



DARWIN LNG ANNUAL ENVIRONMENTAL MONITORING REPORT

1 January 2024 – 31 December 2024
EPL217-03

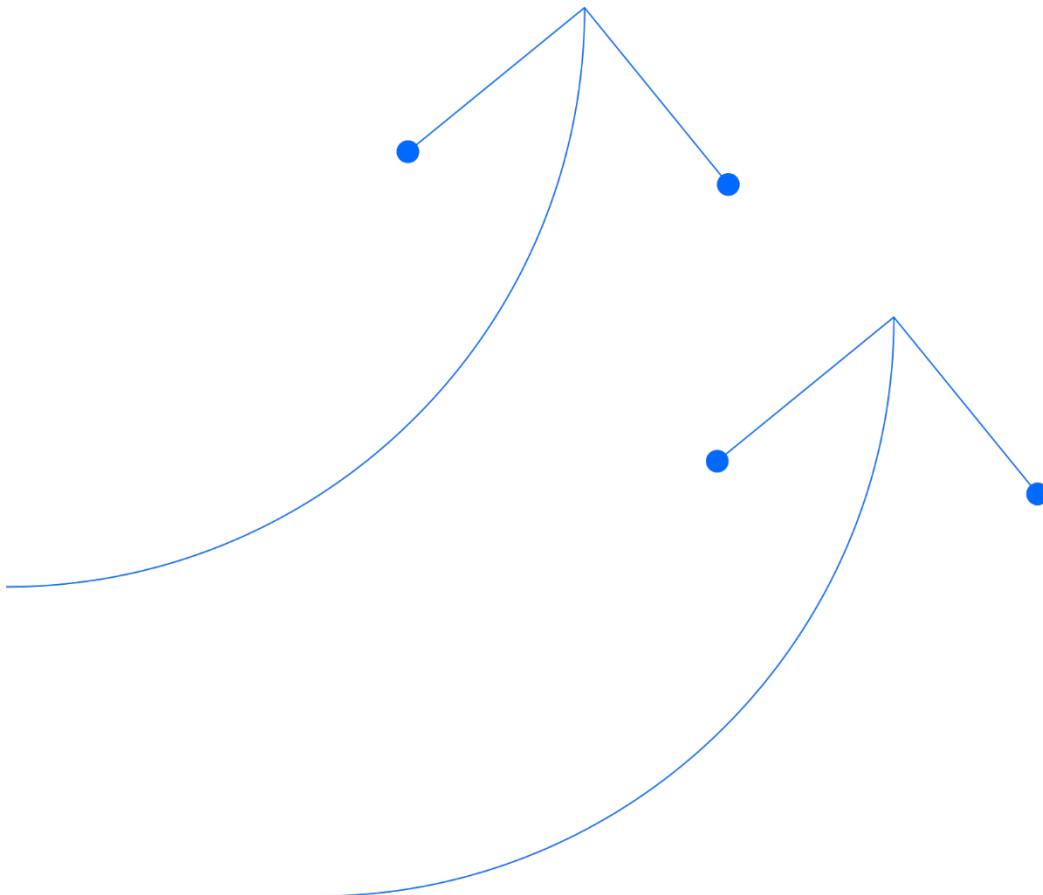


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Date	Rev	Reason For Issue	Author	Checked	Approved
13/3/2025	A	Draft	AG/JD	LS	
20/3/2025	0	Final	BH	SP / DM / JM	PK
15/05/2025	1	Address DLPE comments	BH	DM / JM	PK

Abbreviation Table

Term	Definition
AEMR	Annual Environmental Monitoring Report
AGI	Acid Gas Incinerator
AGMS	Acid Gas Management System
AGV	Acid Gas Vent
Air EPP	Environmental Protection (Air) Policy 2019 (QLD)
ANZG	Australian and New Zealand Guidelines
AQAC	Air Quality Assessment Criteria
BOD	Biochemical Oxygen Demand
CPI/DAFF	Corrugated Plate Interceptor/Dissolved Air Filtration Flotation
DEPWS	Department of Environment, Parks and Water Security
DGV	Default Guideline Value
DHWQO	Darwin Harbour Water Quality Objectives
DLE	Darwin Life Extension
DLNG	Darwin Liquefied Natural Gas
DO	Dissolved Oxygen
DPD	Darwin Pipeline Duplication
DRP	Dissolved Reactive Phosphorus
EC	Electrical Conductivity
ENVID	Environmental Impact Identification
EPA	Environment Protection Authority
EPA378	Environment Protection Approval 378
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EPL217 - 03	Environment Protection Licence 217 - 03
FSANZ	Food Standards Australia New Zealand guidelines 2005
GELs	Generally Expected Levels
GEP	Gas Export Pipeline
GME	Ground Water Monitoring Event
GV-high	'Upper' guideline values
H ₂ S	Hydrogen sulfide
kPa	kiloPascals
LNG	Liquefied Natural Gas
LOR	Limit of Reporting
mg/Nm ³	Milligrams per normal cubic metre

Term	Definition
MK analysis	Mann–Kendall analysis
ML	Megalitre
MLs	Maximum Levels
MZ	Mixing Zone
NATA	National Association of Testing Authorities
NGERS	National Greenhouse and Energy Reporting Scheme
NO ₂	Oxides of Nitrogen as Nitrogen Dioxide equivalent
NPI	National Pollutant Inventory
NRU	Nitrogen Rejection Unit
NSW	New South Wales
NT	Northern Territory
NT EPA	Northern Territory Environment Protection Authority
O ₂	Oxygen
OEMP	Operations Environmental Monitoring Plan
ORP	Oxidation Reduction Potential
OSPG	Onsite Power Generation Turbines
PDS	Particle Size Distribution
ppm	Parts per million (volume)
PWC	Power and Water Corporation
QA	Quality Assurance
QC	Quality Control
RO	Reverse Osmosis
RPAS	Remotely Piloted Aircraft System
RTO	Recuperative Thermal Oxidiser
Santos	Santos NA Darwin Pipeline Pty Ltd
SO ₂	Sulphur Dioxide
STP	Sanitary Treatment Plant
SWL	Standing Water Level
TDS	Total Dissolved Solids
TRH	Total Recoverable Hydrocarbons
TSS	Total Suspended Solids
V-1206	Solvent Regenerator Reflex Drum
WMPC Act	Waste Management and Pollution Control Act 1998

1. Executive Summary

Santos NA Darwin Pipeline Pty Ltd (Santos) is the operator of the Darwin Liquefied Natural Gas facility (DLNG) at Wickham Point, near Darwin, in the Northern Territory (NT) of Australia. DLNG previously received dry natural gas from the Bayu-Undan field located in Timor-Leste offshore waters. Due to declining production rates from the Bayu-Undan field, DLNG ceased the production of Liquefied Natural Gas (LNG) in November 2023 and consequently has been in a shutdown phase throughout 2024.

The Barossa field located 300 kilometres (km) offshore in Commonwealth waters, is currently being developed to supply dry gas to DLNG for liquefaction, storage and export. LNG production from the Barossa field is expected to commence in 2025.

In accordance with Schedule 2 of the *NT Waste Management and Pollution Control Act 1998*, DLNG is required to have an environment protection licence. Santos was issued Environment Protection Licence 217-03 (EPL217-03; the "Licence"), which commenced on 19 September 2022.

Condition 84 of the Licence requires Santos to undertake environmental monitoring of parameters listed in the Licence (e.g. field parameters, environmental indicators and specific potential contaminants of interest) and provide an Annual Monitoring Report to the NT Environment Protection Authority (NT EPA), by 01 March each year. For this Annual Environmental Monitoring Report (this report), the reporting period is defined as 1 January 2024 to 31 December 2024. This report has been developed in accordance with Condition 84 of the Licence and the NT EPA Guideline for Reporting on Environmental Monitoring.

Environmental monitoring programs undertaken during the reporting period included:

- Discharges to water: Water quality (Jetty Outfall discharge and Sediment Pond discharge) and Mangrove monitoring.
- Discharges to air: As DLNG was in shutdown, no monitoring of discharges to air (stack emissions monitoring) were undertaken, however flaring and venting volumes were calculated and reported.
- Discharges to land and surrounding environment: Irrigation discharge and Groundwater monitoring.

It is important to note that for the duration of 2024, DLNG was in shutdown with no LNG production. Monitoring results should be considered in this context when compared to past years of 'normal' operation.

Water quality monitoring undertaken during the reporting period found irrigation discharge, jetty outfall discharge (including mixing zone) and groundwater were generally within the limits of the Licence trigger values, indicating the risk of environmental impact to Darwin Harbour as low. Results of Water quality monitoring at Sediment Ponds 1, 2 and 3 were consistent with historical ranges, however there were exceedances of dissolved reactive phosphorus, total nitrogen, total phosphorus, *Enterococci* and turbidity. These exceedances are likely associated with vegetation breakdown and the presence of wildlife. Given, the exceedances are typically of short duration and coinciding with wet season and rainfall events, it is considered natural and as such the quality of the water discharged from the sediment ponds presents a low environmental risk to Darwin Harbour.

Mangrove monitoring results were compliant with the Licence, with exception of metal exceedances in sediment (zinc) and mudwhelks (copper). These exceedances are consistent with historical monitoring events. Overall, surface water discharged from DLNG has not had a significant impact on mangrove sediment and biota surrounding the facility.

During the reporting period, the total flaring volume from routine and non-routine sources was less than the previous year. The decrease in total plant flaring in 2024 can be attributed to the plant shutdown. Given that DLNG was in a period of shutdown, monitoring of stack emissions sources was not undertaken as no releases to air had occurred, and as such remained compliant with the Licence and presented no discernible risk on the ambient air quality of the Darwin region.

2. Introduction

2.1. Overview

Santos NA Darwin Pipeline Pty Ltd (Santos) is the operator of the Darwin Liquefied Natural Gas facility (DLNG) at Wickham Point, near Darwin, in the Northern Territory (NT) of Australia. The location of DLNG is shown in **Figure 2-1**.

DLNG previously received dry natural gas from the Bayu-Undan field located in Timor-Leste offshore waters. The dry gas was liquefied, stored and exported from DLNG. Since November 2023, DLNG has been in a shutdown phase with no LNG production during 2024.

The Barossa field, located 300 km offshore in Commonwealth waters, is currently being developed to supply dry gas to DLNG for liquefaction, storage and export. The supply of gas to DLNG will be achieved through the installation of a new pipeline from the Barossa field. LNG production from the Barossa field is expected to commence in 2025.

DLNG is required by Schedule 2 of the NT *Waste Management and Pollution Control Act 1998* (WMPC Act) to have an environment protection licence. For the 2024 reporting year, Santos held Environment Protection Licence 217-03 (EPL217-03) (the Licence) in accordance with this requirement. The Licence was issued by the NT Environment Protection Authority (NT EPA). Further information on the Licence is provided in **Section 2.2**.

Condition 84 of the Licence requires Santos to undertake environmental monitoring of parameters listed in the Licence (e.g. field parameters, environmental indicators and specific potential contaminants of interest) and provide NT EPA with an Annual Monitoring Report by 1 March annually and relate to the period of 1 January to 31 December of the preceding year.

This report includes the environmental monitoring results in relation to the Licence for the period between 1 January 2024 and 31 December 2024 (herein referred to as the reporting period).

As per the requirements of Condition 85 of the Licence, this report:

- Has been prepared in accordance with the requirements of the 'Guidelines for Reporting on Environmental Monitoring' (NT EPA, 2016).
- Includes a tabulation of all monitoring data (refer to Attachments).
- Includes long-term trend analysis (at least three years) where suitable monitoring data are available.
- Includes an assessment of the environmental impact of the activity.
- Includes analysis on the impacts of the operation of DLNG on ambient air quality.

During the reporting period DLNG was in shutdown mode to accommodate construction works and maintenance activities being undertaken to extend the production life of DLNG. Consequently, as LNG production had ceased, there were no stack emissions monitoring undertaken during 2024 (detailed further in **Section 4**). The absence of LNG production also resulted in a reduction in the generation and subsequent discharge of process related wastewater (detailed further in **Sections 3** and **Section 5**).

