181						
EMB 12	2.384	2.384	4.194						
EMB 13	4.057	3.257	5.389	3.41	32.8	136.3	269.9	162.8	26.4
EMB 14	4.604	3.704	6.547	5.84	34.3	19.3	205.1	129.3	34.7
EMB 15	2.212	2.212	5.172						
Monthly – 17 January 2024									
EMB 7	1.286	1.286	5.142						
EMB 12	1.324	1.324	5.254						
EMB 13	2.886	2.086	6.56	3.42	32.2	196.3	340.4	194.8	19.4
EMB 14	2.389	1.689	8.762	6.02	33.6	174.1	390.1	208.5	71.8
EMB 15	1.371	2.389	6.013						
Monthly – 21 February 2024									
EMB 7	1.131	1.131	5.297						

Well ID	SWL (mb TOC)	SWL (mBGL)	SWL (mAHD)	In-situ Parameters					
				pH	Temp (°C)	ORP (mv)	EC (µS/cm)	TDS (mg/L)	DO (%)
EMB 12	1.162	1.162	5.416						
EMB 13	2.367	1.567	7.079	3.81	32.1	208.9	269.2	137.7	26.4
EMB 14	2.321	1.621	8.830	6.10	33.7	157.3	380.9	184.8	59.3
EMB 15	0.744	0.744	6.64						
Annual – 22 March 2024									
EMB 7	0.811	0.811	5.547	4.14	31.4	13.1	200.7	116.3	56.8
EMB 12	0.878	0.878	5.700	5.49	33	7.2	217	122.6	51.2
EMB 13	2.139	1.339	7.307	3.56	31.3	12.5	232.4	133.5	61.1
EMB 14	1.773	1.073	9.378	6.59	31.9	-34.4	155.7	88.3	60.4
EMB 15	0.636	0.636	6.748	4.66	34.5	-1.6	1098	586	43.7
Monthly – April 2024									
EMB 7	1.773	1.773	4.585						
EMB 12	1.654	1.654	4.924						
EMB 13	3.436	2.636	6.01	4.16	31.8	344.6	261.7	170	40.5
EMB 14	3.502	2.802	7.649	6.97	32.5	105.8	205.1	133	63.3
EMB 15	1.258	1.258	6.126						
Monthly – 01 May 2024 – Data not available at time of reporting									
EMB 7									
EMB 12									
EMB 13									
EMB 14									
EMB 15									

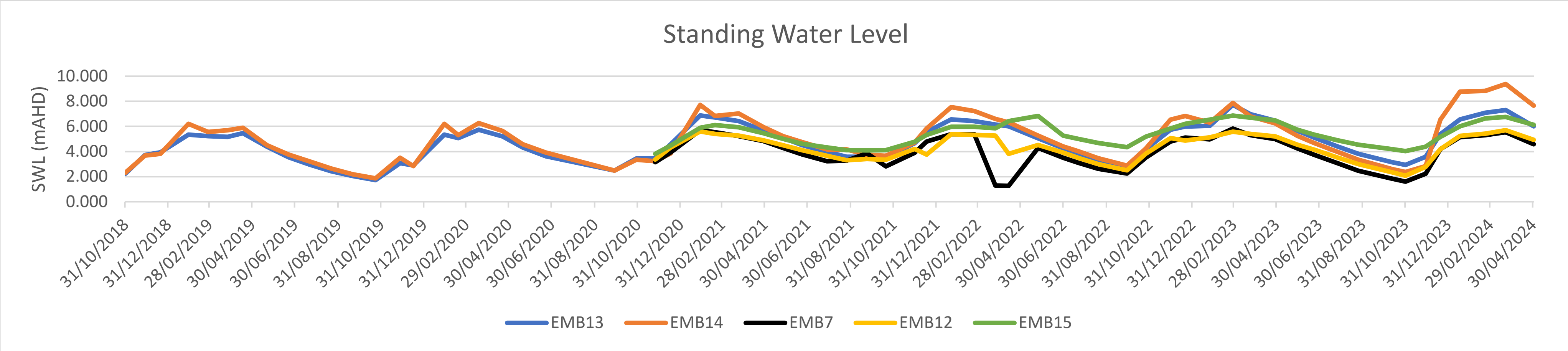

Figure 2-2 Standing Water Level (mAHD)

2.3.3 Water Quality Results Assessment

The results are shown in Appendix D as raw data, there are no trigger values to assess against. The majority of analysis was undertaken at Eurofins Laboratory, whilst the metals and glycols were tested at ALS Laboratory. The laboratory results of the groundwater analysis are summarised in the appendices of the individual monitoring reports attached as Appendix C. These results are provided both in the raw laboratory report documentation and summarised within the individual reports for reference. The laboratory analytical results are presented in Appendix B of the monitoring event-dedicated reports. The results for the March 2024 annual monitoring event are summarised below:

Key groundwater analytical data is presented in the graphs below. Trend lines and associated R^2 values have been included on the graphs. The trend lines show the general changes of data (increases or decreases) across time and the R^2 values show the strength or reliability of those trends. R^2 values range between 0 and 1. The higher the number (i.e. closer to 1) the stronger or more reliable the trend. The lower the number (i.e. closer to 0) the weaker or less reliable the trend.

Table 2-3 R^2 Value Interpretation

Low	0.0-0.39
Moderate	0.4-0.6
High	0.61-1.0

Key findings from a review of the water quality results:

- Generally, the water quality at the Site is indicative of a shallow freshwater aquifer, even given its proximity to the coastline, the EC values throughout the year continue to indicate that there is no saltwater intrusion into this aquifer.
- pH values observed in groundwater are slightly to moderately acidic, which is common in Top End groundwaters. The EMB 13 is overall more acidic than the EMB 14.
- TDS values are observed to be relatively low at the conclusion of purging the wells, which typically accumulate some sediment between GMEs while the wells are undisturbed. This trend is observed during sampling, where the initial groundwater water quality readings during pumping generally show higher TDS values, decreasing as groundwater purging continues. The groundwater exhibited a pale brown to brown colour and no odours or sheens were noted from any of the bores during the monitoring.

2.3.3.1 EMB 13 and EMB 14 (on-site bores)

- Nutrient concentrations (Total Nitrogen, Oxides of Nitrogen and Total Phosphorus) have generally been decreasing in the onsite bores since 2018. Ammonium (NH_3) concentrations and Oxides of Nitrogen at EMB14 show a general increasing trend. These trends are considered weak with low R^2 values (Figure 2-3 and Figure 2-4).
- Dissolved metal concentrations generally show an increasing trend at site since 2018 with a low R^2 value. Manganese at EMB13 shows a decreasing trend with a low R^2 value and Mercury has remained stable since 2018 (Figure 2-7, 2-8, 2-9, 2-10, 2-11, 2-12, 2-13). All trends are considered weak due to their low R^2 values. However, this may also indicate that concentrations are generally remaining stable.

- Hydrocarbon levels remained stable across monitoring events (Figure 2-16). Naphthalene concentrations have a generally decreasing trend since 2018 (Figure 2-17). This trend is considered weak due to the low R^2 value, with the levels remaining stable for the last three years. The raw data is presented in Appendix D.
- PFAS concentrations show an increasing trend at EMB13 with a low R^2. A decreasing trend is shown at EMB14. This trend is considered moderate (Figure 2-18). Phenol concentrations show a weak decreasing trend with a low R^2 value since 2020. However, since late 2021 concentration levels have remained stable (Figure 2-20). Cyanide concentrations (Figure 2-19) have a decreasing trend with low R^2 values. These weak trends generally infer that these concentrations are remaining stable.
- The low R^2 values and weak trends reflects the highly variable data from seasonal changes between the wet and dry seasons and the limited data sets. Low R^2 values may also indicate that data points are remaining stable. As more data becomes available it is expected that the strength of the trends will increase, i.e. they will become more accurate.