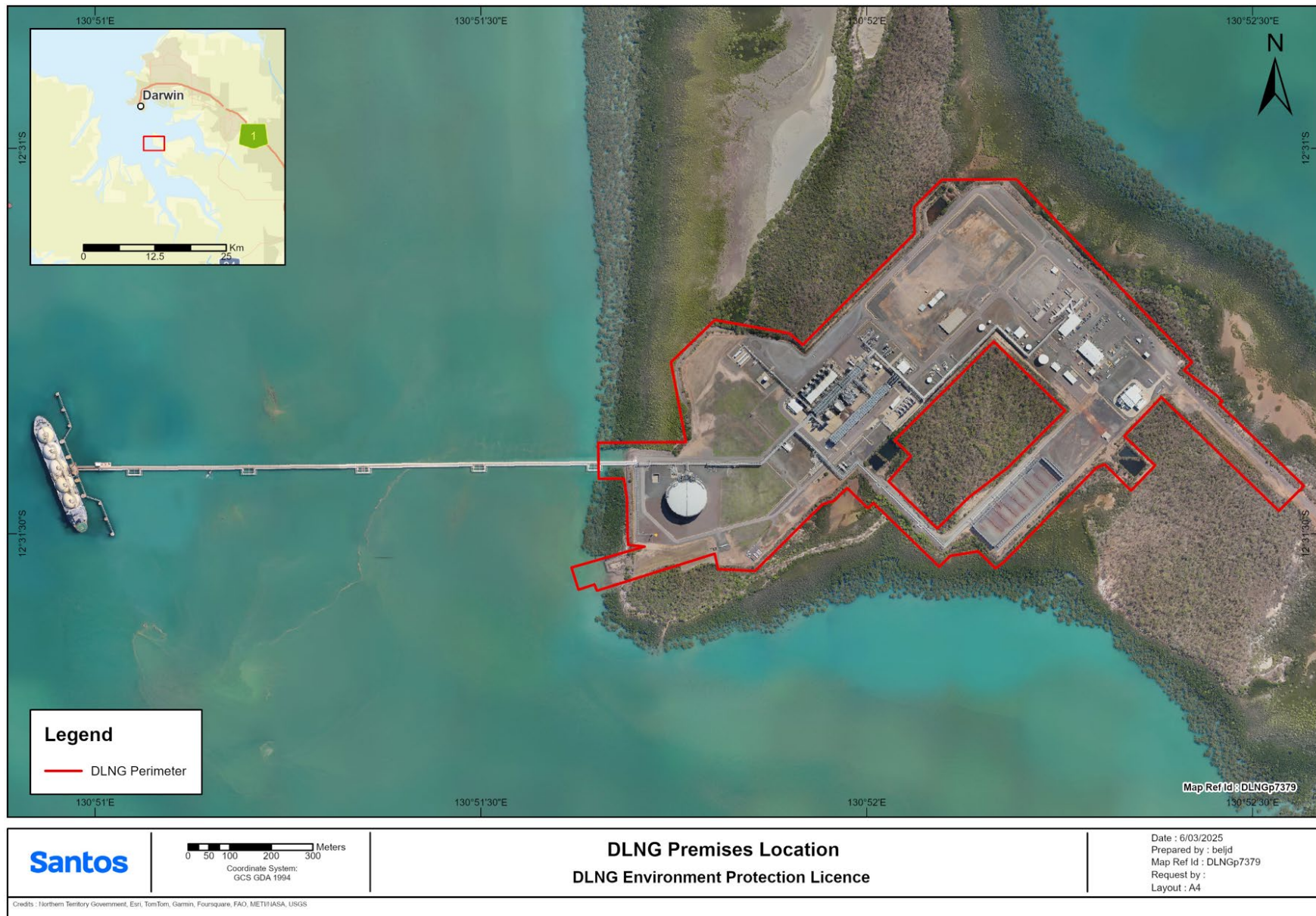


Figure 2-1: DLNG locality map

2.2. Environment Protection Licence 217-03

The Licence held by Santos for DLNG (for the reporting period) commenced on 19 September 2022 and will expire on 18 September 2025. The boundary of the Licence is shown in **Figure 2-1**. The Licence is published on the [NT EPA website](#).

Licence conditions 58 to 72 outline the requirements for monitoring discharges to the environment. The sections of this report which correspond to these requirements, are summarised in **Table 2-1**.

Table 2-1: Summary of monitoring-related Licence conditions and relevant report sections

Condition	Summary	Relevant sections within this report
General (Conditions 58 and 59)	- Monitoring sample collection must provide for sample chain of custody documentation. - Monitoring equipment must measure the parameters of interest and results must be stored appropriately.	The sample collection points, and monitoring equipment used are dependent on the discharge stream and parameters being monitored. Information relating to these conditions is included in each of the discharge monitoring sections: - Monitoring discharges to water (Section 3), - Monitoring air discharges (Section 4), and - Monitoring discharges to land and Surrounding Areas (Section 5).
Monitoring discharges to water (Conditions 60 to 66)	Water Quality - Water quality monitoring must be in accordance with the conditions and tables appended to the Licence, which specify monitoring locations and parameters. - Water quality monitoring locations must be clearly labelled and able to be accessed. - Water quality sampling must be carried out in accordance with specified in New South Wales (NSW) EPA methods. Mangrove Monitoring - Mangrove monitoring must be in accordance with the tables appended to the Licence, which specify monitoring locations and parameters. - Revisions to the mangrove monitoring program must be reviewed by a suitably qualified professional and provided to the NT EPA. - The NT EPA may require Santos to revise or amend and resubmit the mangrove monitoring program.	Water quality monitoring objectives, methods, results and discussion are presented in the following section: - Jetty outfall discharge and mixing zone – Section 3.1.3, - Sediment ponds 1, 2 and 3 discharge – Section 3.1.4, and - Mangrove monitoring – Section 3.2.

Condition	Summary	Relevant sections within this report
Monitoring air discharges (Conditions 67 to 69)	• Air quality monitoring program must be in accordance with the tables appended to the Licence, which specify monitoring locations and parameters. • Air quality sampling and analysis must be carried out in accordance with specified in NSW EPA methods. • Monitoring must be undertaken at least once per year under steady-state operational conditions.	No monitoring of discharges to air were undertaken during 2024. Air quality monitoring is typically presented in Section 4 of this report, and includes results from these locations specified in the Licence: • Power generation turbines • Compressor turbines • Acid Gas Incinerator (AGI) • Acid Gas Vent (solvent regenerator reflux drum), and • Boiler. However, as DLNG was in shutdown during 2024, no monitoring of air discharges (stack emissions monitoring) was undertaken during 2024.
Monitoring discharges to land and surrounding environment (Conditions 70 to 72)	• Maintain and implement the monitoring program in accordance with the tables appended to the Licence and the DLNG groundwater monitoring plan. • Groundwater sampling and analysis must be carried out in accordance with specified in NSW EPA methods. • Sampling undertaken by a qualified sampler.	Monitoring objectives, methods, results and discussion are presented in the following section: • Groundwater and irrigation discharge monitoring is presented in Section 5, which includes results from monitoring and control bores at the locations specified in the Licence.

2.3. DLNG Environmental Monitoring

The operation of DLNG has the potential to impact upon the environment. A conceptual model of how impacts to the environment could potentially occur is provided in **Figure 2-2**.

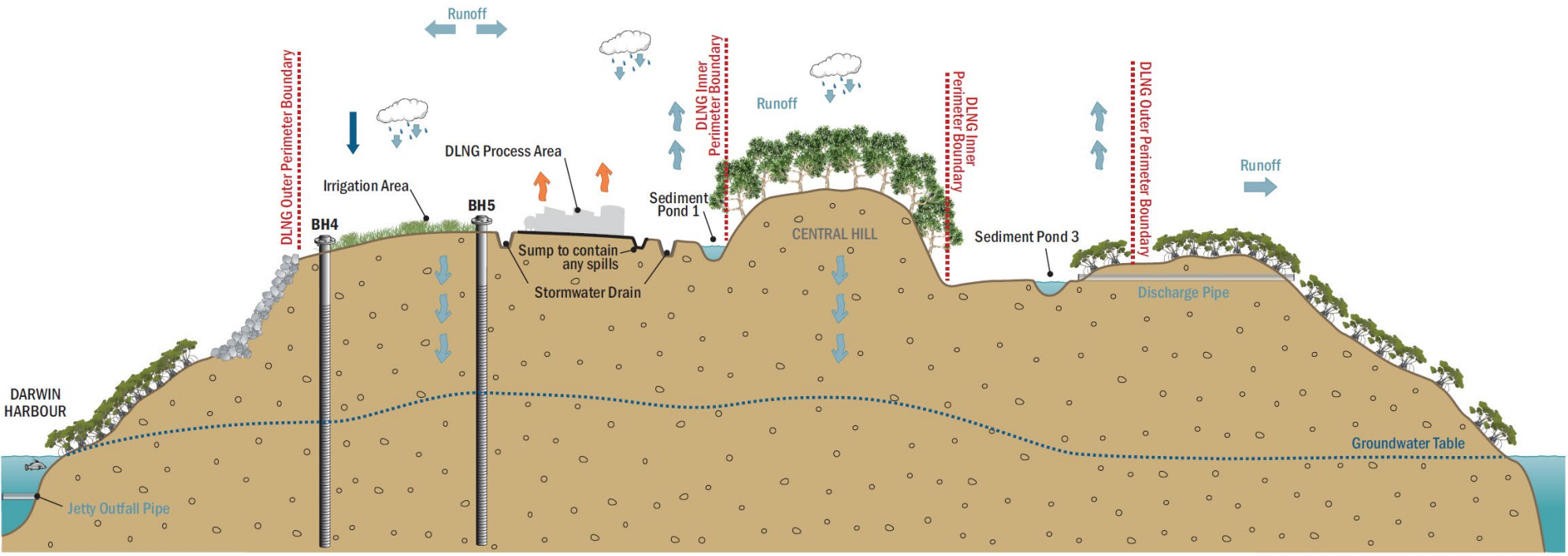
The Licence requires that Santos monitor potential environmental impacts. The methods of monitoring potential environmental impacts are outlined in the DLNG Operations Environmental Management Plan (OEMP).

The OEMP includes monitoring of:

- Discharges to water, including:
 - Jetty outfall monitoring.
 - Sediment pond discharge monitoring.
 - Mangrove monitoring.
- Discharges to air, including:
 - Stack emission monitoring.
 - Ambient air quality monitoring.
 - Flaring and venting monitoring.
- Discharges to land and the surrounding environment, including
 - Groundwater monitoring.
 - Irrigation monitoring.

Santos has developed and implemented monitoring programs in accordance with the Licence, to assess and manage risks to the environment from DLNG operations.

The objectives, methods and results of these monitoring programs have been included in the relevant sections of this report.



NOTE:
Vertical Axis = SCALE EXAGGERATED
Horizontal Axis = NOT TO SCALE

LEGEND

↑ Evaporation ↓ Infiltration ☁ Rainfall → Runoff ↓ Intermittent Irrigation ↑ Air Emissions

Source	Emission or Discharge (Risk Factor)	Pathway	Receptor			
			Human Health and Community (Including Recreational Values)	Marine Waters (Darwin Harbour) and Wetlands (Port Darwin)	Vegetation and Flora	Fauna
Stack emissions from operation of LNG processing and onsite power generation equipment	Air pollutants and GHG emissions (as per EPL217)	Air	✓		✓	✓
Flaring – marine, ground and NGL flare						
Venting from operation of LNG processing equipment and acid gas venting						
Fugitive air emissions from storage tanks, and the operation of equipment and vehicles	Air pollutants, GHG emissions and ozone depleting substances	Air	✓			✓
Failure, rupture, leaks or release from gas or HVAC systems						
Operation of LNG processing, onsite power generation equipment and marine vessel activities generating noise, heat and light emissions	Noise, heat and light	Air	✓			✓
Onsite irrigation of plant wastewater	Wastewater discharged (as per EPL217)	Surface water	✓	✓	✓	✓
Discharge of reverse osmosis reject wate via the jetty outfall						
Discharge of stormwater runoff (collected from hardstand areas and onsite stormwater drains) from the sedimentation ponds						
Accidental contamination of stormwater from overflow of process area spill containment	Hydrocarbons and process chemicals	Surface water	✓	✓	✓	✓
Accidental hydrocarbon/chemical spills and unplanned releases (due to failure, rupture or leaks) from equipment, process area or jetty	Hydrocarbons, amine, LNG, process chemicals and hydraulic fluid					
Onsite irrigation of Plant wastewater	Wastewater discharged (as per EPL217)	Groundwater	✓	✓	✓	
Accidental hydrocarbon/chemical spill and unplanned release (due to failure, rupture or leaks) from equipment and process area						
Onsite irrigation of Plant wastewater	Wastewater discharged (as per EPL217)	Land	✓	✓	✓	
Operation of LNG processing and onsite power generation equipment generating vibrations	Ground vibrations		✓			✓
Discharge of stormwater runoff from stormwater drains	Sediment			✓	✓	
Accidental hydrocarbon/chemical spill and unplanned release (due to failure, rupture or leaks) from equipment and process area	Hydrocarbons, process chemicals, diesel fuel and hydraulic fluid		✓	✓	✓	✓
Fire/explosion from operation of LNG processing and onsite power generation equipment	Explosion, loss of vegetation and fauna				✓	✓
Unauthorised access within the site perimeter	Introduction and/or propagation of weeds, disturbance to vegetation				✓	✓
Consumables and general waste generated from Plant operations	Non-hazardous and hazardous solid and liquid waste		✓	✓	✓	

Figure 2-2: DLNG environmental conceptual model

3. Monitoring Discharges to Water

Conditions 60 to 66 of the Licence outlines requirements to monitor a range of wastewater discharges, including:

- Jetty outfall discharge and mixing zone (**Section 3.1**).
- Sediment ponds discharge (**Section 3.1**).
- Mangrove monitoring (**Section 3.2**).