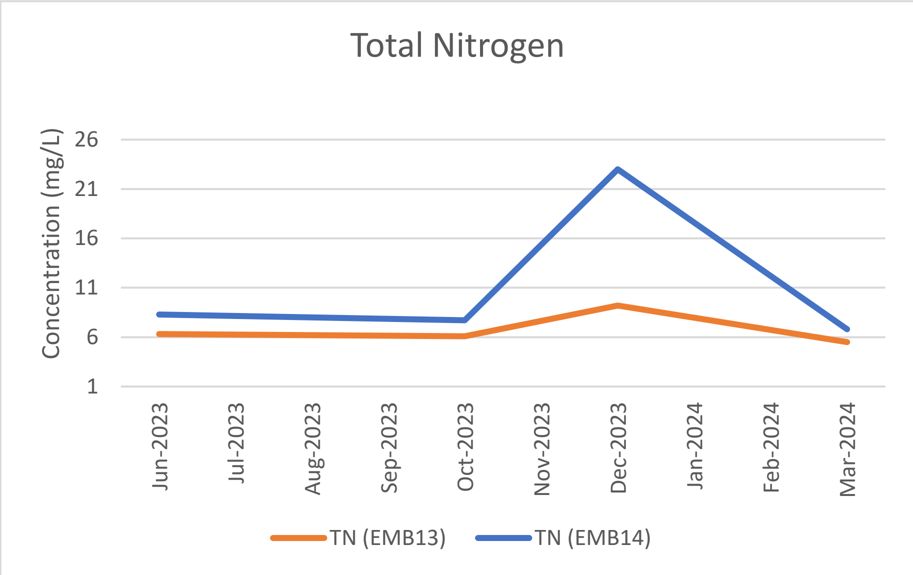

Figure 2-3 Total Nitrogen Concentrations

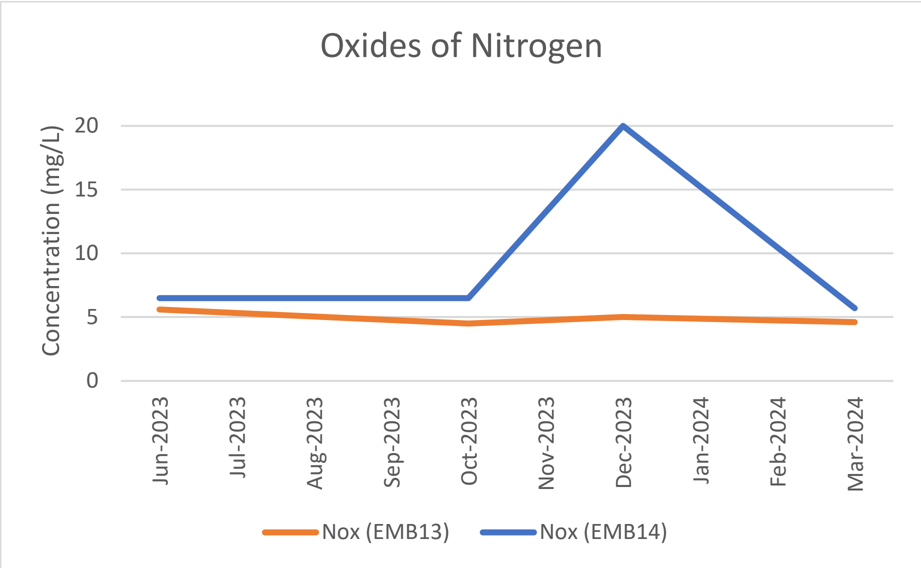

Figure 2-4 Oxides of Nitrogen Concentrations

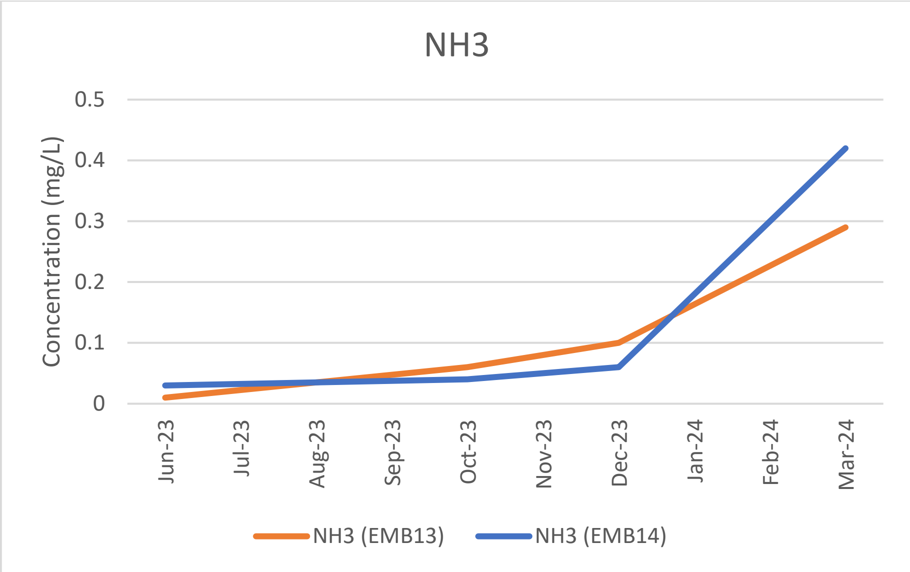

Figure 2-5 NH_3 Concentrations

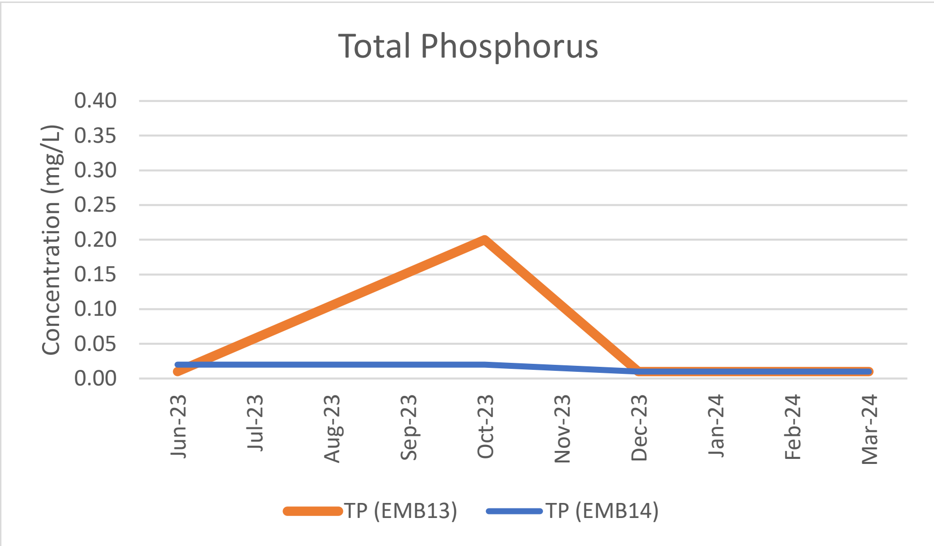

Figure 2-6 Total Phosphorus Concentrations

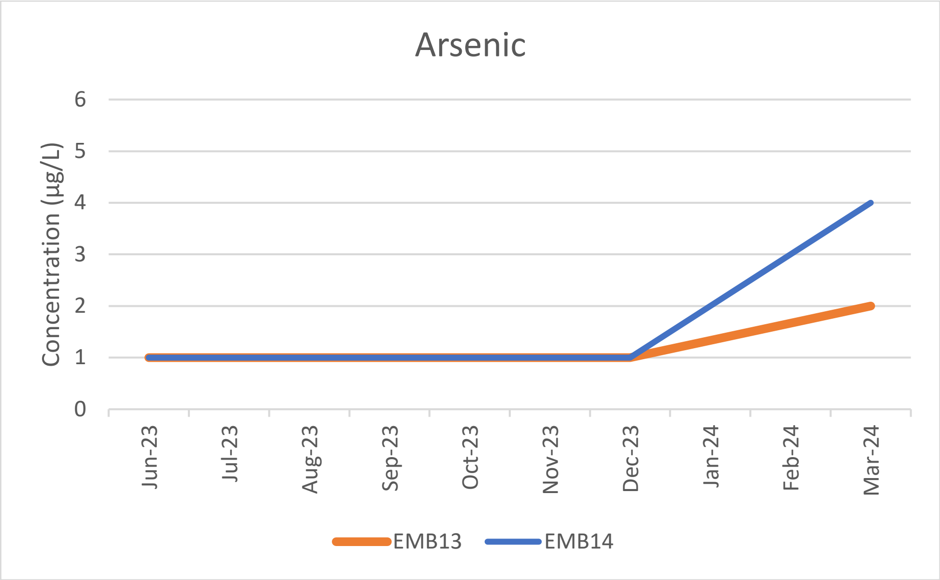

Figure 2-7 Arsenic Concentrations

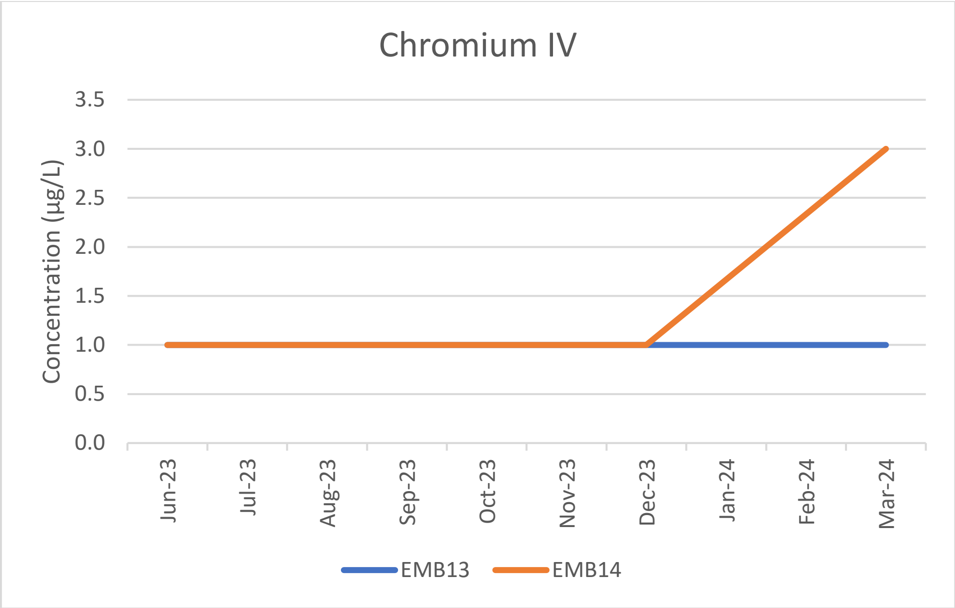

Figure 2-8 Chromium IV Concentrations

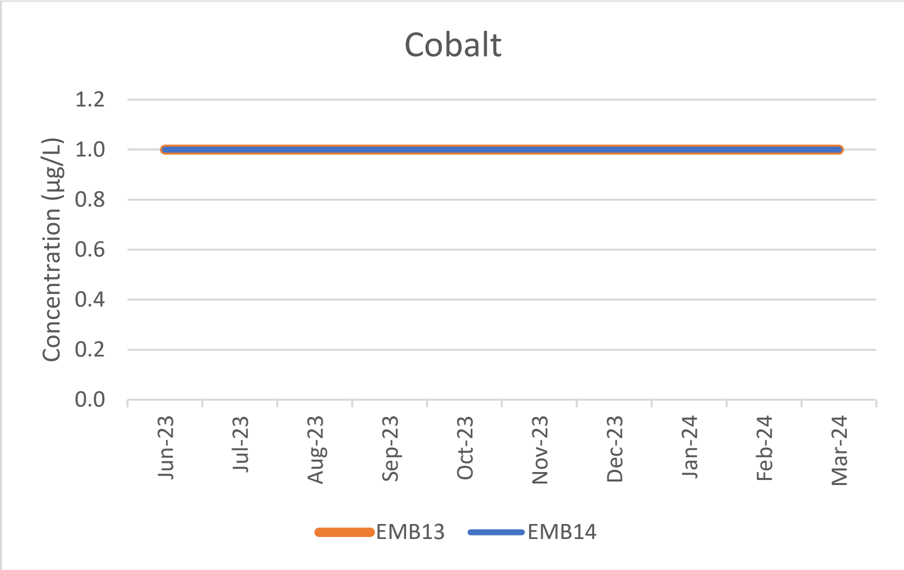

Figure 2-9 Cobalt Concentrations

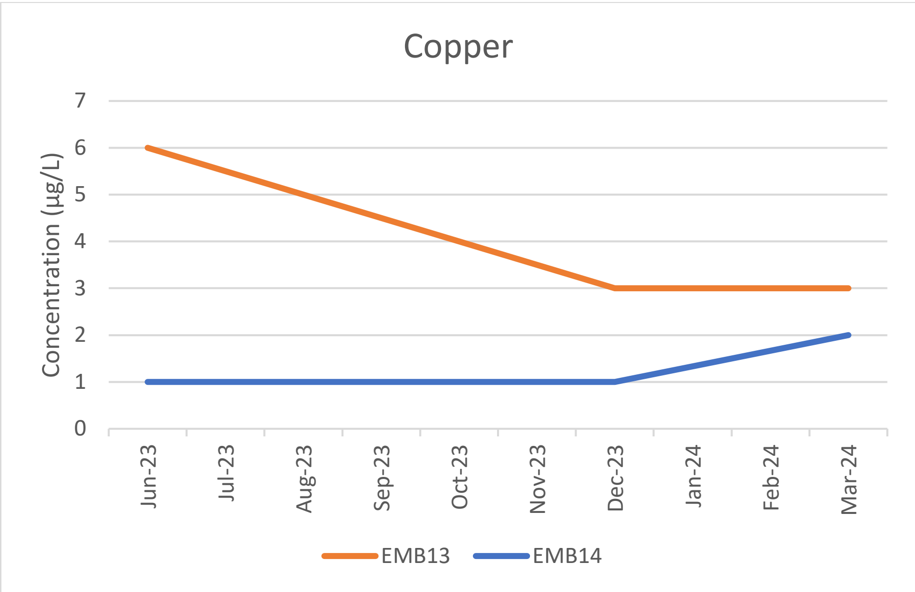

Figure 2-10 Copper Concentrations

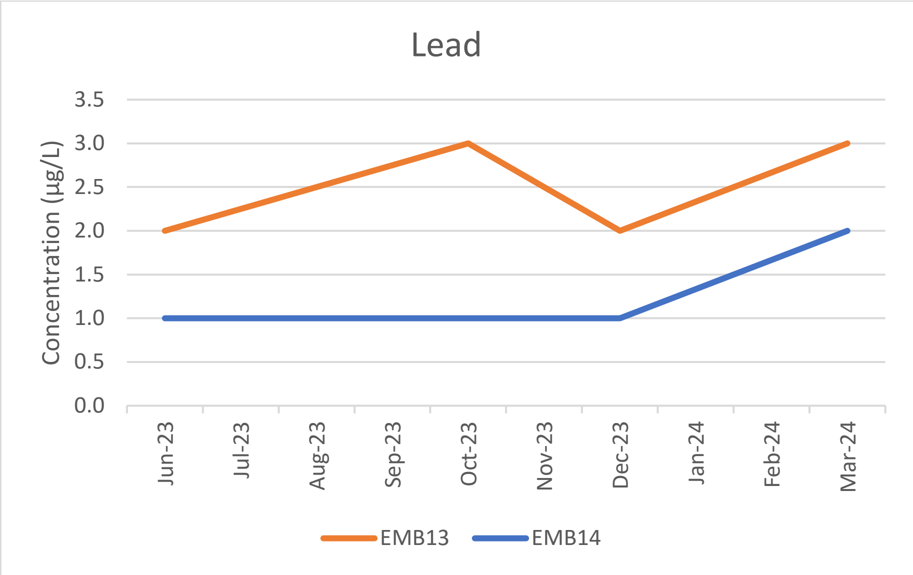

Figure 2-11 Lead Concentrations

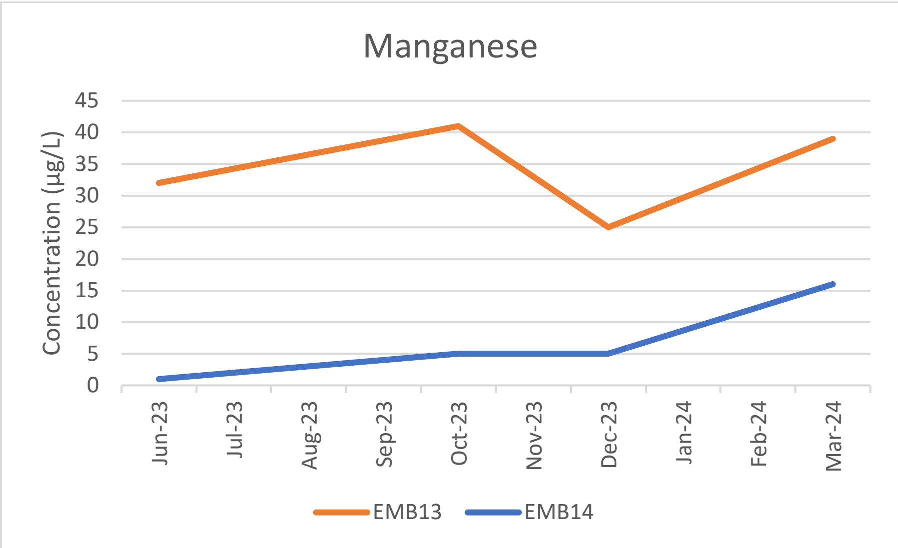

Figure 2-12 Manganese Concentrations

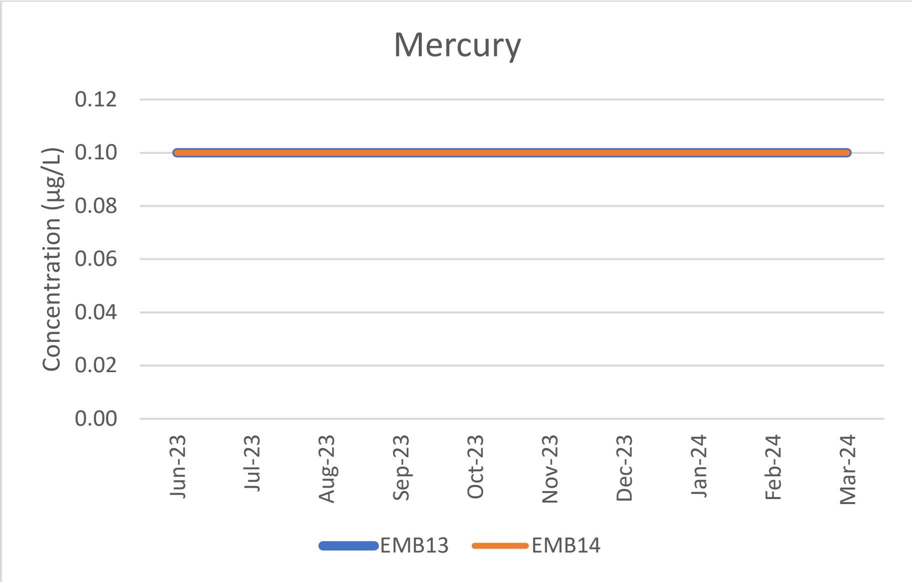

Figure 2-13 Mercury Concentrations

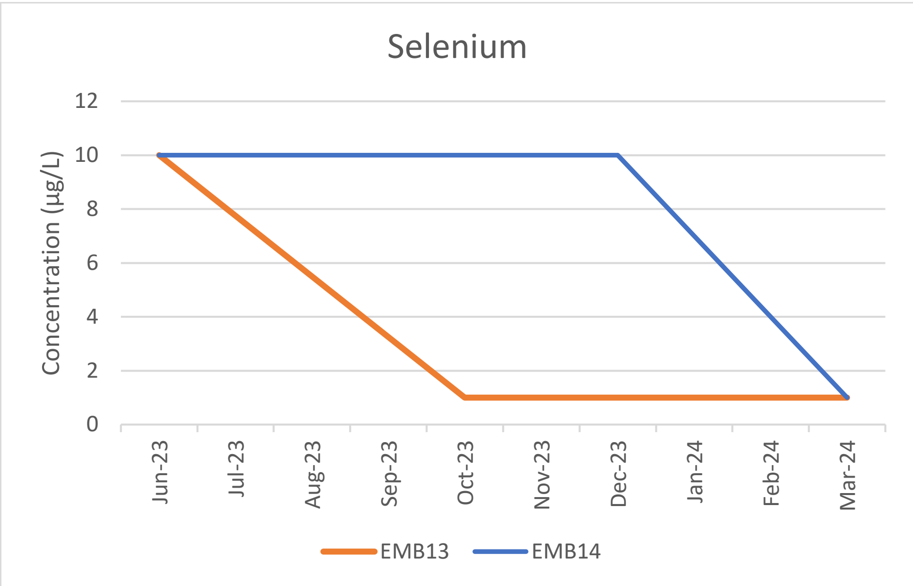

Figure 2-14 Selenium Concentrations

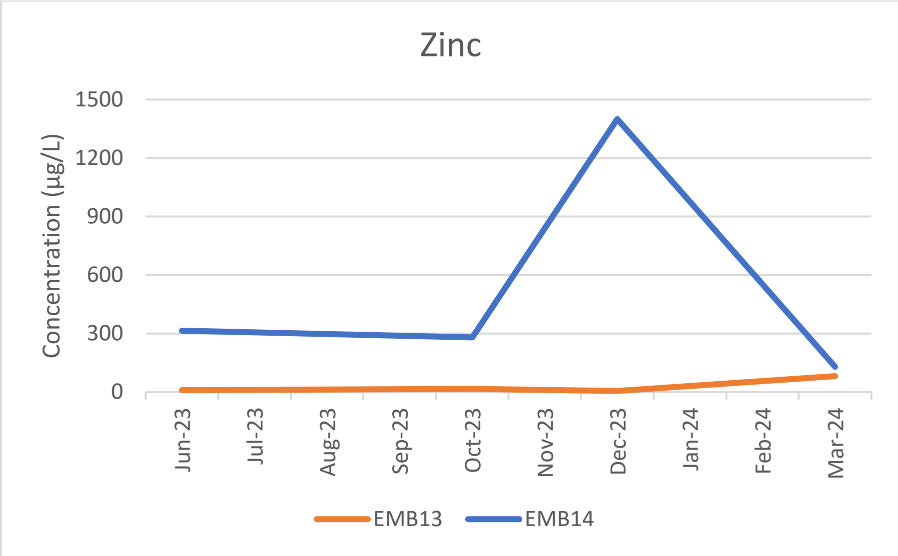

Figure 2-15 Zinc Concentrations

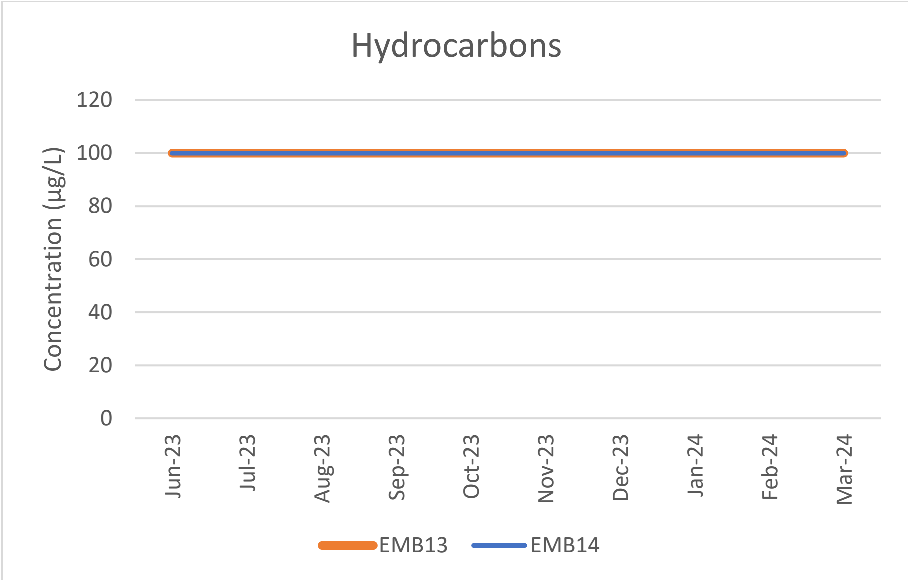

Figure 2-16 Hydrocarbons Concentrations

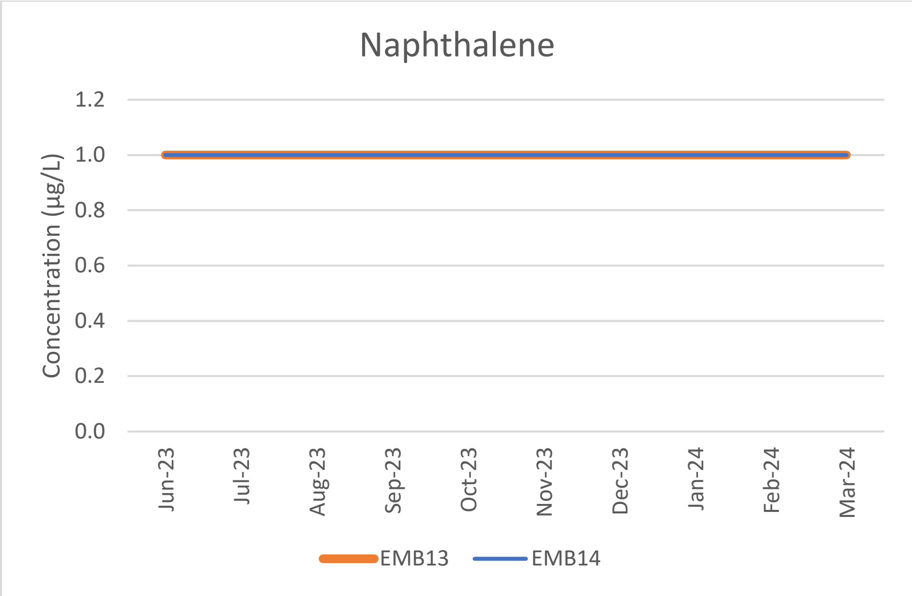

Figure 2-17 Naphthalene Concentrations

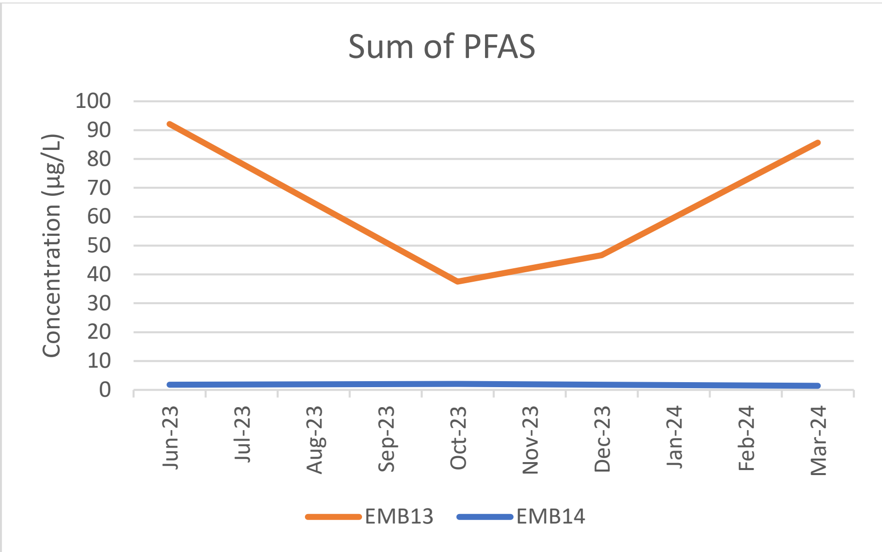

Figure 2-18 Sum of PFAS Concentrations

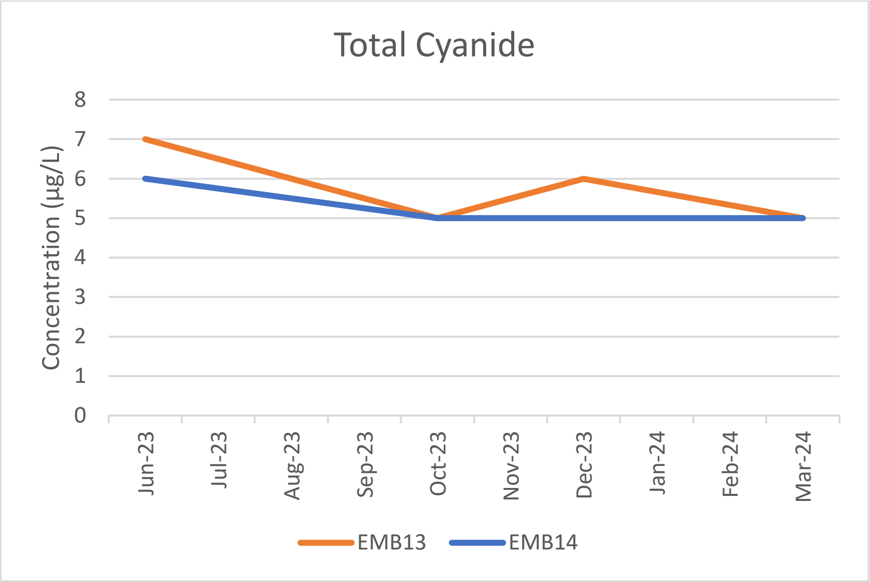

Figure 2-19 Total Cyanide Concentrations

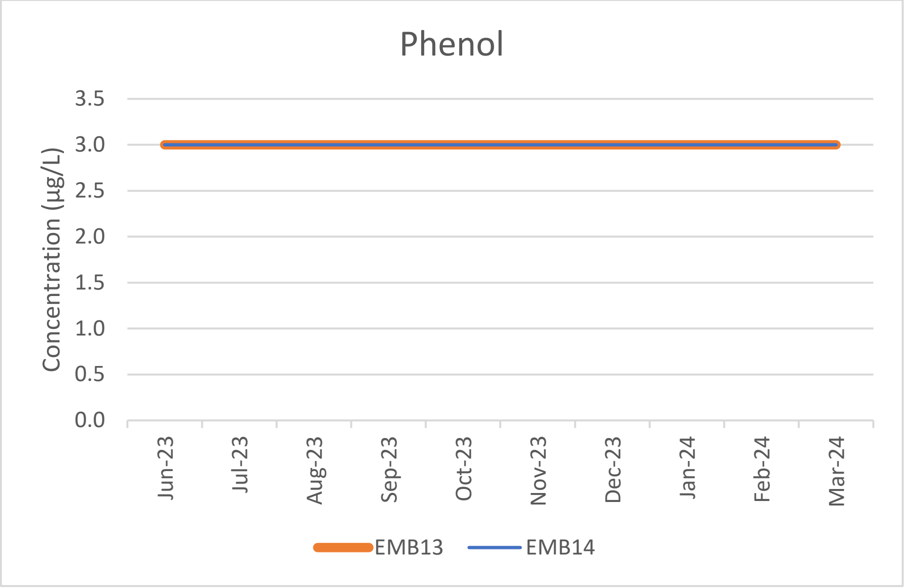

Figure 2-20 Phenol Concentrations

2.3.3.2 EMB7, EMB12, and EMB15 (off-site bores)

- Nutrient concentrations (Total Nitrogen, Oxides of Nitrogen, NH_3 and Total Phosphorus) have generally been increasing in the offsite bores since 2020. NH_3 concentrations have been increasing in EMB7 with a low R^2 value, whereas EMB12 and EMB15 have a moderate R^2 value. Oxides of Nitrogen show a slight increase at EMB7 and a slight decrease at EMB12 and EMB15. All those trends are considered weak due to low R^2 value. Total Nitrogen and Phosphorus have been increasing in all offsite bores except Total Phosphorus at EMB7. All those trends are considered weak due to their low R^2 value, except for Total Nitrogen at EMP7 which has a high R^2 value indicating that the increasing trend is strong.
- Most metals either show increasing or decreasing trends. Arsenic has an increasing trend for all three bores with moderate R^2 values. Chromium is staying stable at EMB15 and shows increasing trends at EMB12 and EMB7 with moderate R^2 values. Copper is staying stable at EMB12 and shows decreasing trends at EMB15 (moderate R^2 value and EMB7 (low R^2 value). Lead is increasing at EMB12 and EMB7 with moderate R^2 value and is decreasing at EMB15 with low R^2 value. Cobalt is decreasing at EMB15 (moderate R^2 value) and EMB12 (low R^2 value) and increasing at EMB7 with moderate R^2 value. Manganese is decreasing at all bores with low R^2 value. Zinc is decreasing at EMB15 (low R^2 value) and EMB12 (moderate R^2 value) and increasing at EMB7 with moderate R^2 value. Mercury is remaining stable at all bores. Selenium shows decreasing trends at all bores with moderate R^2 value. Overall, EMB7 generally shows increasing trends, whereas EMB15 and EMB12 generally show decreasing trends.
- Hydrocarbon & Naphthalene have remained stable in all offsite bores, except for Hydrocarbons at EMB7 which shows an increasing trend with a moderate R^2 value.
- Sum of PFAS showed different trends for each offsite bore. EMB7 showed a slight decreasing trend in Sum of PFAS concentrations, however trend is considered weak due to low R^2 value caused by variable data points. EMB15 shows somewhat stable conditions and EMB12 shows a weak decreasing trend (low R^2 value).
- Phenol and Total Cyanide have an increasing trend, however, this has been attributed to by a change in LOR by the laboratory. Both parameters have been reported below LOR at all three sites since 2021, therefore both parameters can be considered stable.
- Note: Data for the offsite bores remains limited with only four data points available for each bore site. Therefore, even if trends are considered strong due to high R^2 value, those trends are not considered reliable at this time. As more data is collected, observed trends will become more accurate.
- Graphs visualising these trends and patterns for the off-site bores are presented in Appendix J.

2.3.4 Compliance with Licence Conditions and Discussion

As per Clause 42 of EPL229-3, the licensee must conduct groundwater monitoring in accordance with Attachment B of the licence (monthly, quarterly and annually). Based on this clause, the licence conditions have been complied with.

The following observations were made during the annual GME:

- Heavy metals (antimony, cadmium and mercury (all filtered)), hydroxide alkalinity as $CaCO_3$, carbonate alkalinity as $CaCO_3$, benzene, toluene, ethylbenzene and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAH), total phosphate, cyanide, polychlorinated biphenyls (PCBs), phenols and glycols were all reported to be below the LORs for all monitoring wells.
- Several nutrients and organics, chloride, calcium, magnesium, potassium, sodium and filtered heavy metals (arsenic, barium, copper, lead, manganese, nickel and zinc) were reported above the LORs in all monitoring wells.
- Total and bicarbonate alkalinity (as $CaCO_3$) was reported above LORs in EMB7, EMB12 and EMB14. Sulphate was reported above LORs in EMB12, EMB14 and EMB15.
- Chromium (III+VI) (was reported above LORs in EMB7, EMB12 and EMB14 and cobalt was reported above LORs in EMB7, EMB12 and EMB17.
- Selenium was reported above LORs in EMB7 and EMB14.
- Several total recoverable hydrocarbon fractions were reported above LORs in EMB7.
- A range of Per- and Polyfluoroalkyl Substances (PFAS) were detected in all monitoring wells.

There are likely to be background levels of some heavy metals in the wider East Arm area based on historical results prior to the site becoming operational. Weak trends (both increasing and decreasing) in dissolved metals indicate that past and current activities on site are unlikely to have had an impact on heavy metal concentrations.

The significant environmental receptors are the mangrove communities and the Darwin Harbour to the east and west of the site. Groundwater flow direction during the wet season (December to April) is generally moving in a northwest direction, toward the mangrove community and Darwin Harbour. During the dry season (April to October), groundwater is flowing in a northeast direction towards Berrimah.

The potential for groundwater contamination is minimised through the extensive use of impervious surfaces and storage tanks being above ground, within bunded concrete containment areas. Despite this, groundwater contamination is recognised as a potential risk as contamination could occur with loss of integrity in bunded containment structures or through the interaction of surface water with ground water following an uncontained spill. Such occurrences could result in the uncontrolled release of waste materials into the groundwater system which could impact on the surrounding marine environment.

Section 3 Surface Water Monitoring

In accordance with EPL requirements, the Surface Water Monitoring events are undertaken as per EPL229-03 (Appendix A), which outlines the surface water monitoring scope and analytical program. The purpose of the surface water monitoring is to measure in-situ parameters and collect surface water samples for laboratory analysis from the stormwater discharge pit. The stormwater discharge pit and monitoring location is presented in Figure 3-1.

The stormwater process is presented in Appendix E, with daily in-situ parameters taken during release times and monthly full analytical suites in compliance with Attachment A of EPL 229-03.

The Surface Water Monitoring for full analytical suites during this annual reporting period were undertaken monthly on the following dates:

- 13 November 2023
- 13 December 2023
- 24 January 2024
- 16 February 2024
- 12 March 2024

There was no surface water discharge between the months of June 2023 and October 2023 and none in April and May 2024, so no monitoring was undertaken.

Specific details on the methodologies implemented for each surface water sampling event are described below. A summary of the typical surface water sampling programme and testing schedule is described in Table 3-1.

Table 3-1 Surface Water Sampling Programme 2023-2024

Sample Round	Surface Water Monitoring Point	Analysis
Daily	SWMP1	In-situ parameters (pH, temp, EC, DO)

Sample Round	Surface Water Monitoring Point	Analysis
Before a discharge event	SWMP1	In-situ parameters (pH, temp, EC, DO) Nutrients (NH_3, NOx, TKN, TN, TP) Metals (Sb, As, Ba, Be, Bo, Cd, Cr, Cu, Co, Cu, Pb. Mn, Mo, Ni, Se, Ag, Sn, V, Zn, Hg) Total Recoverable Hydrocarbons BTEXN Polycyclic Aromatic Hydrocarbons Cyanide Glycols Major Anions (Alkalinity, Sulfate, Chloride, total) Major Cations (Ca, Mg, K, Na total) PFAS Polychlorinated Biphenyls Total Suspended Solids (TSS) Total Dissolved Solids (TDS)

Figure 3-1 Darwin Recycling and Liquid Waste Treatment Facility Stormwater Monitoring Location

3.1 Surface Water Sampling Methodology

Surface water monitoring has been undertaken at site since October 2018. GRR staff undertake the surface water monitoring and samples are collected from the final chamber of a stormwater pit. Field readings are taken from the contents of the sample bucket using a portable probe. Samples required for laboratory analysis are transferred directly into the relevant sample bottles from the same bucket.

The following methodology was applied:

- Sample jars and sample bucket are collected from an appropriate laboratory.
- The rain gauge is checked, and the reading is recorded.
- The jar labelled as 'Rain' is filled with contents from the gauge. If there is not enough to fill the jar, the rain bucket around the side of the administration building is used to fill the jar. The rain bucket is then emptied.
- A bucket connected to a chain is lowered into the stormwater pit, filled with water and raised.
- A jar labelled, 'Stormwater' is rinsed three times with the water from the stormwater pit, then the jar is filled.
- The bucket is emptied back into the pit and is left upside down, near the pit.
- The sampler wore a clean pair of disposable nitrile gloves when collecting each sample.

- All surface water samples were collected in appropriate bottles/containers provided by analytical laboratories and placed in a chilled esky for transportation immediately after collection.

The field records and calibration records of surface water sampling events undertaken by GRR staff are provided in Appendix F and laboratory certificates are provided in Appendix G.

GRR has also established its own laboratory facilities on site to enable it to test incoming waste streams, monitor and develop treatment methodologies and monitor compliance. The Laboratory is also utilised for analysis of the product glycol and oils generated prior to sale.

3.2 Surface Water Assessment Criteria

The EMP and EPL 229-03 prescribes several surface water assessment criteria to determine the acceptability and investigation limits of individual analytes in the water before it is discharged from site. Where exceedances to these criteria are reported from field water quality measurements or laboratory results, a EPL 229-03 requires notification of these exceedances to NT EPA in accordance with EPL Clause 54.

These acceptance criteria have been summarised in Table 3-2.

Table 3-2 EPL 229-03 Surface water acceptance criteria values

Parameter	Units	Acceptance Limit (EPL 229-03 Attachment A)
In-situ		
pH	pH units	7.0-8.5
Dissolved Oxygen	%	80-100
Nutrients		
Total Phosphorous	µg/L	20
Total Nitrogen	µg/L	270
Oxides of Nitrogen	µg/L	20
Ammonium	µg/L	20
Metals (total and dissolved)		
Antimony	µg/L	270
Arsenic	µg/L	4.5
Boron	µg/L	5,100
Cadmium	µg/L	5.5
Chromium VI	µg/L	4.4
Cobalt	µg/L	1
Copper	µg/L	1.3
Lead	µg/L	4.4
Manganese	µg/L	80

Parameter	Units	Acceptance Limit (EPL 229-03 Attachment A)
Mercury	µg/L	0.4
Nickel	µg/L	70
Selenium	µg/L	3
Vanadium	µg/L	100
Zinc	µg/L	15
Hydrocarbons		
Benzene	µg/L	700
Toluene	µg/L	180
Naphthalene	µg/L	70
Other		
PFOS	µg/L	0.13
PFAS	µg/L	220
Total Cyanide	µg/L	4
Phenols	µg/L	400
TSS	mg/L	10

3.3 Quality Assurance/Quality Control

Stormwater samples were collected from the relevant surface water monitoring location on all occasions. Quality Assurance / Quality Control (QA/QC) measures for this investigation were based on AS4482.1–2005 and include:

- Appropriate sample labelling, preservation, storage and transport under chain of custody procedures.
- Laboratory analyses conducted within appropriate holding times.
- The use of laboratories that hold NATA accreditation for the analyses undertaken. The laboratories used for the analyses were Eurofins. The laboratories are approved by the National Association of Testing Authorities (NATA), and the analyses conducted are within the NATA registration of the laboratories.