The objectives, methods, analysis, and discussion of results for each of these monitoring programs are provided herein.

3.1. Jetty Outfall and Sediment Pond Discharge

As part of DLNG operations, several water and wastewater streams are authorised to be discharged from DLNG under the Licence. Authorised discharge occurs via the jetty outfall, and Sediment Ponds 1, 2 and 3. A schematic of processes associated with discharge streams is shown in **Figure 3-1**.

The jetty outfall discharge comprises reject water from the Reverse Osmosis (RO) process, which uses water supplied by the Power and Water Corporation (PWC) as feed water. The jetty outfall pipe is shown in **Figure 3-2**. The estuarine waters of Darwin Harbour surrounding the discharge pipe are sampled as part of the jetty outfall mixing zone monitoring program.

Three sediment ponds within the DLNG boundary collect stormwater runoff prior to discharge into the intertidal mangroves of Darwin Harbour. Sediment Pond 1 adjacent to DLNG's onsite power generation facility also receives backwash water from the greensand filter (a component of the water RO plant). Overflow water from the three sediment ponds are passively discharged to Darwin Harbour. A typical view of a sediment pond is provided in **Figure 3-3**.

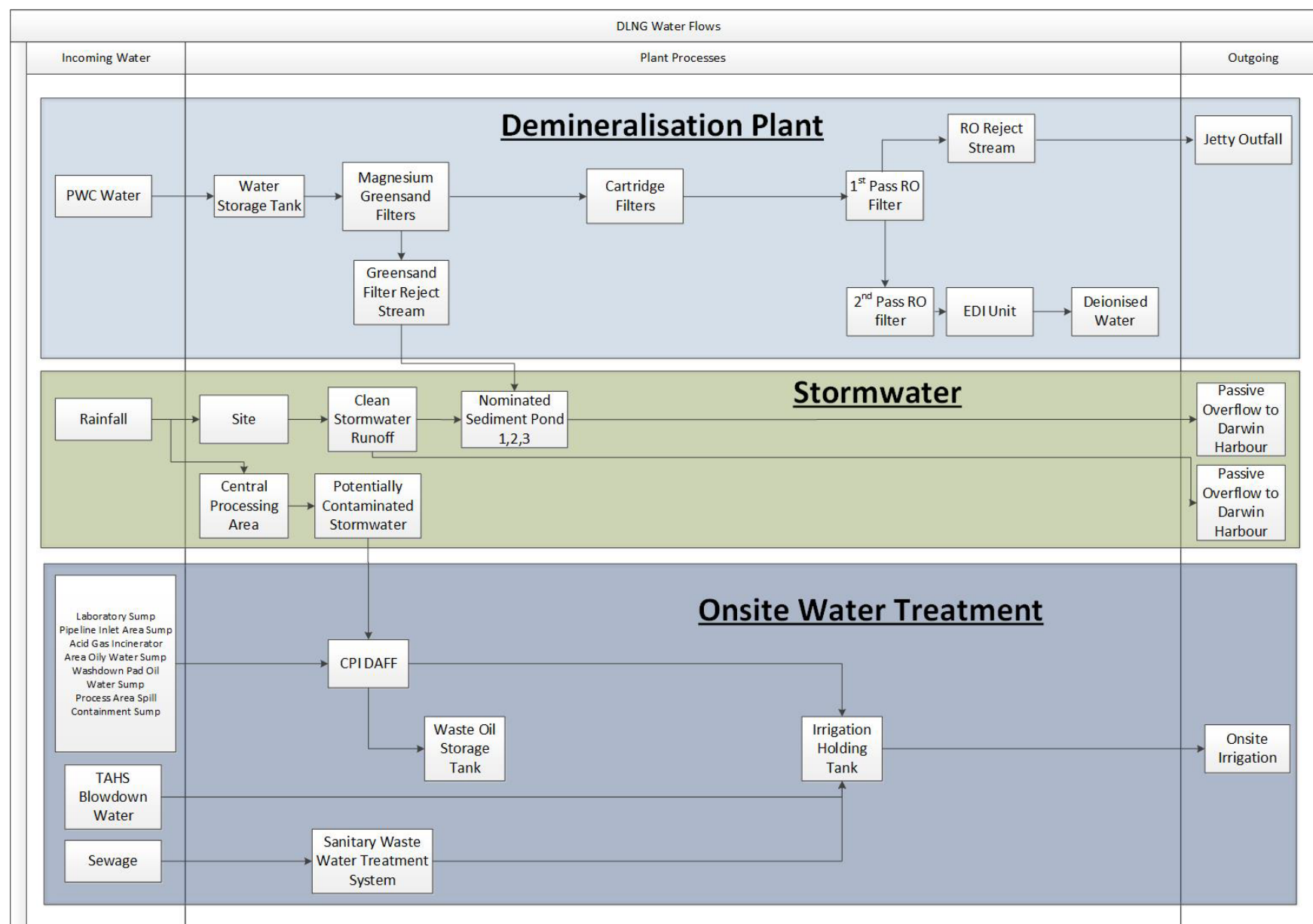


Figure 3-1: Schematic of water inputs, processes, and discharge points at DLNG



Figure 3-2: DLNG jetty outfall pipe (secured to pylon)



Figure 3-3: DLNG sediment pond outflow sampling location

3.1.1. Monitoring Objective

The objectives of the jetty outfall and sediment pond discharge monitoring programs are to:

- Characterise the quality and quantity (jetty outfall only) the flow of the discharge water; and
- Assess compliance with the trigger values in the Licence (refer to Appendix B Table 2 within the Licence).

Characterising the quality of discharge water allows Santos to assess potential for discharged water to impact the environment. As outlined in the conceptual model (**Figure 2-2**), discharged water may interact with groundwater and Darwin Harbour.

The results of the jetty outfall discharge, mixing zone and sediment pond discharge monitoring programs are also used to interpret results from other monitoring programs, such as the mangrove monitoring program (**Section 3.2**).

3.1.2. Monitoring Methods

The location of discharges to water are stipulated in the Licence. These locations are shown in **Figure 3-4** and **Figure 3-5**. Monitoring occurs throughout the year, the coordinates, sampling frequencies and the discharge sources are provided within the Licence (Appendix B Table 1 and Table 2 and Condition 60, Table 2).

Field measurements and samples are collected by DLNG laboratory staff and/or environmental consultants who are suitably trained and experienced with the methodologies used. The sample locations for the irrigation discharge, jetty outfall discharge and sediment ponds are provided below:

- Jetty outfall: Water quality samples from the jetty outfall discharge are collected via a flow meter sample valve positioned along the discharge pipe within the plant.
- Jetty outfall Mixing Zone: Water quality samples from within the outfall mixing zone (in Darwin Harbour and adjacent to the DLNG jetty) are obtained by boat. These locations are shown in **Figure 3-5**.
- Sediment ponds: Water quality samples from the sediment ponds are collected from the overflow weirs. Sediment Ponds are only sampled when they are actively discharging to the environment (inter-tidal area > Darwin Harbour).

Samples are sent to analytical laboratories for analysis. All laboratories used maintain National Association of Testing Authorities (NATA) accreditation for the analyses being carried out.

Concentrations of the parameters analysed at laboratories are often very low and many parameters are not identified at concentrations above laboratory limits of reporting (LOR). Where analytical results have not been identified at concentrations above the LOR, as a conservative approach the analyte was assumed to be present at a concentration equal to the LOR for the purpose of statistical analysis.