The QA/QC controls are considered adequate as per the relevant standards and guidelines.

3.4 Surface Water Monitoring Results

The methodologies described in Section 3.1 were implemented during each of the surface water monitoring events during this annual reporting period. Field water quality parameter measurements (Table 3-3) were collected at the sample site using a calibrated water quality meter. The analytical and physico-chemical results are presented in a spreadsheet (Appendix H). Table 3-4 provides a summary of the results from the monthly monitoring events for this annual reporting period. Due to data of the majority of parameters being unavailable for the initial years of monitoring, the long-term average has been based on the 2020/2021, 2021/2022, 2022/2023 and 2023/2024 reporting periods. As more data becomes available each year, these averages will become more refined and trends will be determined.

Table 3-3 In-situ Surface Water Monitoring Parameter Results

Site ID	Date	In-situ Parameters			
		Temperature (°C)	pH	EC (µS/cm)	DO (%)
SWMP1	06/11/2023	24	7.74	428	86.5
SWMP1	07/11/2023	30	8.00	382	80.0
SWMP1	08/11/2023	27	7.74	322	82.1
SWMP1	15/11/2023	28	7.75	600	81.3
SWMP1	20/11/2023	24	7.66	446	82.4
SWMP1	23/11/2023	30	7.06	384	82.7
SWMP1	27/11/2023	30	7.72	485	80.6
SWMP1	29/11/2023	30	7.79	478	88.4
SWMP1	05/12/2023	30	7.83	368	80.3
SWMP1	08/12/2023	28	7.56	282	83.4
SWMP1	11/12/2023	32	7.96	250	86.2
SWMP1	12/12/2023	32	7.86	250	86.2
SWMP1	13/12/2023	24	7.88	530	82.4
SWMP1	14/12/2023	28	7.92	112	83.8
SWMP1	15/12/2023	30	7.34	120	83.7
SWMP1	18/12/2023	29	7.54	241	85.3
SWMP1	21/12/2023	31	8.26	197	82.3
SWMP1	10/01/2024	30	7.67	150	83.3
SWMP1	11/01/2024	Not recorded	Not recorded	Not recorded	Not recorded
SWMP1	12/01/2024	26	7.80	347	81.8
SWMP1	15/01/2024	26	7.74	57	87.8
SWMP1	18/01/2024	25	7.30	290	90.0
SWMP1	22/01/2024	28	7.36	172	86.3
SWMP1	24/01/2024	25	7.36	124	83.6
SWMP1	25/01/2024	28	7.23	447	84.0
SWMP1	29/01/2024	27	7.53	114	91.6
SWMP1	30/01/2024	30	7.85	913	95.5
SWMP1	31/01/2024	26	7.73	160	95.2

Site ID	Date	In-situ Parameters			
		Temperature (°C)	pH	EC (µS/cm)	DO (%)
SWMP1	12/02/2024	25	7.25	93	93.5
SWMP1	13/02/2024	24	7.10	62	90.9
SWMP1	14/02/2024	28	7.15	61	88.9
SWMP1	17/02/2024	29	7.15	142	90.3
SWMP1	27/02/2024	27	7.03	298	89.1
SWMP1	07/03/2024	30	7.65	2330	90.2
SWMP1	11/03/2024	29	7.00	1079	80.8
SWMP1	12/03/2024	24	7.00	908	89.4
SWMP1	14/03/2024	25	7.02	1380	86.2
SWMP1	18/03/2024	30	7.10	642	81.1
SWMP1	21/03/2024	29	7.03	3240	91.2
SWMP1	25/03/2024	30	7.65	2205	87.5
SWMP1	03/04/2024	29	7.01	1075	88.2

Key findings from a review of the water quality results include:

- Some Nutrients, Metals, Hydrocarbons and others had values preceding by '<' indicating that concentrations had been detected, but not at precise concentrations. For example, data for Cadmium has been displayed conservatively, i.e. it has been assumed that the detection has been at the upper limit of the possible detection range. For example, where Cadmium has been recorded as <1µg/L, it has been assumed that the reading was 1µg/L.
- In-situ field measurements of pH and DO were within the licence trigger value ranges.
- Nutrients (Total Phosphorous, Total Nitrogen, and Ammonium) all exceeded the licence trigger value (Figure 3-4). Ammonium and Total Nitrogen were both multiple times above trigger values throughout the reporting period. These exceedances were considered reportable as they occurred across at least three consecutive monitoring events or were more than three times the trigger value. Total Phosphorus exceeded the licence trigger value once throughout the reporting period, but the exceedance was less than three times the trigger value (Figure 3-4). However, Phosphorous was only recorded on three of the five sampling events. Furthermore, no data point for Oxides of Nitrogen was recorded during the reporting period. Ammonium and Total Nitrogen 2024 average concentrations both exceeded the trigger values.
- Five metals (Chromium, Copper, Manganese, Selenium & Zinc) exceeded the licence trigger values. Copper, Manganese and Zinc had all multiple exceedances (Figure 3-12, Figure 3-14 and Figure 3-19), whereas Chromium and Selenium all had one data point above the trigger values throughout the reporting period (Figure 3-10 and Figure 3-17). The 2024 average concentrations for these parameters also exceeded the trigger values, with the exception of dissolved Selenium and dissolved Chromium. Overall, many of the metals showed a decline in the concentration values, compared to previous years. In the 2021-2022 report period nine metal concentrations

exceeded the licence trigger values, six metals exceeded in the 2022-2023 report period, whereas in the most recent report period only five metals exceeded trigger values.

- Results for Naphthalene, Benzene, Toluene, PFAS, PFOS and Phenols all recorded well below the trigger values and as a result have not been represented in graphs.
- Total suspended solids had four out of five results that were above the licence trigger values in the reporting period (Figure 3-24). The exceedance in December was more than three times more than the trigger value and is therefore considered reportable. Exceedances were recorded for Total Cyanide for all reported concentration values throughout the recording period (Figure 3-23). The exceedance in December was considered reportable as the exceedance is more than three times the trigger value.
- Trend lines and R^2 values were included on each graph to present the general increases and decreases in concentrations over time and the relative strength (i.e., reliability) of these trends. All metals show a decreasing trend except, Total Copper which shows an increasing trend. All Nutrients, except Total Nitrogen which is increasing, show a decreasing trend. Hydrocarbons, Total Cyanide, TSS, Phenols, PFAS and PFOS, all show a decreasing trend. All trends have low R^2 values, indicating that the strength of these trends is weak (i.e., low reliability). These weak trends also imply that concentrations are generally remaining stable.
- It was observed for the March monitoring event that some parameters appear elevated in comparison to historic records. This is reflected in the in-situ EC measurement, sodium, chloride as well as laboratory parameters for Boron.

Table 3-4 Surface Water Monitoring Results summary – July 2023 to June 2024

Parameter	Limit of Reporting (LOR)	Licence Trigger Value	Monitoring Frequency	2023/24 Value Range	2023 /24 Average	Long-term Average (2020 – 2024) ^	2023/24 Reportable Exceedances*
In-situ							
Temp (ºC)		-	Daily	24-32	28	28.78	-
pH		7.0-8.5	Daily	7-8	8	7.14	-
EC (us/cm)		-	Daily	57-3240	554	325.49	-
Dissolved Oxygen (%)		80-100	Daily	80-96	86	85.05	-
Major Ions							
Calcium (mg/L)	0.5	-	Monthly	0.8-27	10.70	32.02	-
Magnesium (mg/L)	0.5	-	Monthly	0.5-1.2	0.68	2.43	-
Sodium (mg/L)	0.5	-	Monthly	3.7-190	66.34	57.37	-
Potassium (mg/L)	0.5	-	Monthly	0.5-28	8.06	6.81	-
Carbonate (mg/L)	10	-	Monthly	10	10	12.03	-
Bicarbonate (mg/L)	20	-	Monthly	49-190	102.60	98.52	-
Chloride (mg/L)	1	-	Monthly	8.3-160	64.58	73.82	-
Sulphate (mg/L)	5	-	Monthly	5	5.00	8.38	-
Nutrients							
Total Phosphorous (mg/L)	0.01	0.02	Monthly	0.01-0.05	0.02	0.16	No
Total Nitrogen (mg/L)	0.2	0.27	Monthly	0.4-3.0	1.43	1.48	Yes
Oxides of Nitrogen (mg/L)	0.5	0.02	Monthly			0.12	-

Parameter	Limit of Reporting (LOR)	Licence Trigger Value	Monitoring Frequency	2023/24 Value Range	2023 /24 Average	Long-term Average (2020 – 2024) ^	2023/24 Reportable Exceedances*
Ammonium (mg/L)	0.01	0.02	Monthly	0.01-0.28	0.068	0.19	Yes
Metals (total and dissolved)							
Antimony (µg/L) (total)	5	270	Monthly	5	5	14.14	-
Antimony (µg/L) (dissolved)	5	270	Monthly	5	5	11.21	-
Arsenic (µg/L) (total)	1	4.5	Monthly	1-3	1.80	7.90	-
Arsenic (µg/L) (dissolved)	1	4.5	Monthly	1-2	1.20	3.24	-
Barium (ug/L) (total)	20	-	Monthly	120-170	138	297.25	-
Barium (ug/L) (dissolved)	20	-	Monthly	120-170	134	264.83	-
Beryllium (ug/L) (total)	1	-	Monthly	1	1	2.57	-
Beryllium (ug/L) (dissolved)	1	-	Monthly	1	1	2.25	-
Boron (µg/L) (total)	50	5,100	Monthly	50-2900	872.50	607.42	-
Boron (µg/L) (dissolved)	50	5,100	Monthly	50-2800	688	523.58	-
Cadmium (µg/L) (total)	0.2	5.5	Monthly	0.2	0.20	0.52	-
Cadmium (µg/L) (dissolved)	0.2	5.5	Monthly	0.2	0.20	0.50	-
Chromium VI (µg/L) (total)	1	4.4	Monthly	2-16	5.20	4.17	Yes
Chromium VI (µg/L) (dissolved)	1	4.4	Monthly	1-9	2.80	3.14	No
Cobalt (µg/L) (total)	1	1	Monthly	1	1	3.89	-
Cobalt (µg/L) (dissolved)	1	1	Monthly	1	1	3.50	-
Copper (µg/L) (total)	1	1.3	Monthly	2-7	4.8	5.96	Yes

Parameter	Limit of Reporting (LOR)	Licence Trigger Value	Monitoring Frequency	2023/24 Value Range	2023 /24 Average	Long-term Average (2020 – 2024) ^	2023/24 Reportable Exceedances*
Copper (µg/L) (dissolved)	1	1.3	Monthly	1-6	2.20	4.19	Yes
Lead (µg/L) (total)	1	4.4	Monthly	1	1	2.86	-
Lead (µg/L) (dissolved)	1	4.4	Monthly	1	1	2.52	-
Manganese (µg/L) (total)	5	80	Monthly	55-320	141	481.80	Yes
Manganese (µg/L) (dissolved)	5	80	Monthly	52-320	140.20	444.83	Yes
Mercury (inorganic) (µg/L) (total)	0.1	0.4	Monthly	0.10	0.10	0.34	-
Mercury (inorganic) (µg/L) (dissolved)	0.1	0.4	Monthly	0.10	0.10	0.31	-
Nickel (µg/L) (total)	1	70	Monthly	3-24	11.40	13.17	-
Nickel (µg/L) (dissolved)	1	70	Monthly	3-23	10.80	13.66	-
Selenium (µg/L) (total)	1	3	Monthly	1-13	3.40	9.55	Yes
Selenium (µg/L) (dissolved)	1	3	Monthly	1-11	3	3.31	Yes
Vanadium (µg/L) (total)	5	100	Monthly	5	5	14.31	-
Vanadium (µg/L) (dissolved)	5	100	Monthly	5	5	12.59	-
Zinc (µg/L) (total)	5	15	Monthly	370-1500	1060	1642.15	Yes
Zinc (µg/L) (dissolved)	5	15	Monthly	250-1100	616	1232.76	Yes
Hydrocarbons							
Benzene (µg/L)	1	700	Monthly	1	1	59.14	-
Toluene (µg/L)	1	180	Monthly	1	1	59.14	-
Ethylbenzene (µg/L)			Monthly	1-2	1.20	59.18	-

Parameter	Limit of Reporting (LOR)	Licence Trigger Value	Monitoring Frequency	2023/24 Value Range	2023 /24 Average	Long-term Average (2020 – 2024) ^	2023/24 Reportable Exceedances*
Xylene (µg/L)			Monthly	3	3	129.04	-
Naphthalene (µg/L)	1	70	Monthly	1-10	4.60	350.86	-
PAHS (µg/L)	1		Monthly	1-3	1.40	1.73	-
TRH (µg/L)	100	-	Monthly	10-20	12	2871.61	-
Organic Alcohols							
Monoethylene Glycol (mg/L)	20	-	Monthly	20-270	132	49.47	-
Triethylene Glycol (mg/L)	20	-	Monthly	20	20	20	-
Other							
PFOS (µg/L)	0.01	0.13	Monthly	0.01-0.11	0.06	0.11	-
PFAs (µg/L)	0.1	220	Monthly	0.13-3.49	1.286	0.80	-
Polychlorinated Biphenyls (ug/L)	5	-	Monthly	5	5	3.96	-
Total Cyanide (µg/L)	5	4	Monthly	5-13	6.60	6.28	Yes
Total Halogenated Phenol (µg/L)	10	400	Monthly	10-30	14	11.20	-
Total Non-halogenated Phenol (µg/L)	100	400	Monthly	100	100	421.61	-
TSS (mg/L)	5	10	Monthly	5-39	19	19.13	Yes
TDS (mg/L)	10	-	Monthly	54-800	394.80	363.45	-

^Long term average based on reporting period 2020/2021 onwards as significant portions data was missing from preceding reporting periods (2018/2019 and 2019/2020) and reliable averages were unable to be calculated.

*Reportable exceedances include an exceedance of a trigger value on three consecutive occasions (and all subsequent consecutive occasions) and/or an exceedance on a single occasion where the parameter measures greater than or equal to three times the trigger value.

Note: Where concentration results preceded by ‘<’ have been identified in the data, these values have been conservatively assumed to represent the upper limit of the value (e.g. <100 µg/L represents 100 µg/L). These assumed values have been used to determine averages in the above table and to depict the data in the graphs below.

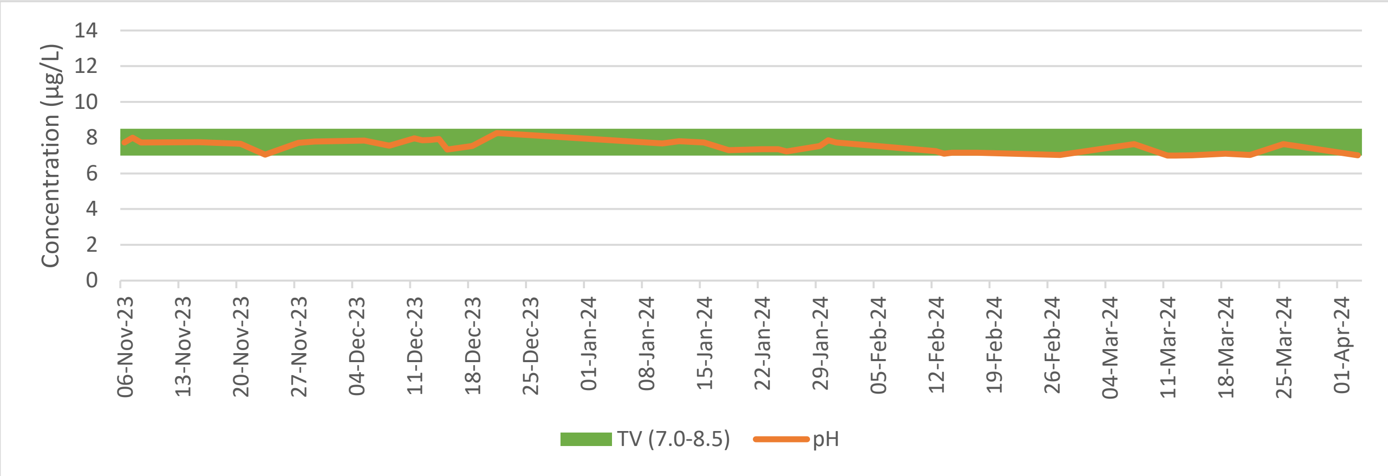

Figure 3-2 pH Concentration

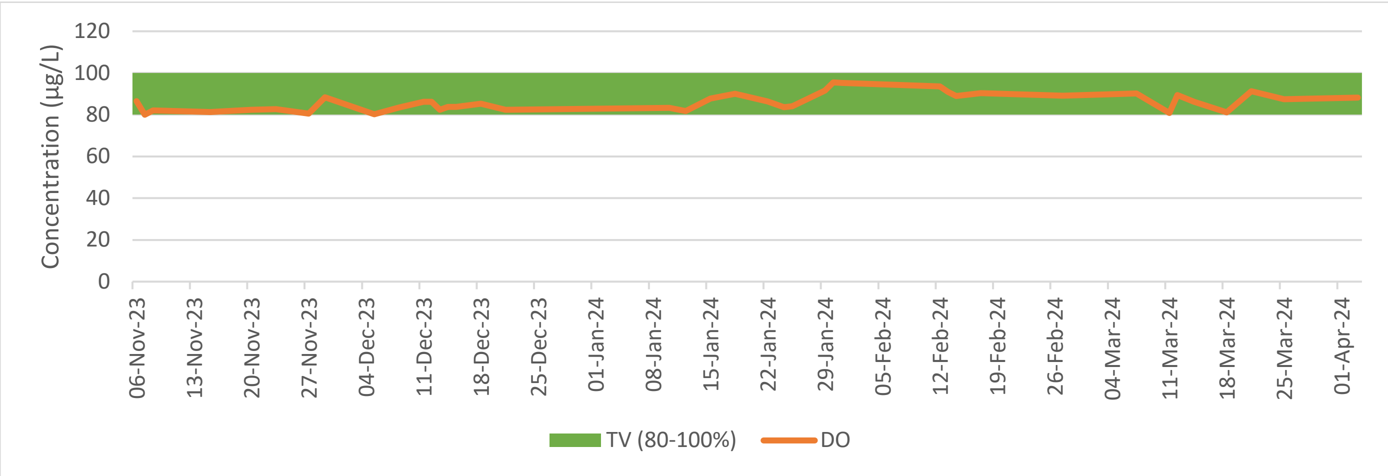

Figure 3-3 Dissolved Oxygen Concentration

Figure 3-4 Total Phosphorus, Oxides of Nitrogen and Ammonium Concentrations

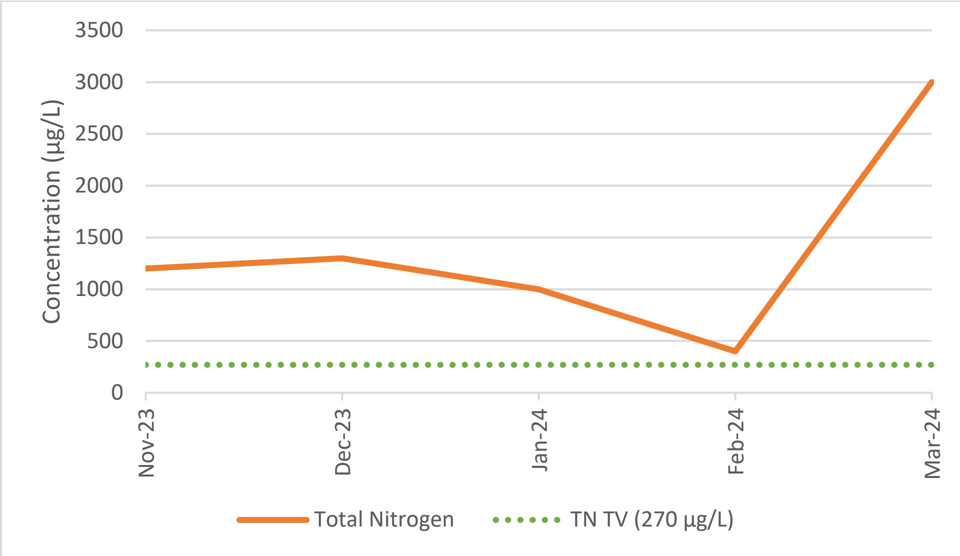

Figure 3-5 Total Nitrogen Concentrations

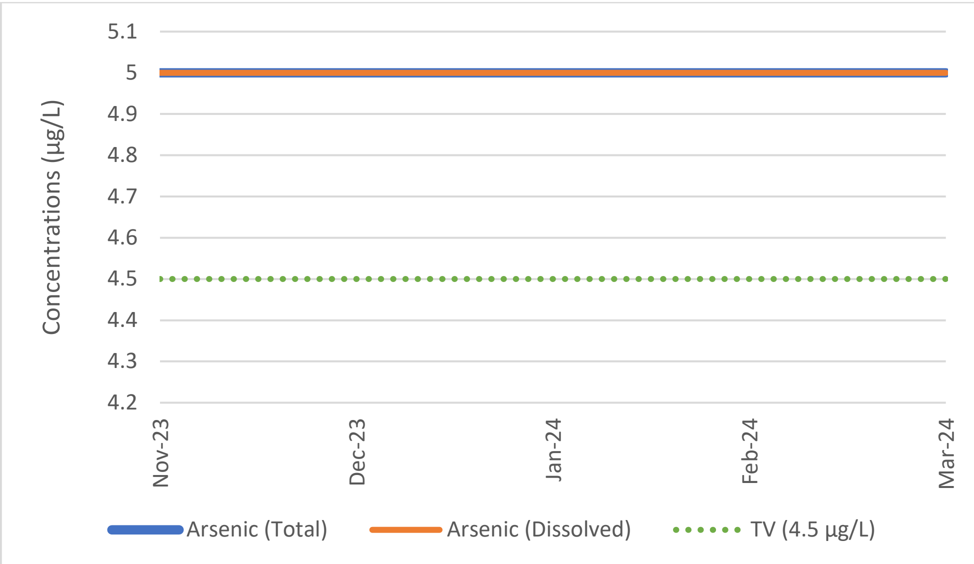

Figure 3-6 Arsenic Concentrations

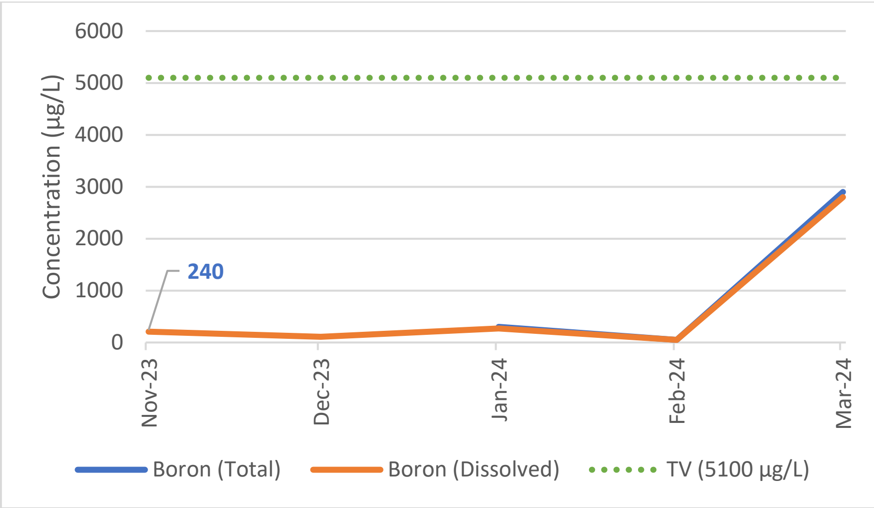

Figure 3-7 Boron Concentrations

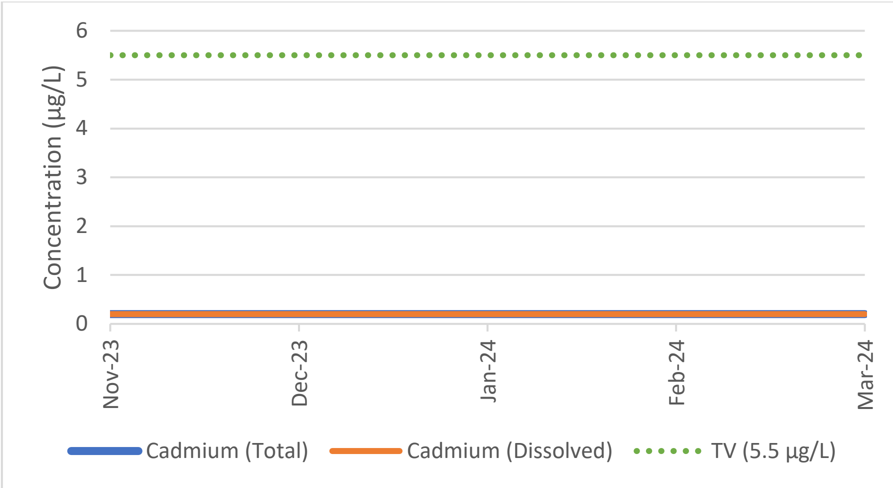

Figure 3-8 Cadmium Concentrations

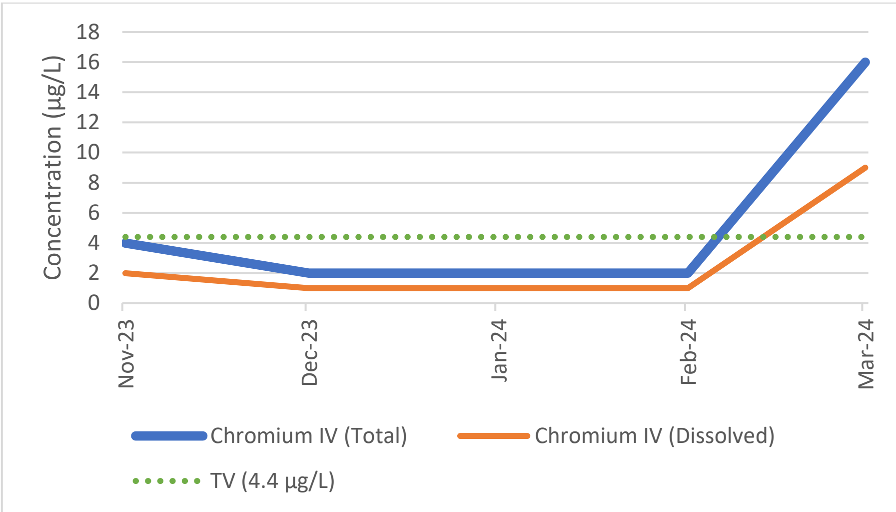

Figure 3-9 Chromium Concentrations

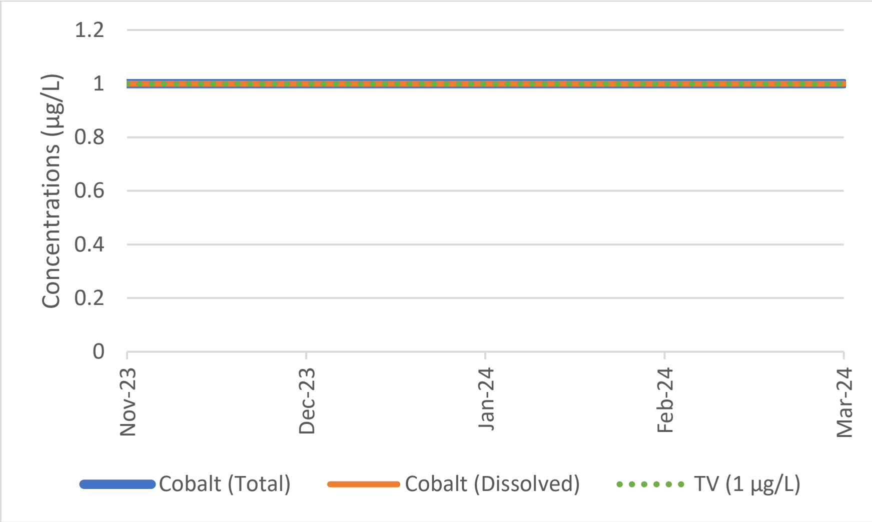

Figure 3-10 Cobalt Concentrations

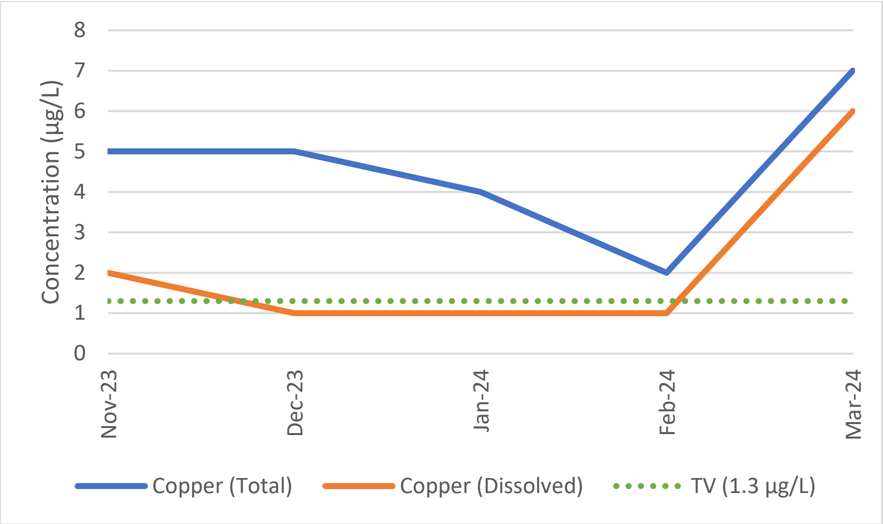

Figure 3-11 Copper Concentrations

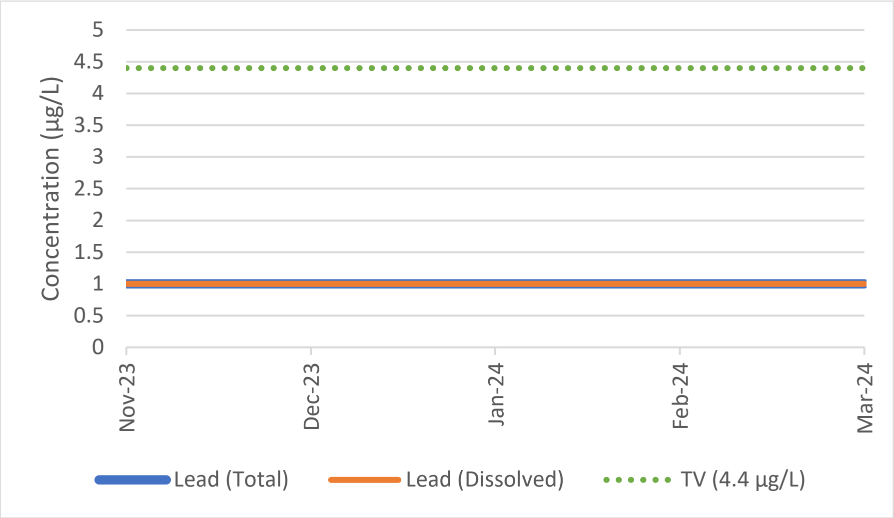

Figure 3-12 Lead Concentrations

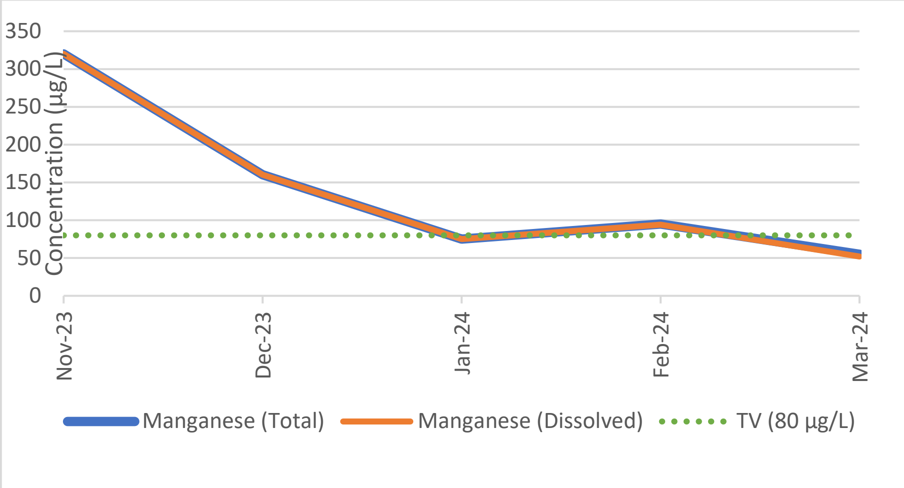

Figure 3-13 Manganese Concentrations

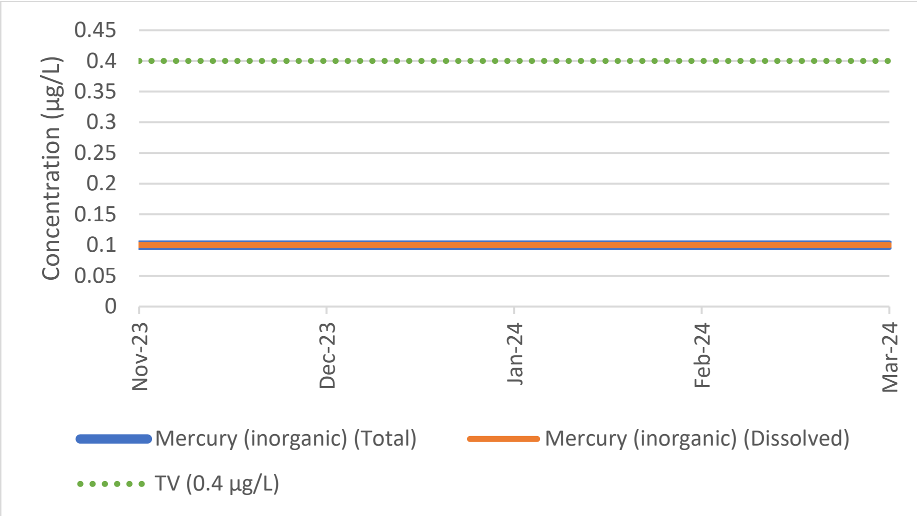

Figure 3-14 Mercury Concentrations

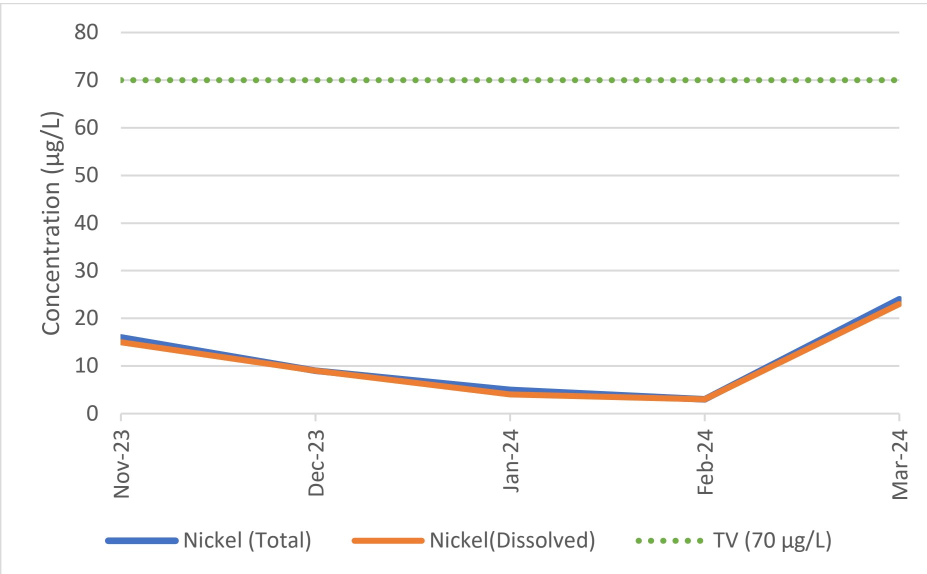

Figure 3-15 Nickel Concentrations

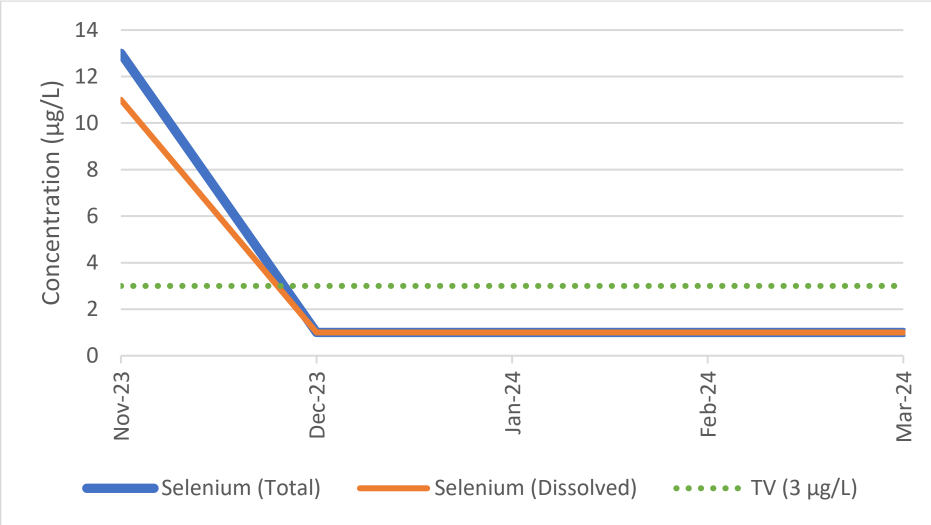

Figure 3-16 Selenium Concentrations

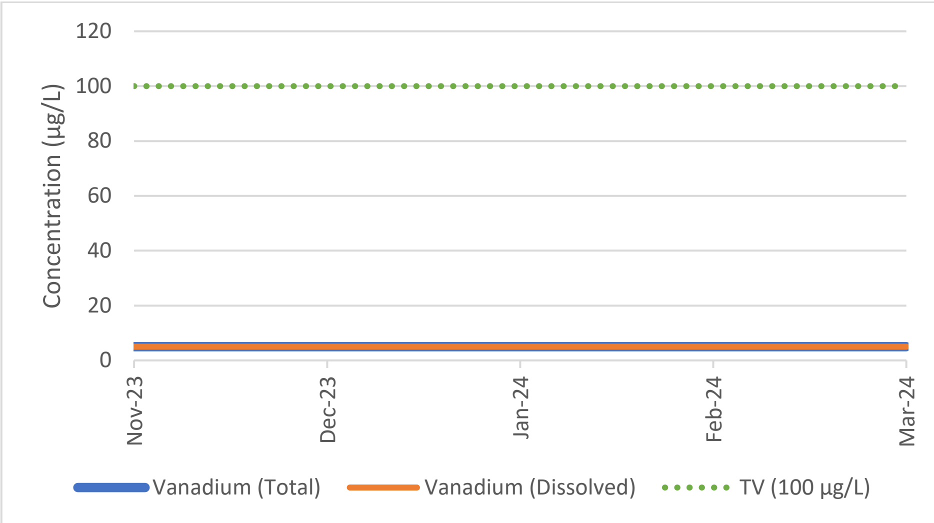

Figure 3-17 Vanadium Concentrations

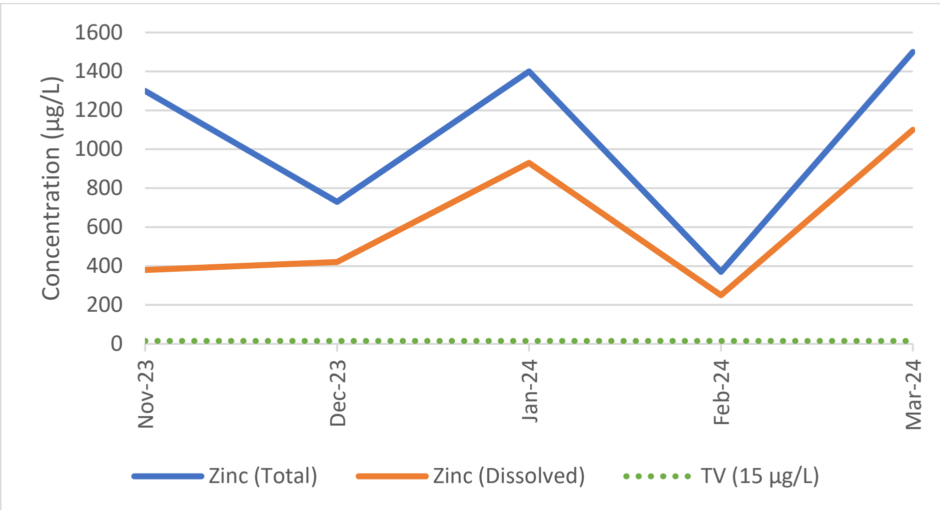

Figure 3-18 Zinc Concentrations

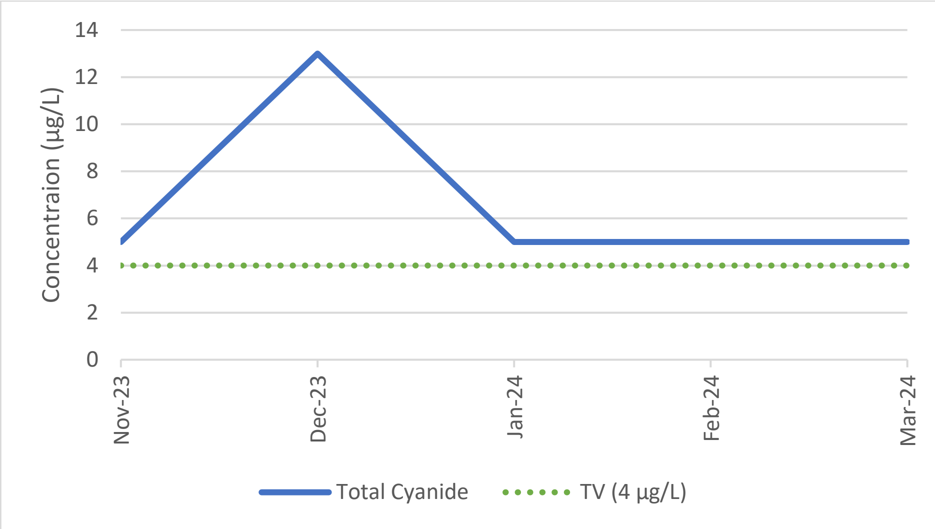

Figure 3-19 Total Cyanide Concentrations

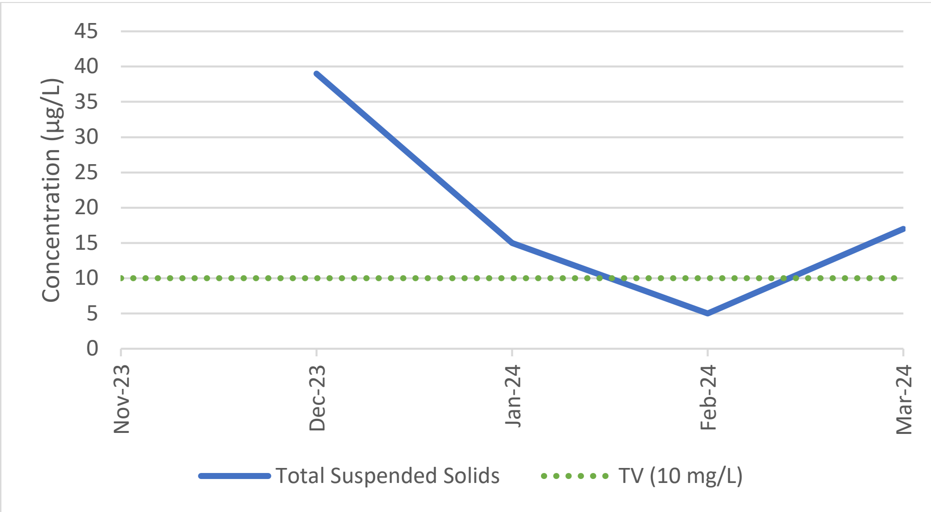

Figure 3-20 Total Suspended Solids Concentrations

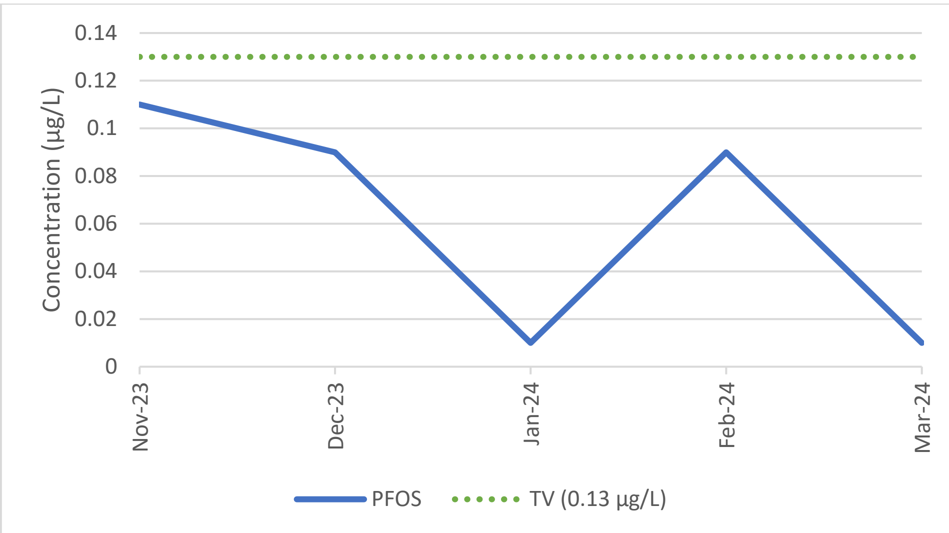

Figure 3-21 PFOS Concentrations

3.5 Compliance with Licence Conditions and Discussion