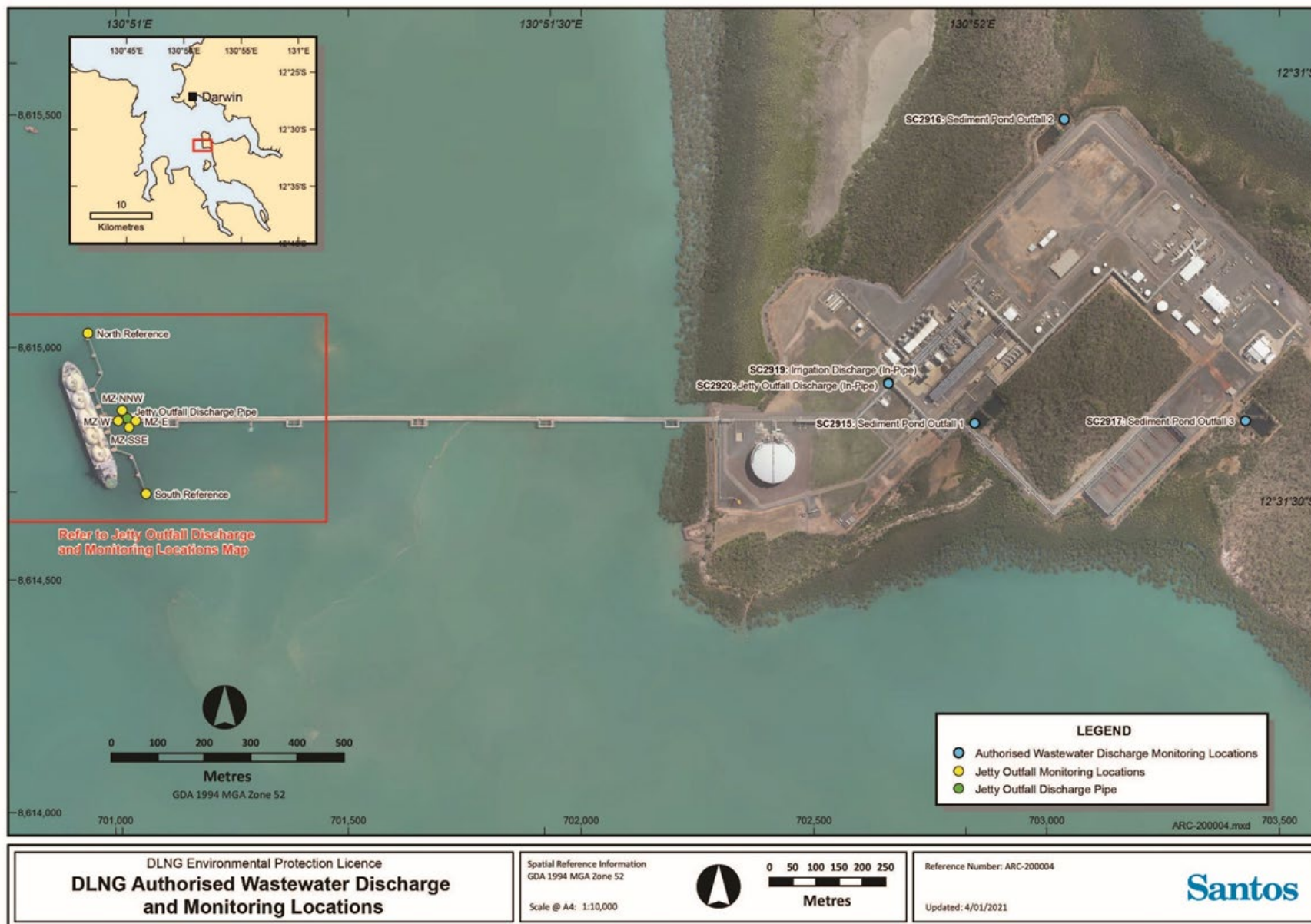


Figure 3-4: Map of authorised wastewater discharge locations

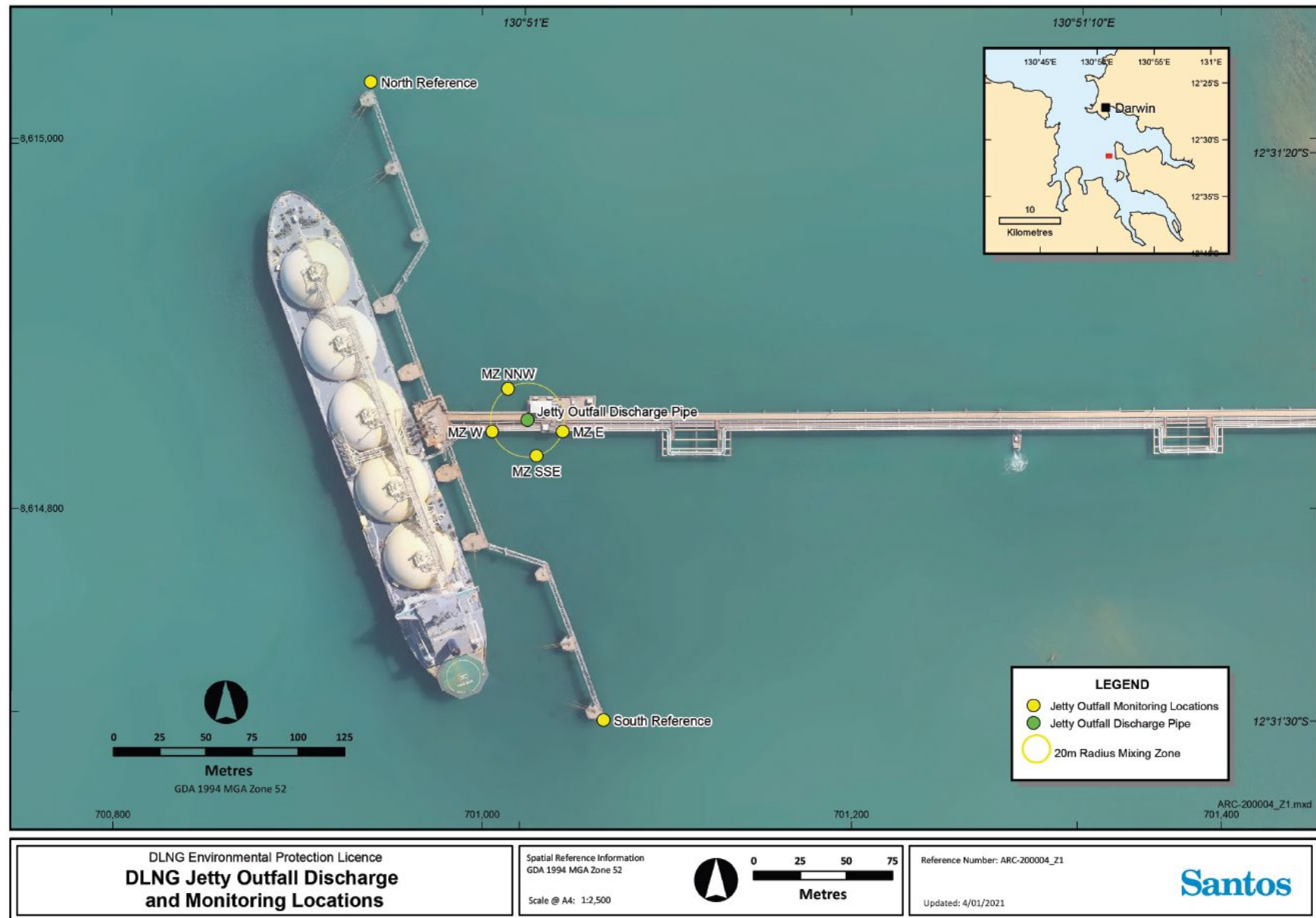


Figure 3-5: Map of jetty outfall discharge and monitoring location

3.1.3. Monitoring Results – Jetty Outfall

3.1.3.1. Volume discharged

A total of 1,002.6 m³ was discharged from the jetty outfall during the reporting period (**Figure 3-6**). This is approximately 1.67% of the 60 ML Licence limit. This volume is lower than 2023 and is the lowest annual discharge volume recorded for DLNG. This was expected due to the decreased outflow from the Demineralisation Plant, which has been running at minimum rates since LNG production ceased in November 2023.

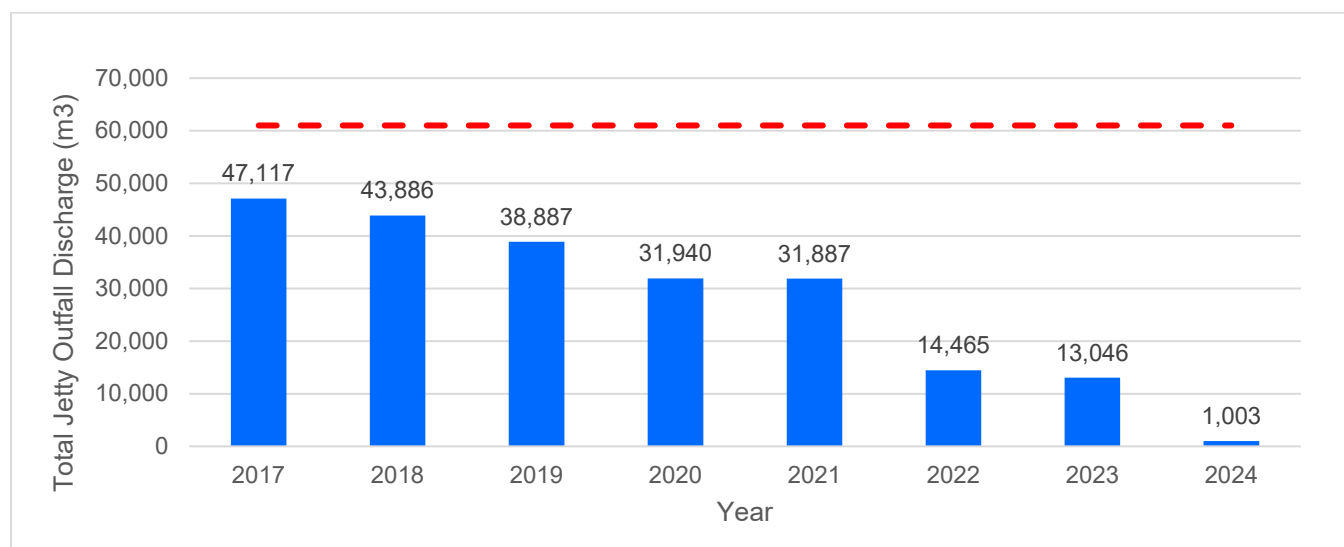


Figure 3-6: Water volume discharged to jetty outfall

3.1.3.2. Water quality monitoring results

The biannual monitoring of environmental indicators was undertaken in May and November 2024. Two additional monitoring events occurred in March and August 2024 for quarterly indicators (**Table 3-1**).

The historical dataset of jetty outfall discharge water quality monitoring results is provided in **Attachment A** – Irrigation, Jetty Outfall and Sediment Pond data; values exceeding current Licence trigger values are bolded. An exceedance of the Licence trigger values is not a reportable non-conformance as per Conditions 38, 39 and 78 of the Licence.

Key findings from a review of the results of the water quality monitoring for the jetty outfall discharge include:

- Field parameters recorded for the jetty outfall discharge during 2024 (**Table 3-1**) generally did not exceed the Licence trigger values [with the exception of Dissolved Reactive Phosphorous (DRP) and zinc as described below], and were consistent with or less than the long-term averages derived from previous monitoring event results.
- Analytical results for DRP (PO₄-P) exceeded the trigger level for both biannual sampling events in 2024 (59 µg/L and 103 µg/L compared to the trigger level of 51 µg/L) and zinc exceeded the trigger level once in 2024 (45 µg/L compared to the Licence trigger level of 15 µg/L).

With the exception of DRP and zinc, these results are consistent with what has been reported in previous annual monitoring event results. The elevated DRP and zinc is likely associated with the reduced flows and from the jetty outfall. The jetty outfall discharge water quality monitoring generally met the Licence trigger values, and the risk of environmental impact from the jetty outfall discharge is low.

Table 3-1: Summary of 2024 jetty outfall discharge monitoring results

Parameter	Units	Monitoring Frequency	Licence Trigger Value	2024 Maximum	2024 Minimum	2024 Average	Long-term Average (2017-2024)	2024 Reportable Non-Conformance ^[1]
Field Parameters								
pH	pH units	Monthly	7 – 8.5	8.20	7.68	7.87	7.80	No
Electrical conductivity	µs/cm	Monthly	No trigger	890.10	574.50	742.89	735.66	N/A
TSS	mg/L	Monthly	≤ 30	2.00	0.00	0.29	0.65	No
Turbidity	NTU	Monthly	20	4.74	0.35	1.23	1.07	No
DO	mg/L	Monthly	No trigger	6.39	1.59	3.01	3.51	N/A
Temperature	°C	Monthly	No trigger	34.20	25.70	29.67	32.10	N/A
Environmental Indicators								
Ammonium nitrogen (NH ₃ -N)	µg/L	Quarterly	337	180.00	2.00	50.25	317.75	No
Nitrate (NO ₃ -N)	µg/L	Quarterly	764	654	317.00	466.00	306.61	No
Nitrite (NO ₂ -N)	µg/L	Quarterly	27	4.00	2.00	3.00	22.54	No
DRP (PO ₄ -P)	µg/L	Biannually	51	103.00	59.00	81.00	22.09	No ^[4]
Total Nitrogen	mg/L	Quarterly	≤ 40	1.20	0.88	1.03	1.69	No
Total Phosphorous	mg/L	Biannually	≤ 10	0.135	0.085	0.11	0.07	No
BOD	mg/L	Biannually	≤ 25	N/A ^[2]	N/A ^[2]	N/A ^[2]	7.03	No
TRH	mg/L	Biannually	< 6	N/A ^[2]	N/A ^[2]	N/A ^[2]	N/A ^[2]	No
<i>E. coli</i>	MPN/100 mL	Biannually	≤ 75	N/A ^[2]	N/A ^[2]	N/A ^[2]	52.00 ³	No
<i>Enterococci</i>	MPN/100 mL	Biannually	50	N/A ^[2]	N/A ^[2]	N/A ^[2]	N/A ^[1]	No
Metals & BTEX								
Arsenic	µg/L	Biannually	No trigger	N/A ^[2]	N/A ^[2]	N/A ^[2]	1.0	N/A
Cadmium	µg/L	Quarterly	5.5	<0.2	N/A ^[2]	N/A ^[2]	N/A ^[2]	No
Chromium	µg/L	Biannually	4.4	1.00	1.00	1.00	1.25	No
Copper	µg/L	Quarterly	3.0	2.0	1.0	1.67	1.88	No
Iron	µg/L	Biannually	No trigger	210.00	110.00	157.50	152.41	N/A

Parameter	Units	Monitoring Frequency	Licence Trigger Value	2024 Maximum	2024 Minimum	2024 Average	Long-term Average (2017-2024)	2024 Reportable Non-Conformance ^[1]
Lead	µg/L	Biannually	4.4	N/A ^[2]	N/A ^[2]	N/A ^[2]	N/A ^[2]	No
Manganese	µg/L	Biannually	No trigger	54.00	5.00	18.50	17.89	N/A
Mercury	µg/L	Biannually	0.4	N/A ^[2]	N/A ^[2]	N/A ^[2]	N/A ^[2]	No
Nickel	µg/L	Quarterly	70	6.00	2.00	3.40	4.11	No
Silver	µg/L	Biannually	1.4	N/A ^[2]	N/A ^[2]	N/A ^[2]	N/A ^[2]	No
Zinc	µg/L	Quarterly	15	45.00	11.00	20.75	14.57	No ^[4]
BTEX	µg/L	Biannually	700	N/A ^[2]	N/A ^[2]	N/A ^[2]	4	No

Notes:

1. Results from mandatory sampling are only considered when determining reportable non-conformances under the Licence
 2. All results were less than the LOR.
 3. Average based on a single detection.
 4. Not reportable due to Conditions 38, 39 and 78 of EPL217-03
- *Yellow shading denotes values that exceed / are outside of the EPL 217-03 Jetty Outfall Mixing Zone Trigger Value.

3.1.3.3. Mixing zone water quality monitoring results

Condition 61 of the Licence requires the 20 m mixing zone around the jetty outfall to be monitored quarterly and compared against the trigger values detailed in Appendix B Table 2 of the Licence.

The Licence does not specify how to assess results from the mixing zone sites against the reference sites¹ in relation to select physicochemical parameters. In response, the following trigger value definitions have been developed to assess mixing zone conditions. These values (or assessment criteria) are based on the reference values and are summarised in **Table 3-2**.

Table 3-2: Internal assessment criteria for physiochemical parameters

Parameter	Trigger Value (TV) – Relative to Upstream Reference Location
pH	If median of mixing zone (MZ) value is greater or less than + / - 0.5 units of the reference value
Temperature	If median of MZ value is greater or less than + / - 1 °C of the reference value
Electrical Conductivity (EC)	If median of MZ value is greater or less than + / - 5% of the reference value
Total Suspended Solids (TSS)	If median of MZ value is greater than the reference value
Total Dissolved Solids (TDS)	If median of MZ value is greater than the reference value
Dissolved Oxygen (DO)	If median of MZ value is less than - 5 % saturation of the reference value
Biochemical Oxygen Demand (BOD)	If median of MZ value is greater than the reference value

A summary of results from the quarterly Jetty Outfall Monitoring Reports (CDM Smith 2024a, b, c, and d) for 2024 are presented in **Table 3-3**. The full 2024 dataset of the mixing zone water quality results is provided in **Attachment A** – Irrigation, Jetty Outfall and Sediment Pond data. Values exceeding current Licence trigger values are bolded and/or shaded.

The key findings from a review of the jetty outfall mixing zone water quality monitoring results include:

- The median concentration in the mixing zone for Dissolved Oxygen exceeded the trigger value detailed in Appendix B, Table 2 of the Licence, however the concentrations were consistent with that of the reference sites. All other parameters were below the trigger values.
- The median pH value for the boundary of the mixing zone did not exceed the Licence trigger value however did exceed the internal assessment criteria (refer to **Table 3-2**).

¹ Reference sites are located on Northern and Southern ends of the jetty and provide a measurement to account for environmental factors outside of DLNG. Location of reference sites in Figure 3-5.

Table 3-3: Summary of 2024 jetty outfall mixing zone monitoring results

Parameter	Units	EPL 217-03 Jetty Outfall Mixing Zone Trigger Values	Q1 2024		Q2 2024		Q3 2024		Q4 2024	
			North Reference (NORTHERN)	Median of	North Reference (NORTHERN)	Median of	North Reference (NORTHERN)	Median of	North Reference (NORTHERN)	Median of
				Sites 1-3		Sites 1-3		Sites 1-3		Sites 1-3
pH	pH units	7 – 8.5	7.85 (7.35-8.35) ¹	7.96	6.96 (6.46-7.46) ¹	<u>7.8</u>	6.80 (6.30-7.30) ¹	<u>7.55</u>	6.80 (6.30-7.30) ¹	<u>7.32</u>
Temperature ²	°C	NA	30.5 (29.5-31.5)	30.9	27.28 (26.38 – 28.28)	27.2	26.4 (25.40- 27.40)	25.80	31.80 (30.80- 32.80)	31.40
Electrical Conductivity	µs/cm	NA	51 300 (48 735- 53 865)	51 389	38 450 (36 528-40 373)	47 660	71 620 (68 039 – 75 201)	72 470	56 040 (53 238-58 842)	57 360
Total Suspended Solids (TSS)	mg/L	≤10	<5.0	<5	<5 (>5)	<5	<5	<5	<5	<5
Turbidity	NTU	20	2.21	2.09	2.70 (>2.70)	2.60	>2.5	2.10	1.70 (>1.70)	2.20
Total Dissolved Solids (TDS)	mg/L	N/A	NR	NR	NR	NR	NR	NR	NR	NR
Dissolved Oxygen (DO) ²	%	80-100	59.0 (>56.1)	78.4	104.3 (>99.1)	104.2	104.2 (>98.99)	104.5	106.5 (>101.2)	107.1
Biological Oxygen Demand (BOD)	mg/L	N/A	N/A	N/A	<2 (>2)	<2	N/A	N/A	<2 (>2)	<2
Total Nitrogen	mg/L	<0.27	0.127	0.125	0.082	0.096	0.140	0.094	0.079	0.073
Total Phosphorus (P)	mg/L	<0.02	N/A	N/A	<0.005	<0.005	N/A	N/A	<0.005	<0.005
Ammonia	mg/L	<0.02	0.005	<0.005	<0.005	<0.005	<0.010	<0.010	<0.010	<0.010
Nitrate (NO ₃)	mg/L	0.7	0.010	0.010	0.009	0.010	<0.002	0.002	<0.002	<0.002
Nitrite (NO ₂)	mg/L	N/A	0.002	<0.002	0.004	0.004	<0.002	<0.002	<0.002	<0.002
Dissolved reactive phosphorus (PO ₄ -P)	mg/L	0.005	N/A	N/A	0.002	0.002	N/A	N/A	<0.001	<0.001
Total Kjeldahl Nitrogen	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chlorophyll a	mg/L	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001
Escherichia coli (E. coli)	MPN /100mL	<200	N/A	N/A	<10	<10	N/A	N/A	<10	<10
Enterococci	MPN /100mL	50	N/A	N/A	<10	<10	N/A	N/A	<10	<10
Arsenic ²	µg/L	N/A	N/A	N/A	1.3	1.4	N/A	N/A	1.4	1.5
Cadmium ³	µg/L	5.5	<0.0002	<0.0002	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chromium ³	µg/L	4.4	N/A	N/A	<0.5	<0.5	N/A	N/A	<0.5	<0.5
Copper ³	µg/L	1.3	<0.001	<0.001	<1	<1	<1	<1	<1	<1
Iron ³	µg/L	N/A	N/A	N/A	<5	<5	NA	N/A	<5	<5
Lead ³	µg/L	4.4	N/A	N/A	<0.2	<0.2	N/A	N/A	<0.2	<0.2
Manganese ³	µg/L	N/A	N/A	N/A	<0.5	<0.5	N/A	N/A	1.1	1.1
Mercury ³	µg/L	0.4	N/A	N/A	<0.1	<0.1	N/A	N/A	<0.1	<0.1
Nickel ³	µg/L	70	<0.0005	<0.0005	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Silver ³	µg/L	1.4	N/A	N/A	<0.1	<0.1	N/A	N/A	<0.1	<0.1
Zinc ³	µg/L	15	<0.005	<0.005	<5	<5	7	<5	<5	<5
BTEX	µg/L	700	N/A	N/A	<1	<1	N/A	N/A	<1	<1
Total Recoverable Hydrocarbons (TRH)	mg/L	LOR (<0.1)	N/A	N/A	<0.1	<0.1	N/A	N/A	<0.1	<0.1

Notes:
NA indicates no Trigger Values available.
LOR indicates trigger value or detection below limit of reporting.

Yellow shading denotes values that exceed / are outside of the EPL 217-03 Jetty Outfall Mixing Zone Trigger Value.
Underline denotes a median value that exceeds the internal Assessment Criteria for Physio-chemical Parameters.

Red denotes medians that exceed the EPL 217-03 Jetty Outfall Mixing Zone Trigger Value and Reference Site value.
Bold denotes values that exceed Reference Site Value

¹ Criteria based on internal assessment criteria for physio-chemical parameters
² Represents dissolved fraction.

3.1.4. Monitoring Results – Sediment Ponds

3.1.4.1. Sediment Ponds discharge water quality monitoring results

A summary of the sediment water quality results for 2024 for Sediment Ponds 1, 2 and 3 is provided herein. The summary addresses trend analysis for relevant parameters over the period 2017 to 2024, and the comparison of results against Licence trigger values. The results are presented in **Table 3-4**, **Table 3-5**, and **Table 3-6**.

Discharges from sediment ponds vary with rainfall, except for Sediment Pond 1 which also receives greensands filter backwash discharge from the Demineralisation Plant year-round. The following is a summary of the sediment pond discharge and sampling undertaken in 2024:

- Sediment Pond no. 1 (SP1): Discharges only occurred from January to May, monthly samples were collected in this period and in November and December. No samples were collected from July to October when there was no discharge from SP1.
- Sediment Pond no. 2 (SP2): Discharges occurred in February, monthly samples were collected in this period and in November and December. No samples were collected in January or from March to October when there was no discharge from SP2.
- Sediment Pond no. 3 (SP3): Discharges occurred between January and April, with monthly samples collected in this period and in November and December. No samples were collected from May to October when there was no discharge from SP3.

The 2017 to 2024 dataset of both compliance and voluntary sediment pond water quality monitoring results is provided in **Attachment A** – Irrigation, Jetty Outfall and Sediment Pond data. Values exceeding current Licence trigger values are bolded.

Key findings from a review of the water quality results for the discharge from the sediment ponds include:

- Field parameter measurements were generally consistent with the 2017-2024 averages.
- Analytical results for discharge samples were below the Licence trigger values except for:
 - Total Nitrogen in a sample from SP1 (10 January 2024)
 - Dissolved reactive phosphorus in a sample from SP1 (11 November 2024)
 - Turbidity recorded in a sample from SP2 (14 February 2024)
 - Enterococci recorded in samples from SP2 (14 February 2024 and 11 November 2024)
 - Ammonium Nitrogen recorded in a sample from SP3 (10 January 2024).

Table 3-4: Summary of 2024 Sediment Pond 1 water quality monitoring results

Parameter	Units	Monitoring Frequency	Licence Trigger Value ^[1]	2024 Maximum	2024 Minimum	2024 Average	Long-term Average (2017-2024)	2024 Reportable Non-Conformance ^[1]
Field Parameters								
pH	pH units	Monthly	6 - 8.5	7.43	6.66	6.95	6.92	No
Electrical conductivity	µs/cm	Monthly	No trigger	244.70	82.10	135.5	132.67	N/A
TSS	mg/L	Monthly	≤ 75	6.00	0.00	0.75	0.73	No
Turbidity	NTU	Monthly	28.0	12.40	1.22	5.24	2.45	No
DO	mg/L	Monthly	No trigger	6.76	2.32	4.23	5.40	N/A
Temperature	°C	Monthly	No trigger	31.60	23.40	28.58	28.85	N/A
Environmental Indicators								
Ammonia (NH ₃ -N)	µg/L	Annual	94.0	12.00	5.00	8.67	21.82	No
Nitrate (NO ₃ -N)	µg/L	Annual	145	64.00	2.00	33.00	47.19	No
Nitrite (NO ₂ -N)	µg/L	Annual	17	8.00	8.00	8.00	3.00	No
DRP (PO ₄ -P)	µg/L	Annual	5	6.00	4.00	5.00	4.15	No
Total Nitrogen	mg/L	Annual	≤ 40.	56.00	0.23	19.07	1.55	No
Total Phosphorous	µg/L	Annual	≤ 10.	10.00	0.05	6.68	0.53	No
BOD	µg/L	Monthly	≤ 25	7.00	1.10	3.30	2.10	No
TRH	µg/L	Annual	< 6.0	N/A ^[2]	N/A ^[2]	N/A ^[2]	N/A ^[2]	No
<i>E. coli</i>	MPN/100 mL	Biannual	≤ 305	63.00	10.00	36.50	75.00	No
<i>Enterococci</i>	MPN/100 mL	Biannual	261	169.00	148.00	158.50	76.14	No
Metals & BTEX								
Arsenic	µg/L	Annual	No trigger	N/A ^[2]	N/A ^[2]	N/A ^[2]	0.17	N/A
Cadmium	µg/L	Monthly	5.5	0.10	0.10	0.10	0.14	No
Chromium	µg/L	Annual	4.4	N/A ^[2]	N/A ^[2]	N/A ^[2]	N/A ^[2]	No
Copper	µg/L	Monthly	2.0	N/A ^[2]	N/A ^[2]	N/A ^[2]	N/A ^[2]	No
Iron	µg/L	Annual	No trigger	640.00	220.00	430.00	197.76	N/A
Lead	µg/L	Annual	4.4	N/A ^[2]	N/A ^[2]	N/A ^[2]	N/A ^[2]	No
Manganese	µg/L	Annual	No trigger	570.00	210.00	390.00	329.43	N/A
Mercury	µg/L	Monthly	0.4	N/A ^[2]	N/A ^[2]	N/A ^[2]	N/A ^[2]	No
Nickel	µg/L	Annual	70	1.00	1.00	1.00	2.20	No
Silver	µg/L	Annual	1.4	N/A ^[2]	N/A ^[2]	N/A ^[2]	N/A ^[2]	No
Zinc	µg/L	Monthly	1,000.	92.00	15.00	45.13	110.34	No
BTEX	µg/L	Monthly	700	N/A ^[2]	N/A ^[2]	N/A ^[2]	N/A ^[2]	No

Note:

- 1. Results from mandatory sampling are only considered when determining reportable non-conformances under the Licence.
- 2. No samples above LOR in the period.

*Yellow shading denotes exceedances of the Licence trigger values.