As per Clause 41 of EPL 299-03, the licensee must conduct surface water monitoring in accordance with Attachment A. It should be noted that a non-compliance with this licence includes:

57.1 an exceedance of a trigger value specified in Attachment A, Attachment B and Attachment C on three consecutive sampling occasions;

57.2 subsequent consecutive exceedances of trigger values as described in condition 58.1; and

57.3; an exceedance of a trigger value specified in Attachment A, Attachment B and Attachment C on a single occasion where the parameter measures greater than or equal to three times the trigger value.

3.5.1 Stormwater Monitoring Data

After reviewing Stormwater Monitoring Results provided by GRR, it has been noted that there may be potential data gaps for the following parameters:

- Data has not been provided for the December 2023 monitoring event for total boron, cobalt (total and filtered) and total phosphorus.
- Data has not been provided for oxides of nitrogen for the 2023/2024 period.
- Data has not been provided for total suspended solids for the November sampling event.
- Data has not been provided for total phosphorus for the March sampling event.

To ensure compliance with condition 41 of EPL229-03, surface water monitoring must be undertaken in accordance with Attachment A of the licence.

3.5.2 Trigger Value Exceedances

A Notification of Trigger Value Exceedances were provided to the NTEPA for February and March 2024 Surface water monitoring events as per condition 58 of EPL229-03 (provided as Appendix I). Notification was not provided to the NTEPA for exceedances during the November 2023, December 2023 and January 2024 surface water monitoring events.