Table 3-5: Summary of 2024 Sediment Pond 2 water quality monitoring results⁸

Parameter	Units	Monitoring Frequency	Licence Trigger Value ^[1]	2024 Maximum	2024 Minimum	2024 Average	Long-term Average (2017-2024)	2024 Reportable Non-Conformance ^[1]
Field Parameters								
pH	pH units	Monthly	6-8.5	7.50	6.94	7.22	6.67	No
Electrical conductivity	µs/cm	Monthly	No trigger	650.70	41.30	319.50	208.04	N/A
TSS	mg/L	Monthly	≤ 75.0	10.00	0.00	5.00	10.05	No
Turbidity	NTU	Monthly	28.0	38.10	3.93	15.99	20.15	No
DO	mg/L	Monthly	No trigger	6.63	5.00	6.04	5.48	N/A
Temperature	°C	Monthly	No trigger	26.30	25.50	25.93	29.61	N/A
Environmental Indicators								
Ammonia (NH ₃ -N)	µg/L	Annual	94.0	3.00	3.00	3.00	58.05	No
Nitrate (NO ₃ -N)	µg/L	Annual	145	67.00	1.00	34.00	146.50	No
Nitrite (NO ₂ -N)	µg/L	Annual	17	6.00	3.00	4.50	6.00	No
DRP (PO ₄ -P)	µg/L	Annual	5	2.00	2.00	2.00	4.15	No
Total Nitrogen	mg/L	Annual	≤ 40	0.32	0.13	0.23	0.60	No
Total Phosphorous	µg/L	Annual	≤ 10	0.03	0.03	0.03	0.02	No
BOD	µg/L	Monthly	≤ 25	1.00	1.00	1.00	1.91	No
TRH	µg/L	Annual	< 6.0	N/A ^[2]	N/A ^[2]	N/A ^[2]	0.65	No
<i>E. coli</i>	MPN/100 mL	Biannual	≤ 305	144.00	63.00	103.50	167.16	No
<i>Enterococci</i>	MPN/100 mL	Biannual	261	3448.00	408.00	1928.00	366.86	Yes
Metals & BTEX								
Arsenic	µg/L	Annual	No trigger	1.0	1.0	1.0	1.0	N/A
Cadmium	µg/L	Monthly	5.5	N/A ^[2]	N/A ^[2]	N/A ^[2]	0.25	No
Chromium	µg/L	Annual	4.4	N/A ^[2]	N/A ^[2]	N/A ^[2]	N/A ^[2]	No
Copper	µg/L	Monthly	2.0	1.00	1.00	1.00	1.88	No
Iron	µg/L	Annual	No trigger	76.00	32.00	54.00	136.20	N/A
Lead	µg/L	Annual	4.4	N/A ^[2]	N/A ^[2]	N/A ^[2]	N/A ^[2]	No
Manganese	µg/L	Annual	No trigger	230.00	63.00	146.50	622.93	N/A
Mercury	µg/L	Monthly	0.4	N/A ^[2]	N/A ^[2]	N/A ^[2]	N/A ^[2]	No
Nickel	µg/L	Annual	70	N/A ^[2]	N/A ^[2]	N/A ^[2]	4.33	No
Silver	µg/L	Annual	1.4	N/A ^[2]	N/A ^[2]	N/A ^[2]	N/A ^[2]	No
Zinc	µg/L	Monthly	1,000	52.00	52.00	52.00	94.33	No
BTEX	µg/L	Monthly	700	N/A ^[2]	N/A ^[2]	N/A ^[2]	N/A ^[2]	No

Note:

1. Results from mandatory sampling are only considered when determining reportable non-conformances under the Licence.
2. No samples above LOR in the period.

*Yellow shading denotes exceedances of the Licence trigger values.

Table 3-6: Summary of 2024 Sediment Pond 3 water quality monitoring results

Parameter	Units	Monitoring Frequency	Licence Trigger Value	2024 Maximum	2024 Minimum	2024 Average	Long-term Average (2017-2024)	2024 Reportable Non-Conformance ^[1]
Field Parameters								
pH	pH units	Monthly	6-8.5	8.45	6.94	7.65	7.11	No
Electrical conductivity	µs/cm	Monthly	No trigger	322.30	109.80	162.20	145.83	N/A
TSS	mg/L	Monthly	≤ 75	5.00	0.00	1.20	1.63	No
Turbidity	NTU	Monthly	28.0	16.00	1.56	7.94	6.51	No
DO	mg/L	Monthly	No trigger	8.56	3.61	6.32	6.09	N/A
Temperature	°C	Monthly	No trigger	30.70	24.90	28.25	29.89	N/A
Environmental Indicators								
Ammonia (NH ₃ -N)	µg/L	Annual	94	265.00	8.00	94.00	31.96	No
Nitrate (NO ₃ -N)	µg/L	Annual	145	19.00	4.00	11.50	63.00	No
Nitrite (NO ₂ -N)	µg/L	Annual	17	5.00	2.00	3.50	4.31	No
DRP (PO ₄ -P)	µg/L	Annual	5	3.00	2.00	2.50	6.89	No
Total Nitrogen	mg/L	Annual	≤ 40	0.81	0.17	0.46	0.33	No
Total Phosphorous	µg/L	Annual	≤ 10	0.08	0.01	0.05	0.02	No
BOD	µg/L	Monthly	≤ 25	4.00	2.00	3.00	1.92	No
TRH	µg/L	Annual	< 6.0	N/A ^[2]	N/A ^[2]	N/A ^[2]	N/A ^[2]	No
<i>E. coli</i>	MPN/100 mL	Biannual	≤ 305	86.00	63.00	74.50	1262.62	No
<i>Enterococci</i>	MPN/100 mL	Biannual	261	171.00	10.00	90.50	138.63	No
Metals & BTEX								
Arsenic	µg/L	Annual	No trigger	1.00	1.00	1.00	1.00	N/A
Cadmium	µg/L	Monthly	5.5	N/A ^[2]	N/A ^[2]	N/A ^[2]	0.40	No
Chromium	µg/L	Annual	4.4	N/A ^[2]	N/A ^[2]	N/A ^[2]	11.00	No
Copper	µg/L	Monthly	2.0	2.00	1.00	1.50	2.54	No
Iron	µg/L	Annual	No trigger	1000	480.00	740.00	286.17	N/A
Lead	µg/L	Annual	4.4	N/A ^[2]	N/A ^[2]	N/A ^[2]	N/A ^[2]	No
Manganese	µg/L	Annual	No trigger	4.00	1.00	2.50	66.79	N/A
Mercury	µg/L	Monthly	0.4	N/A ^[2]	N/A ^[2]	N/A ^[2]	N/A ^[2]	No
Nickel	µg/L	Annual	70.	N/A ^[2]	N/A ^[2]	N/A ^[2]	8.0	No
Silver	µg/L	Annual	1.4	N/A ^[2]	N/A ^[2]	N/A ^[2]	N/A ^[2]	No
Zinc	µg/L	Monthly	1,000.	18.00	7.00	11.00	79.58	No
BTEX	µg/L	Monthly	700	N/A ^[2]	N/A ^[2]	N/A ^[2]	N/A ^[2]	No

Note:

1. Results from mandatory sampling are only considered when determining reportable non-conformances under the Licence.
 2. No samples above LOR in the period.
- *Yellow shading denotes exceedances of the Licence trigger values.

3.1.5. Data Management and Quality Control

As outlined in **Section 3.1.2**, all samples and field measurements are collected by DLNG laboratory staff or environmental consultants, who are trained and experienced with the sampling methodologies used. All samples are collected by DLNG laboratory staff in accordance with Santos document, *Laboratory Sampling – Monitoring of Wastewater [1U00-200-PRO-0596]*. All samples are analysed by laboratories accredited by the NATA for the analyses performed.

Field parameters (pH, DO, EC, TSS, turbidity and temperature) are recorded in-situ (i.e. directly from the discharge) using calibrated water quality meters, or using DLNG laboratory equipment.

All field measurements and analytical results are reviewed prior to being recorded in a Santos database. Where anomalous results are identified, the results are investigated further and additional sampling undertaken if required.

3.1.6. Discussion and Interpretation of Results

3.1.6.1. Jetty outfall discharge and mixing zone

The monitoring program for the jetty discharge recorded trigger level exceedances for DRP for both sampling events and zinc on one sampling event during 2024. Monitoring at the mixing zone demonstrated compliance with the respective trigger values for DRP and zinc. These results were also consistent with monitoring at the reference site. Subsequently these exceedances were not considered a non-compliance with EPL 217-03, Condition 78. The elevated DRP and zinc were likely associated with the reduced flows and from the jetty outfall.

Dissolved Oxygen in the mixing zone exceeded the trigger level range for three monitoring events in 2024, however as the reference sites also all exceeded the trigger value range to the same extent as the mixing zone sites, it is considered to be compliant, on the basis that the results are consistent for both the mixing zone and the reference sites. The median dissolved oxygen value is also considered compliant in accordance with the internal assessment criteria for each monitoring event.

In summary, the results of the jetty outfall mixing zone sampling program were compliant with Licence Condition 78. In addition, the dilutions generally met the reference site, Licence trigger values and DHWQO trigger values, therefore the risk of environmental impact from the jetty outfall discharge is low.

3.1.6.2. Sediment Ponds

Overall, in 2024 the sediment pond monitoring results were consistent with data obtained during previous monitoring events in past years.

There were exceedances of Licence triggers value for DRP, total nitrogen and total phosphorus in Sediment Pond 1, *Enterococci* and turbidity in Sediment Pond 2 and ammonium nitrogen in Sediment Pond 3. These results are likely to be associated with the breakdown of vegetative matter in the stormwater drainage network at DLNG, which flows into the sediment ponds.

An investigation into the *Enterococci* exceedance recorded at Sediment Pond 2 did not reveal any anthropogenic sources (e.g. sewage spills), however higher turbidity recorded in the sediment ponds may indicate that sediments may have been a source of *Enterococci* in Sediment Pond 2. In addition, wildlife frequents the sediment ponds to source freshwater and in doing so contributes faecal matter which is a known source of *Enterococci* / *E.coli* leading to trigger value exceedances of the Licence, as well as contributing to the nutrient loads.

The exceedances are typically of short duration (i.e. for one monitoring event), coinciding with the onset of the wet season and rainfall events, which is typical for tropical environments and is considered natural. The discharge water quality from the sediment ponds is of low environmental risk.

3.2. Mangrove Monitoring

There is mangrove habitat surrounding DLNG, which is monitored to determine if there is any environmental impact from the operation of DLNG. Condition 64 of the Licence requires Santos to implement and maintain a mangrove monitoring program. The requirements for this program are outlined in Appendix D of the Licence, and are summarised below:

- Mangrove health monitoring (including groundwater monitoring) – regular ongoing monitoring of indices related to mangrove health, such as:
 - Canopy density.
 - Tree density.
 - Species composition.
 - Defoliation index.
 - Relative ground levels – sediment accumulation or erosion; and
 - Groundwater condition.
- Chemical monitoring – analysis of sediments and biota in mangrove habitats for hydrocarbon and heavy metal contamination, including:
 - Sediment particle size; and
 - Concentrations of metals and hydrocarbons in sediments and biota (mudwhelks).

The mangrove monitoring program is required to be undertaken annually.

CDM Smith, with the support of EcoScience, were commissioned by Santos to collect, review, and interpret mangrove related data in accordance with the mangrove monitoring plan. The results of this analysis were provided in an annual mangrove monitoring report (CDM Smith, 2024f and 2024g) and are summarised in this section.

3.2.1. Monitoring Objectives

The objective of the mangrove monitoring program is to identify and quantify potential impacts from the operation of DLNG on the environment surrounding the facility. The monitoring program provides information on the health of this ecosystem. The information collected by the mangrove monitoring and chemical surveillance program is considered in conjunction with results from other monitoring programs implemented by Santos.

The mangrove monitoring and chemical surveillance program is also intended to maintain compliance with Condition 64 and Appendix D of the Licence.

3.2.2. Monitoring Methods

The annual mangrove monitoring was undertaken at DLNG during August 2024. The methods used to undertake the monitoring are summarised in **Table 3-7** and are in accordance with the Mangrove Surveillance and Chemical Monitoring Program outlined in Appendix D of the Licence. The sampling locations are shown in **Figure 3-7** and **Figure 3-8**.

Table 3-7: Summary of 2024 mangrove monitoring and chemical surveillance methods

Element	Indicator	Method	Information Provided
Mangrove Monitoring			
Mangrove Health	Canopy cover	Densiometer readings of foliage or canopy cover	Quantitative estimates of mangrove canopy density used to determine changes in canopy cover over time
	Photo-monitoring	Comparison of photo-monitoring from current year with baseline imagery and previous years	Standardised set of photos used for comparison of forest health over time

Element	Indicator	Method	Information Provided
	Tree condition	Defoliation index (score of health on scale of 0-5)	Visual assessment using standardised method of tree health used for comparison of forest health over time
	Tree density and species composition	Percentage species composition Tree density per hectare	Mangrove species richness, diversity and density measures used for comparison over time
	Resilience	Abundance of seedlings (<1 m) and saplings (<2 m) is ranked from 0 to 5	Assessment of the presence and abundance of mangrove seedlings and saplings as an indicator of forest health and potential for rapid regeneration
Groundwater monitoring	Water table depth Total dissolved solids (TDS) pH	Water quality monitoring probes in monitoring bores	Data on groundwater quality (water table depth, TDS and pH) for comparison of water quality to previous monitoring data and water quality standards
Sediment / erosion monitoring	Sediment levels	Measurements of sediment height taken from fixed reference post	Sediment height in relation to reference post for comparison over time
Chemical Monitoring			
Sediment characterisation	Particle size distribution (PDS)	Wet sieving Laser diffraction	Sediment particle size distribution for comparison over time
	Metal and hydrocarbon concentrations in sediments	Sediment samples for laboratory analysis	Concentrations of metals and hydrocarbons in sediments for comparison to previous monitoring data and sediment quality standards
Bioaccumulation	Metal and hydrocarbon concentrations in mudwhelks	Tissue samples for laboratory analysis	Concentrations of metals and hydrocarbons in mudwhelk tissue for comparison to previous monitoring data

The following changes have been made to the monitoring methods:

- During the August 2015 survey, two new sites (SS15A and SS16A) were established as replacement sites for SS15 and SS16 whose value had become limited due to location of plots within the flare dyke footprint during the construction phase. The new sites were selected to provide monitoring coverage in this area and were also located adjacent the outlet of discharge from Sedimentation Pond 1 (**Figure 3-7**).
- During monitoring surveys conducted between 2003 to 2017 canopy cover was measured using a standard densiometer. In 2017 and 2018 the Stickler's modified 17-point densiometer was trialled alongside the standard densiometer method. The 17-point densiometer has been widely adopted as the standard instrument in mangrove monitoring in Darwin Harbour since 2011. After reviewing the trial data and other benefits, this was adopted as the sole method for measuring canopy at DLNG since the 2019 mangrove surveillance monitoring campaign.
- Historically all photo monitoring has been undertaken using the corner post to centre method. Since the 2018 survey a second set of photographs has been taken using the centre to corner post method. This additional set of high-quality images improves the ability to detect short-term and localised changes in mangroves, eliminating the redundancy of older, occasionally mis-matched photos and allows detailed visual monitoring of post-cyclone recovery and future changes in mangrove forest health.
- Three new chemical monitoring sites were installed during in 2020 and have been retained in the 2024 program to help assess potential contamination downstream of Sediment Ponds 2 and 3 (SP2A – sediment only, SP3 – sediment only and SP3-A – sediment and biota). Biota is not typically present at SP2A and SP3.
- In 2021 two new photo monitoring sites were installed downstream from the sediment ponds (SP1-C and SP3-B).

- A remote sensing trial (using drone or UAV technology) was conducted during the 2023 field survey and repeated in the current 2024 survey. The Remotely Piloted Aircraft System (RPAS) trial was designed to obtain data on mangrove health and cover as well as the current distribution and extent, for comparison with ground-based measurements. The 2023 and 2024 trials have demonstrated that RPAS data is analogous with ground based estimates and measurements of key indices of mangrove health and could therefore replace these during future surveys.

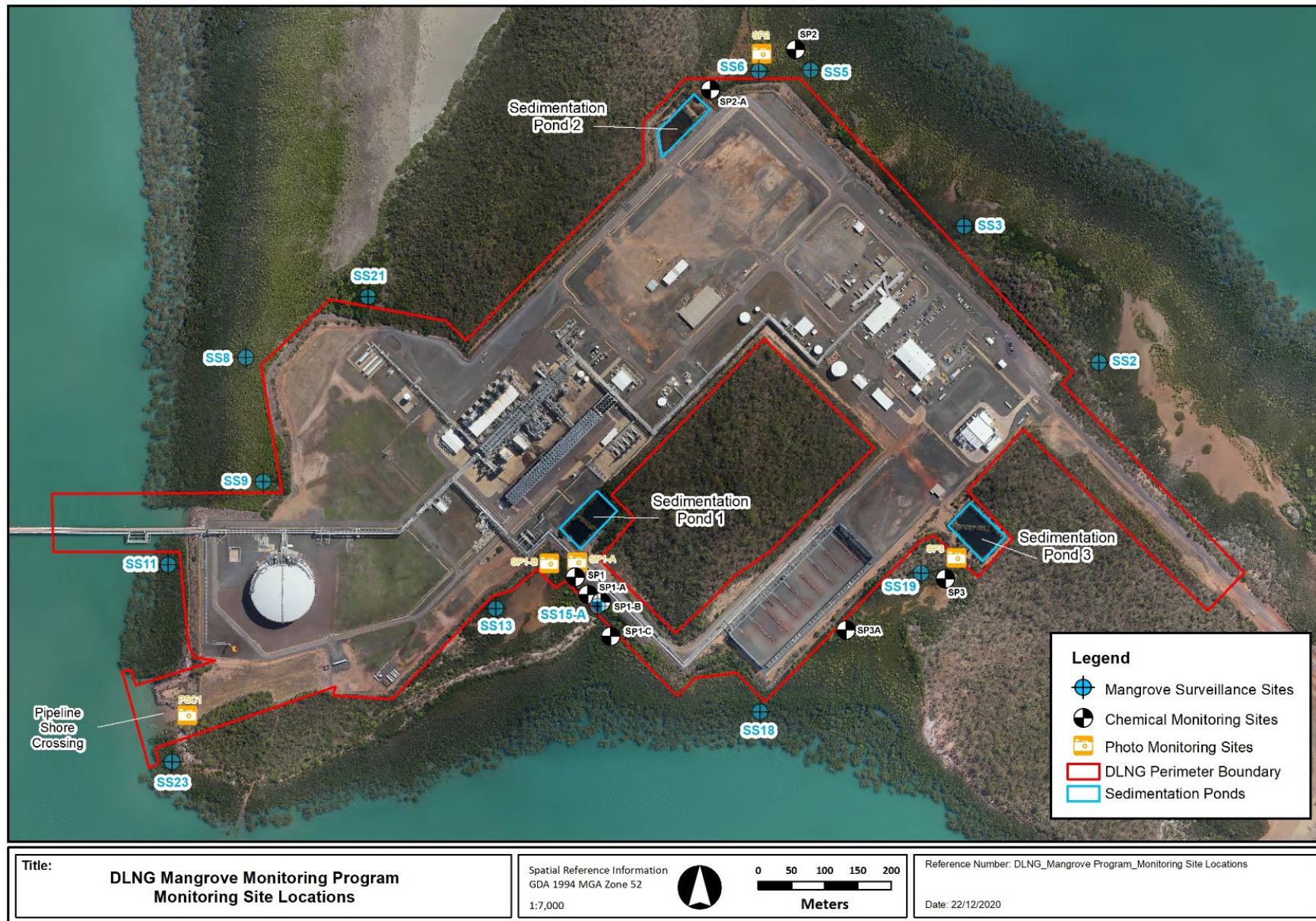


Figure 3-7: Location of sampling sites for the mangrove monitoring program

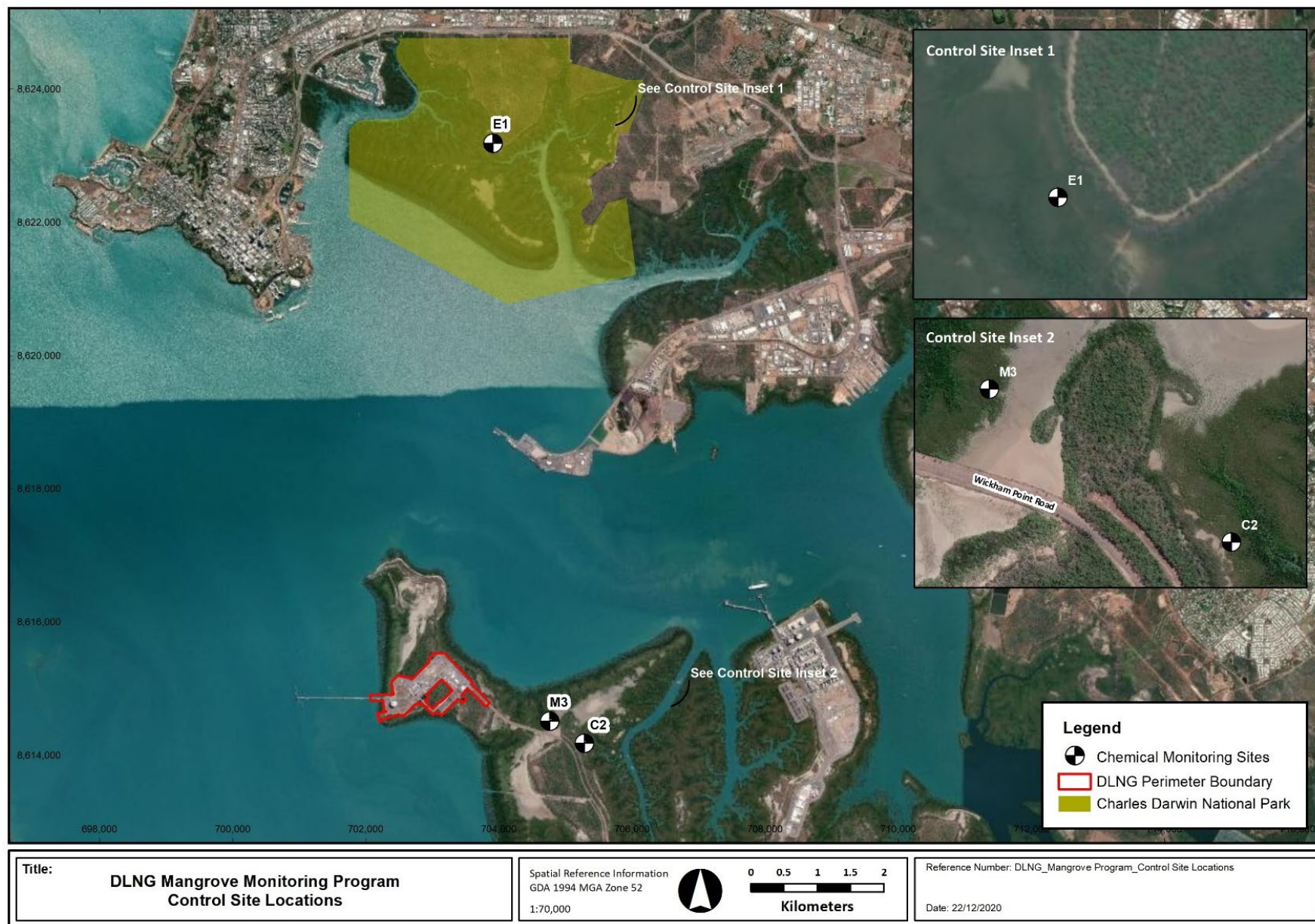


Figure 3-8: Location of control sites for the mangrove monitoring program

Mangrove monitoring sites around DLNG represent several mangrove assemblages, which are distinguished by the degree of tidal inundation experienced as illustrated in the conceptual model (Metcalf, 2007) (**Figure 3-9**). DLNG monitoring sites are in the hinterland margin, tidal flat and tidal creek assemblages. Most sampling locations (11 of 23) are located in the most landward assemblage (hinterland margin), which typically abuts DLNG boundary. The hinterland margin assemblage is dominated by mid-high *Ceriops australis* and *Lumnitzera racemosa* and in some areas this assemblage may be only 10 m in width. Three of the 23 surveillance sites occur within *Ceriops* forests of the tidal flat assemblage, which occurs slightly lower in the intertidal zone and are dominated by low *Ceriops australis*. Nine sites occur within forests dominated by *Rhizophora stylosa* (the tidal creek or *Rhizophora* zone) which typically occur further to seaward but are also associated with minor tidal channels draining the tidal flat.