Table 3-5 Trigger Value Exceedances

Date	Parameters exceeded & exceedance value	Reported to the NTEPA
13/11/23	▪ Total Phosphorus - .0.5mg/L ▪ Total Nitrogen – 1.2mg/L ▪ Ammonium - 0.28mg/L ▪ Copper - 0.006mg/L ▪ Copper - (filtered) 0.002mg/L ▪ Manganese – 0.32mg/L ▪ Manganese (filtered) – 0.32mg/L ▪ Zinc – 1.3mg/L ▪ Zinc (filtered) – 0.38 mg/L	No

Date	Parameters exceeded & exceedance value	Reported to the NTEPA
13/12/23	▪ Total Nitrogen – 1.3mg/L ▪ Ammonium – 0.03 mg/L ▪ Copper - 0.005mg/L ▪ Manganese – 0.16mg/L ▪ Manganese (filtered) – 0.16mg/L ▪ Zinc – 0.73mg/L ▪ Zinc (filtered) – 0.0.42 mg/L	No
24/01/2024	▪ Total Nitrogen – 1mg/L ▪ Copper – 0.004mg/L ▪ Zinc – 1.4mg/L ▪ Zinc (filtered) – 0.93 mg/L	No
16/02/2024	▪ Total Phosphorous – 0.05mg/L ▪ Total Nitrogen – 0.4mg/L ▪ Copper – 0.002mg/L ▪ Manganese – 0.095mg/L ▪ Zinc – 0.37mg/L	Yes – Appendix I
12/03/2024	▪ Total Nitrogen – 3 mg/L ▪ Chromium – 0.016mg/L ▪ Copper – 0.007mg/L ▪ Zinc – 1.5mg/L ▪ TSS – 17mg/L	Yes – Appendix I

Historical testing of stormwater completed between 2017 and early 2020 when the site became operational have demonstrated that values for nitrogen compounds, phosphorous compounds, zinc, copper, selenium and manganese are variable but consistently elevated, and that they commonly exceed the trigger values. As these values have remained consistently high, they are considered to represent pre-existing and/or natural background levels of these parameters likely to be representative of local conditions. Notwithstanding, exceedances are required to be reported to the NTEPA in accordance with *57.1, 57.2 & 57.3*.

For in-situ parameters during the reporting period, the 2023/2024 average results were generally aligned with the long-term average, except for EC. As the data in the long-term average is only utilised from the 2020/2021 and 2021/2022, 2022/2023 and 2023/2024 reporting periods, the averages are expected to evolve and come into further alignment as more data is included. It is also noted that the results for metals and nutrients are likely being naturally derived from soils and dust washed into the stormwater pits as these are not utilised in manufactured form on site.

Section 4 Air Quality Monitoring

EPL 229-03 condition 43 requires GRR to conduct annual Stack Emission Monitoring in accordance with Attachment C of the licence, which outlines the monitoring scope and analytical program. GRR are required to monitor emissions from two point sources within the facility; AEP1 – Boiler Stack and AEP2 – Cold Stack. Emissions from both points are required to be tested on an annual basis.

No air quality monitoring was undertaken during the 2023-2024 reporting period. The site has been at limited operational capacity during the reporting period and a monitoring event was not undertaken. Noting that the boiler operations occurred over a very short period on an ad-hoc basis, it is considered that the environmental risk presented is low. Air quality monitoring will be undertaken as per the licence when the site returns to standard operating.

Section 5 Conclusions and Recommendations

The results from this annual reporting period indicate that activities being undertaken on the GRR site do not pose a risk to the surrounding environment. Although the surrounding environment exhibits minimal to no impact from the site activities, groundwater and air quality monitoring will continue to be undertaken as per NTEPA requirements. Whilst some data and compliance with monitoring requirements were not fully complete as per the EPL 229-03, it did not inhibit the ability to analyse data trends for the reporting period.

It is recommended that all exceedances continue to be reported to the NTEPA as per EPL229-03 to provide the NTEPA with context to the site. This will provide a consistent approach and build confidence with the regulator that the exceedances do not relate to irregular activities but are more likely representative of typical background conditions.

It is recommended that the groundwater analytical dataset be reviewed and assessed to determine whether the recorded exceedances are a trend or represent naturally occurring background concentrations (e.g., copper, nickel and zinc). The outcome of this assessment should be considered when evaluating the suitability of the current acceptance criteria. It is maintained that the results for metals and nutrients are likely being naturally derived from soils and dust washed into the stormwater pits as these are not utilised in manufactured form on site.

It is recommended that where the Limit of Reporting is greater than the licence trigger value, the parameter be collected and analysed as ultra-trace, or the laboratory LOR's are reviewed to ensure that the laboratory can provide results appropriate for the analytical program. This will provide a more accurate reading for detecting trigger value exceedances. The is particularly relevant for Cyanide where the current Limit of Reporting is 5µg/L, which is above the trigger value of 4µg/L.

EPL229-03 does not provide any specific trigger values for assessment of PFAS. It is recommended that the guideline values contained in the PFAS National Environmental Management Plan are adopted for due diligence and benchmarking purposes.

Based on the proposed changes to site and operational direction it is recommended that the stormwater, surface water and groundwater monitoring programs be reviewed and rationalised as appropriate to the risk profile of the site and chemicals of concern. Likewise, the monitoring of the boiler stack is to be reviewed against current operation plans and rationalised as appropriate for any associated environmental risks arising from site operations.

Section 6 Disclaimer and Limitations

This report has been prepared by CDM Smith Australia Pty Ltd (CDM Smith) for the sole benefit of GRR for the sole purpose of informing the outcomes of the Global Resource Recovery Plant Annual Monitoring Report.

This report should not be used or relied upon for any other purpose without CDM Smith's prior written consent. Neither CDM Smith, nor any officer or employee of CDM Smith, accepts responsibility or liability in any way whatsoever for the use of or reliance on this report for any purpose other than that for which it has been prepared.

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a. released to any other party, whether in whole or in part (other than to officers, employees and advisers of GRR);

b. used or relied upon by any other party; or

c. filed with any Governmental agency or other person or quoted or referred to in any public document.

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a. has relied upon and presumed the accuracy of this information;

b. has not verified the accuracy or reliability of this information (other than as expressly stated in this report);

c. has not made any independent investigations or enquiries in respect of those matters of which it has no actual knowledge at the time of giving this report to GRR; and

d. makes no warranty or guarantee, expressed or implied, as to the accuracy or reliability of this information.

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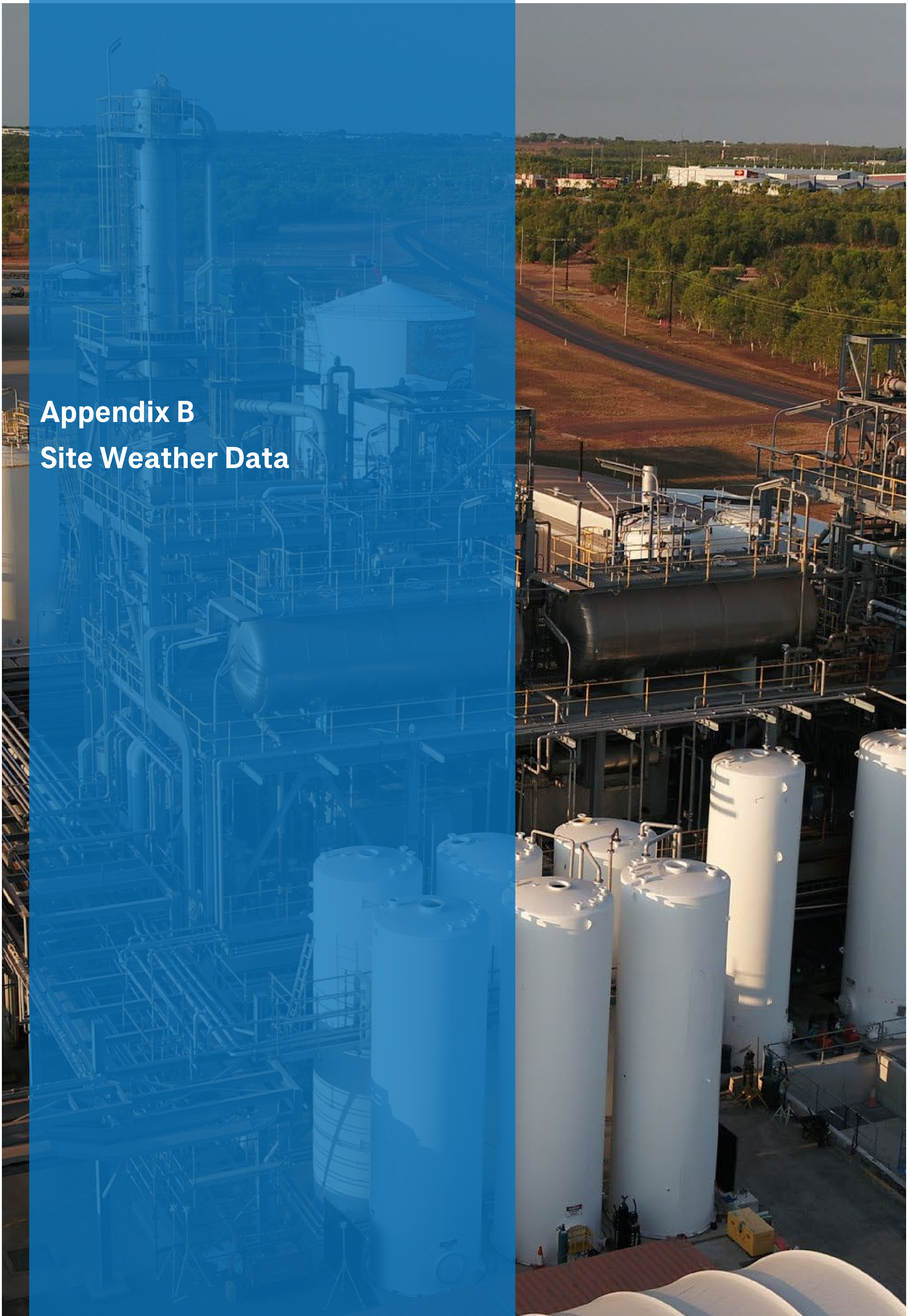
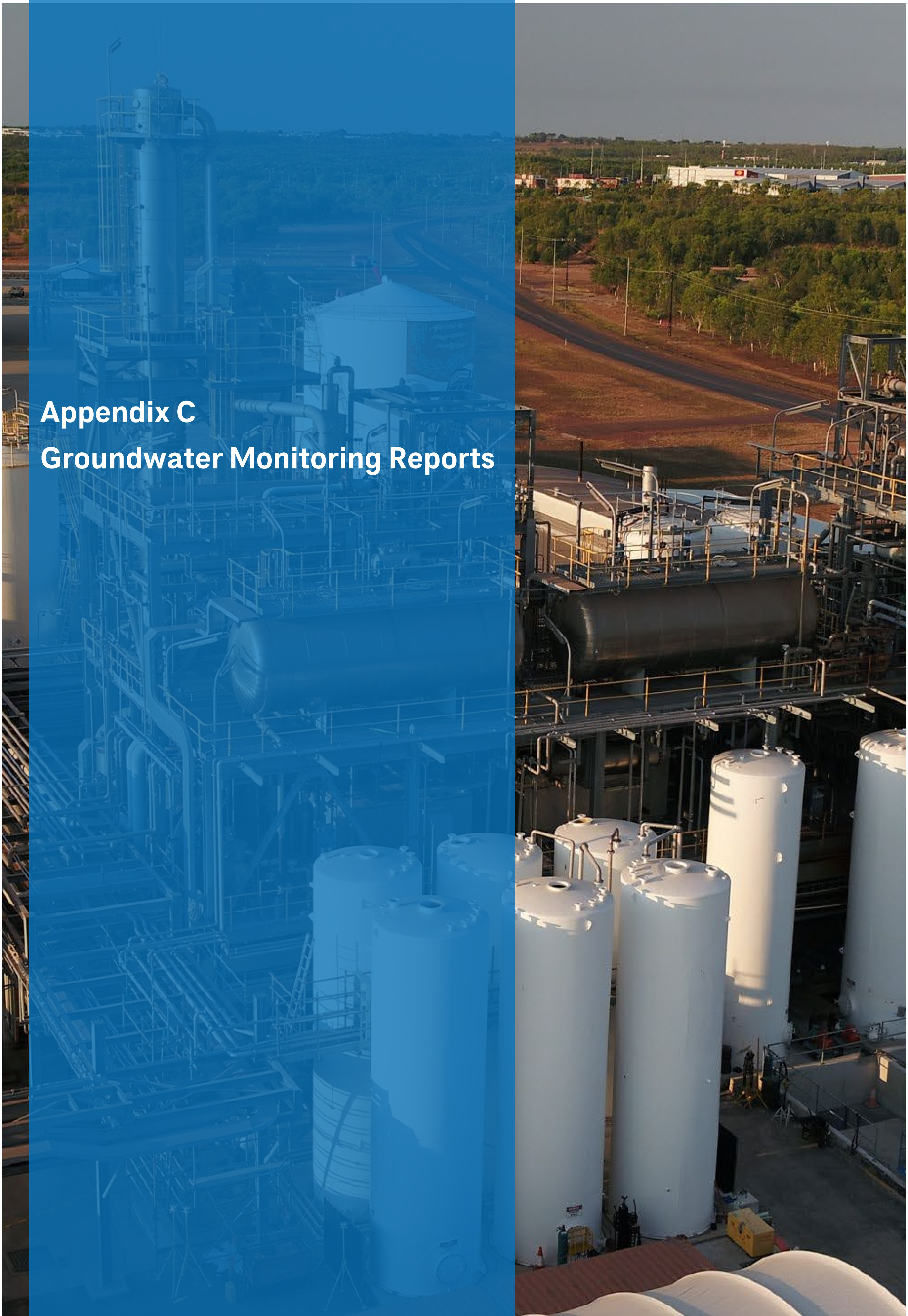
If further information becomes available, or additional assumptions need to be made, CDM Smith reserves its right to amend this report.

Appendix A
Environment Protection Licence (EPL) 229-03

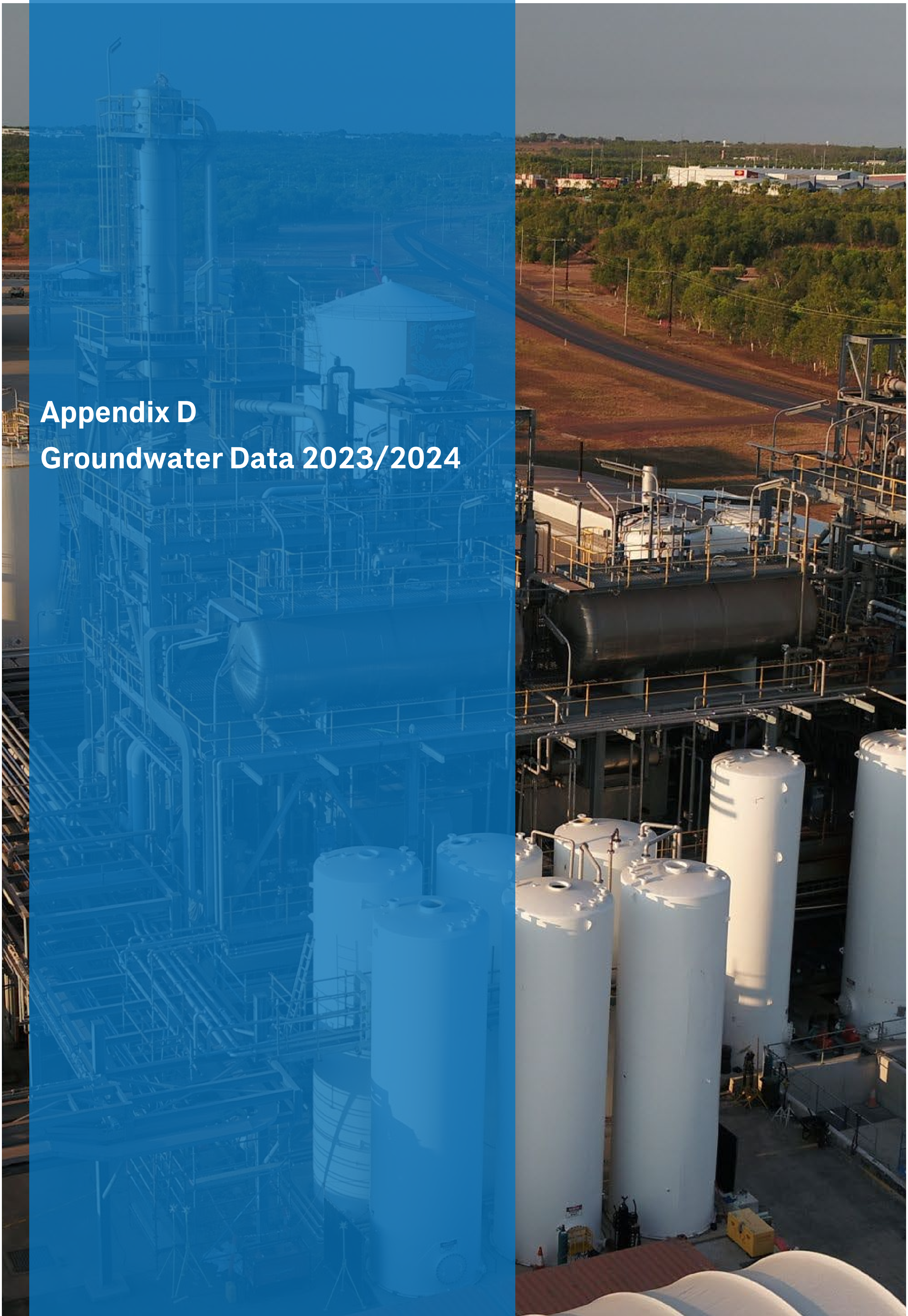
Appendix B
Site Weather Data



Appendix C
Groundwater Monitoring Reports

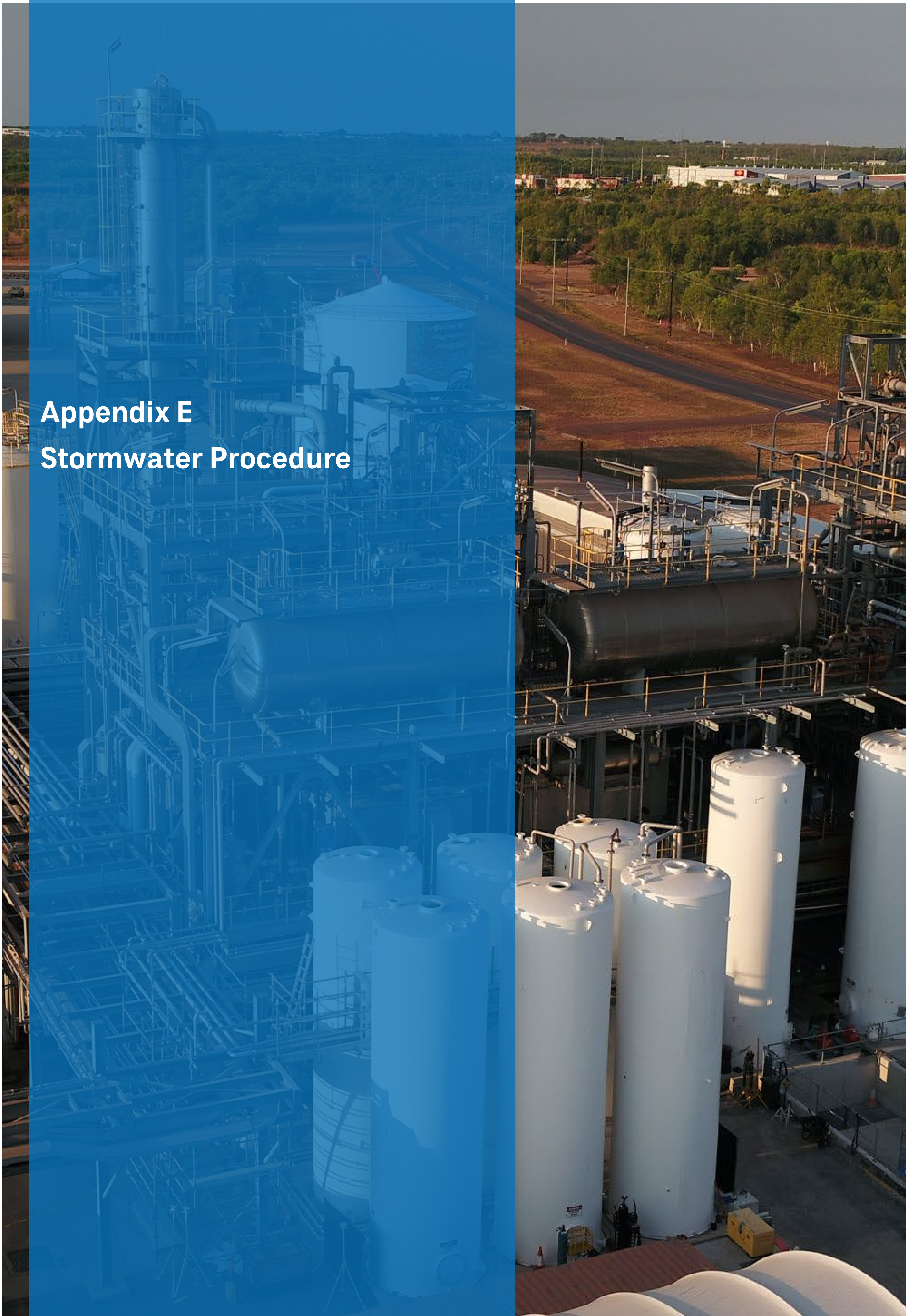


Appendix D
Groundwater Data 2023/2024

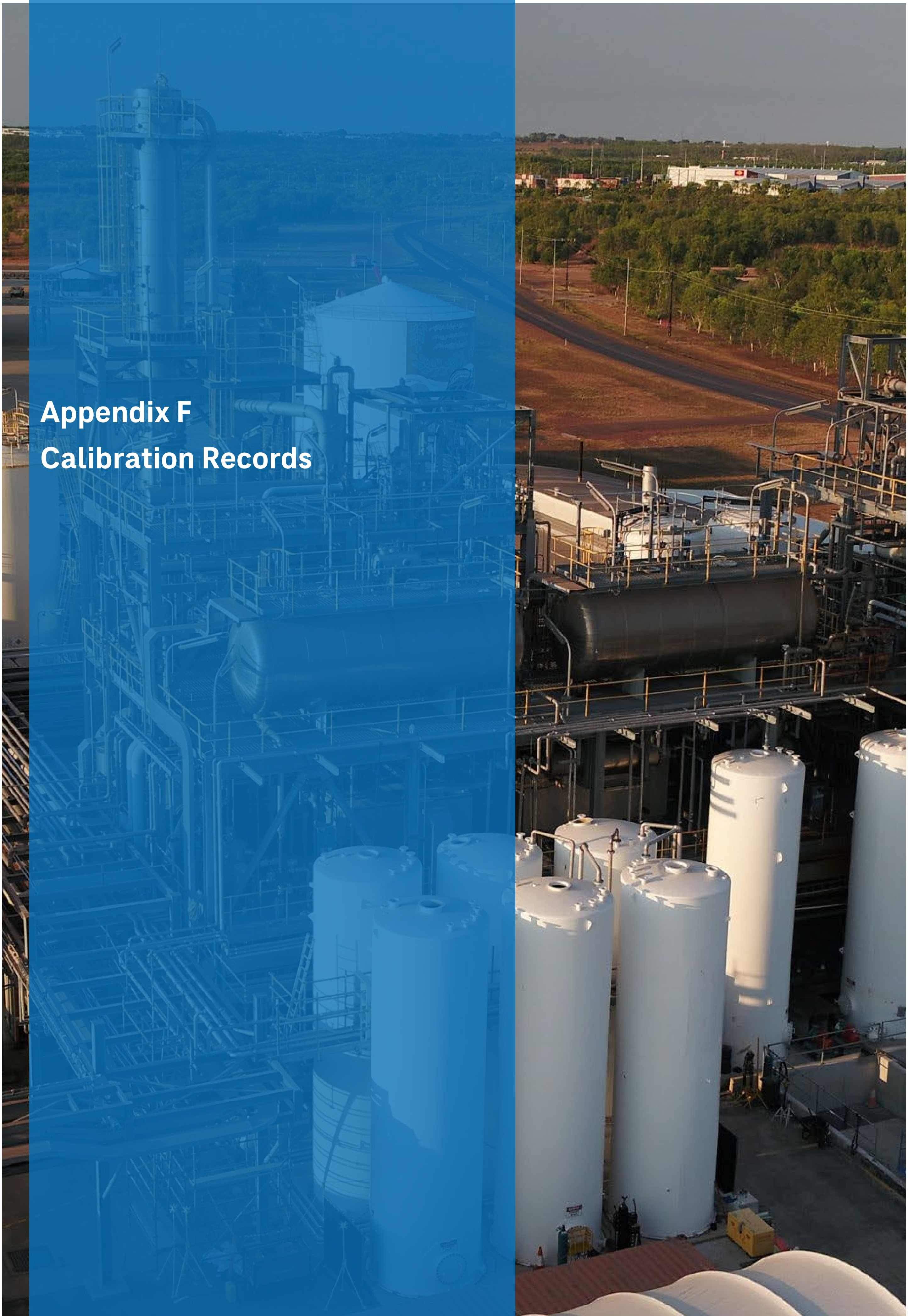


Appendix E

Stormwater Procedure

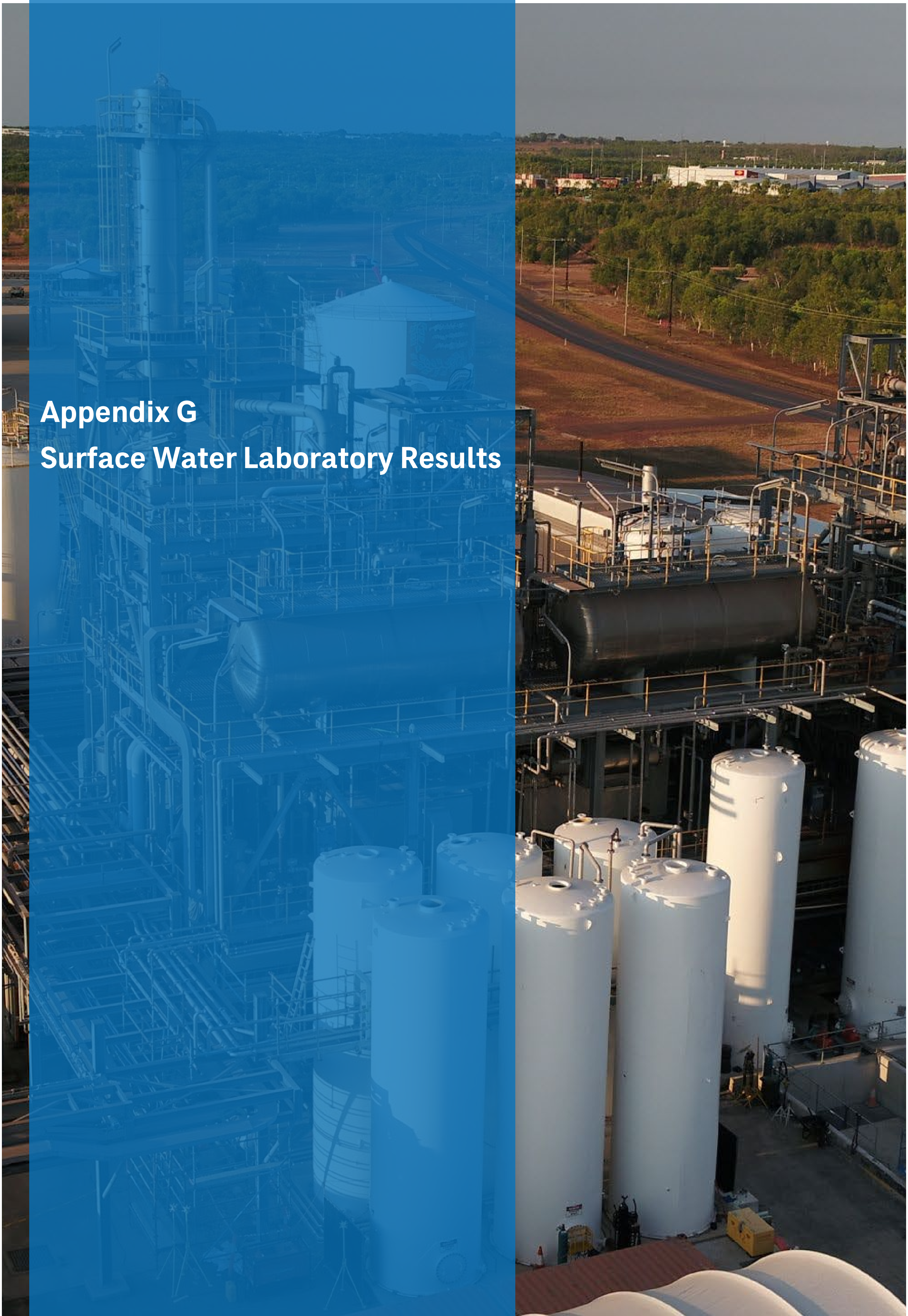


Appendix F
Calibration Records

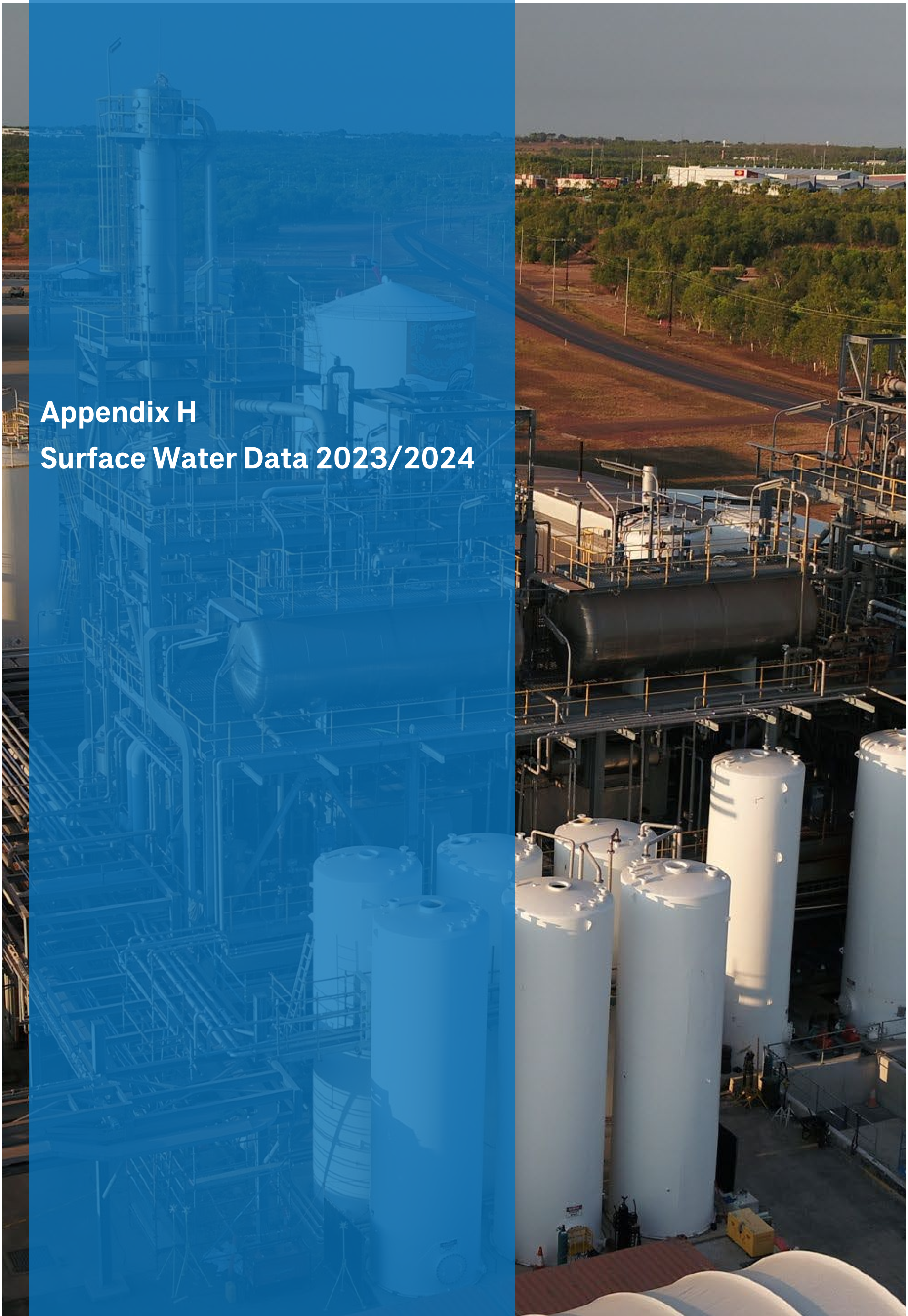


Appendix G

Surface Water Laboratory Results



Appendix H
Surface Water Data 2023/2024



Appendix I

Surface Water Exceedance Notifications

Appendix J
Off-site Bore Graphs