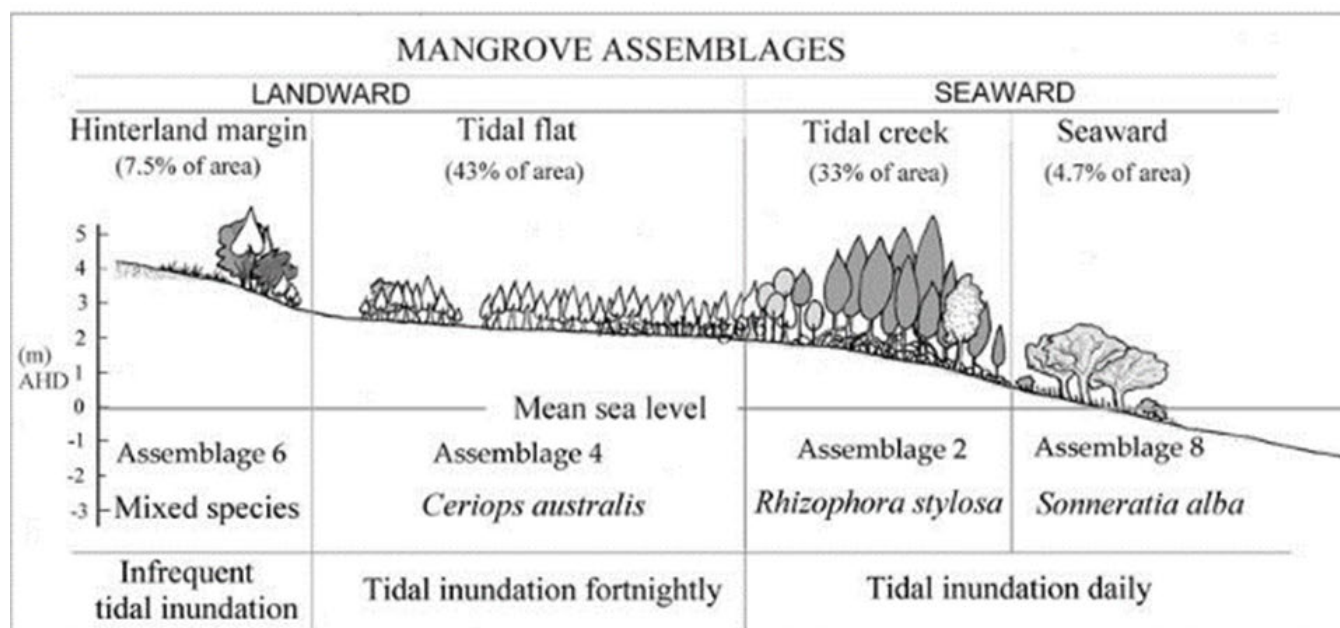


Figure 3-9: Conceptual model of the four main mangrove assemblages found within Darwin Harbour

3.2.3. Monitoring Results – Mangrove Surveillance

A summary of the mangrove monitoring results is provided in the following sections with a dataset (2003-2024) provided in **Attachment B – Mangrove Data**.

3.2.3.1. Canopy Density

Canopy cover, which is determined by leaf growth and senescence, is sensitive to a wide range of environmental factors. Hence the density of the tree canopy is a useful gauge of forest condition and is typically a key indicator of mangrove health. During monitoring surveys conducted between 2003 and 2017 the canopy cover was measured using a standard densiometer. In 2017 and 2018, the Stickler's modified 17-point densiometer was trialled and is now the preferred and sole method since 2019.

From the 2021 monitoring event onwards, long-term changes in canopy cover (%) now incorporate the initial 2003-2004 baseline survey as well as the subsequent 2015 and 2017 baseline surveys. In contrast, all previous reports only examined long-term change between the initial 2003-2004 baseline survey and the most recent monitoring programme, omitting the additional sites SS15A & SS16A established in 2015, and site SS06 which has only recently been included in canopy cover monitoring in 2017.

Changes in canopy cover data for each monitoring site is presented in **Table 3-8**. Key findings include:

- Canopy cover data recorded during the 2024 season was similar to previous monitoring surveys, revealing no trigger exceedances were recorded when analysing annual (2023-2024) change. Although no trigger level exceedances were documented in 2024, notable changes (both increases and decreases) in canopy cover since baseline have been observed at several sites.
- During the 2024 survey, eight sites displayed declines in canopy cover since baseline. Most of these losses in canopy cover have been minimal (< -7%) and are likely associated with seasonal fluctuations in canopy fullness, natural canopy thinning due to forest maturation and inherent operator error associated with the

densiometer method. Long term patterns in canopy measurements show declines at most sites are small, non-significant and stable. Notable declines in canopy cover (> -15% but less than -20% exceedance level) have been recorded at two monitoring sites SS03 and SS23.

- Declines in canopy cover at SS03 are believed to be in response to storm damage or a lightning strike between 2011 and 2012 and is unrelated to impacts from DLNG operations. Although current photo monitoring suggests that forest recovery is occurring at SS03, regenerating mangrove vegetation is likely to have little to no effect on canopy cover readings for many years.
- Declines in canopy cover at SS23 have been evident since 2018. This was because of strong damaging winds from cyclone Marcus in March 2018. The localised decline in canopy cover at SS23 is therefore not associated with anthropogenic impacts from DLNG.
- Increases in canopy cover since baseline were recorded during the 2024 survey at ten sites.
- Notable increases in canopy cover occurred at site SS05 (25% change since baseline) which may have been encouraged by increased freshwater inflows associated with the DLNG footprint and indirect runoff from Sedimentation Pond 2. These results may also be slightly exaggerated by apparent increases in low forests (2–4m in height) by use of the tripod-mounted 17-point densiometer which captures a greater portion of low-growing tree canopies. Increases in percentage change in canopy cover since baseline are regarded as positive changes and not of concern in terms of anthropogenic impacts to mangroves.

Table 3-8: Differences in mean canopy cover (%) from baseline (2003)

Change from Baseline (%)											
Assemblage	Site	Standard Densiometer			17-point Densiometer						
		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Hinterland Margin	SS01	-1	1	1	6.3	6.5	4	6	2	0	-5
	SS02	-2	4	3	9.1	8.2	7.9	7	7	7	5
	SS03	-18	-18	-16	-14.0	-16.2	-12.5	-11	-11	-17	-15
	SS04	-2	-1	-1	2.1	2.5	2.9	3	2	1	0
	SS07	-2	-5	-7	5.9	-1.6	5	2	1	-3	-6
	SS09	-1	2	5	11.7	11.1	12.1	13	14	11	11
	SS13	1	2	3	7.2	6.3	8.2	9	7	6	7
	SS14	-4	-1	0	10.4	-0.1	0.5	2	-1	-2	-7
	SS19	0	0	-1	28.3	18.5	17.8	11	4	2	0
	SS20	2	-7	-16	15.4	3.3	5.9	2	-3	-5	-7
	SS21	1	0	0	1.2	3.1	2.3	4	-2	0	1
Rhizophora forest	SS10	-3	-5	-5	-8.4	-6.8	-4.2	-2	-1	-4	-3
	SS11	-6	-5	-8	-6.3	-6.5	-4.1	-3	-7	-9	-6
	SS12	-2	-6	-3	1.0	2.1	2.9	4	2	0	2
	SS15A ^[2]	N/A	2	-3	13	9	9	7	5	7	2
	SS16A ^[2]	N/A	4	10	13	10	16	15	15	15	15
	SS17	-3	-2	-4	2.2	0.6	1.1	2	1	1	1
	SS18	-6	-4	-10	2.2	-3.6	-1.1	0	-3	-4	-4
	SS22	-3	-3	-6	1.1	0.0	1.8	6	1	2	3
	SS23	-1	-5	-5	-9.7	-14.2	-13.8	-14	-14	-19	-20

Change from Baseline (%)											
Assemblage	Site	Standard Densiometer			17-point Densiometer						
		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Ceriops forest / tidal flat	SS05	8	8	14	40.6	35.7	37.2	33	33	28	25
	SS06 ^[2,3]	N/A	N/A	N/A	2	-8	4	1	-1	-2	-4
	SS08	12	11	5	32.8	28.2	22.1	19	19	14	10

[1] N/A indicates data unavailable for previous years

[2] Surveillance sites SS15A & SS16A and SS06 which were established in 2015 and 2017 respectively: Mean change (%) calculated from the four subplots at each site.

[3] Change from Baseline data for SS06 is now derived from the 2017 Baseline survey 17-point densiometer data. NB: all previous reports displaying change were derived from the Standard densiometer method.

3.2.3.2. Photographic Monitoring

Photo-monitoring images are used as a reference and to monitor mangrove health by detection of any changes in forest structure, regeneration, species composition and physiognomy over time. Digital photographs were taken from the four corner posts of each of the 23 monitoring plots directed toward the centre of each plot, as well as from the centre outwards towards the four corner posts.

Key findings from the photographic monitoring results include:

- Photo-monitoring supplemented results for defoliation index and percentage canopy change, showing the following:
 - Little or no short-term change was observed in images from hinterland margin sites (e.g., SS13, SS14 and SS20) except for some active regrowth of seedlings within canopy gaps (SS03) and increased sapling and tree density were evident at SS09.
 - Some distinct, largely positive, changes were detected by detailed examination of imagery from several tidal flat sites dominated by *Ceriops australis* and *Avicennia marina*. A marked increase in height and forest density was apparent at SS05 which appear to reflect long-term environmental change, potentially associated with sea level rise and/ or freshwater inflow.
 - Minor structural post-cyclone changes (e.g., disintegration of logs and attrition of dead trees) were evident in shoreline *Rhizophora* forests (e.g., SS10, SS23).
 - Photo-monitoring during 2024 was effective in allowing detailed monitoring of current conditions and recovery since cyclone Marcus in 2018. Photo-monitoring results demonstrate that the healthy status of mangroves remain unchanged at the 23 monitoring sites surrounding DLNG.

3.2.3.3. Defoliation Index

To supplement canopy cover data and to provide a rapid assessment of forest health within each surveillance site, the health of the canopy, as indicated by the degree and extent of leaf loss (or defoliation) is estimated. To estimate defoliation index, the observer stands within the centre of each of the four 5 m x 5 m quadrants of the monitoring plot to assess tree health within the subplot. A ranked estimate of the cover of foliage (i.e., above and surrounding that central point), is derived from the mean of four visual assessments per plot.

Mean defoliation index data, averaged from four ranked estimates obtained from each site for the period 2016 and 2024 is presented in **Table 3-9**. Key findings include:

- Overall, defoliation index or tree condition recorded at each surveillance site during the 2024 survey showed no changes from the previous survey. Steady, unchanging index measures confirm that the mangrove forests surrounding DLNG remain in a stable and healthy condition.

Table 3-9: Annual mean defoliation index

Assemblage	Site	2016	2017	2018	2019	2020	2021	2022	2023	2024	Difference between 2023-2024
Hinterland margin	SS01	4.0	4.0	4.25	4.25	4.3	4.0	4.0	4.0	4.0	0.0
	SS02	4.0	4.0	4.75	4.25	4.3	4.3	4.3	4.3	4.3	0.0
	SS03	3.5	3.5	2.0	2.5	2.5	2.5	2.5	2.5	2.5	0.0
	SS04	4.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0	0.0
	SS07	4.0	4.0	3.5	4.0	3.5	3.5	3.5	3.5	3.5	0.0
	SS09	4.0	4.0	4.25	4.25	4.3	4.0	4.0	4.0	4.0	0.0
	SS13	4.0	4.0	4.75	5.0	4.8	5.0	5.0	5.0	5.0	0.0
	SS14	4.0	4.0	4.25	4.0	4.0	3.8	3.8	3.8	3.8	0.0
	SS19	4.0	4.0	2.75	3.0	3.0	2.8	2.8	2.8	2.8	0.0
	SS20	4.0	4.0	3.0	3.0	3.0	2.8	2.8	2.8	2.8	0.0
	SS21	4.0	4.0	3.25	4.0	4.0	4.8	4.8	4.5	4.5	0.3
Rhizophora forest	SS10	4.0	4.0	4.25	4.5	4.3	4.3	4.3	4.3	4.3	0.0
	SS11	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	0.0
	SS12	4.0	4.0	4.75	4.75	4.8	4.8	4.8	4.8	4.8	0.0
	SS15A	4.0	4.0	3.75	4.0	4.0	3.8	3.8	3.8	3.8	0.0
	SS16A	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	0.0
	SS17	4.0	4.0	4.25	4.25	4.3	4.3	4.3	4.3	4.3	0.0
	SS18	4.0	4.0	4.0	4.0	4.3	4.3	4.3	4.3	4.3	0.0
	SS22	4.0	4.0	4.5	4.25	4.0	4.0	4.0	4.0	4.0	0.0
	SS23	4.0	4.0	3.25	3.5	3.3	3.3	3.3	3.3	3.3	0.0
Ceriops forest / tidal flat	SS05	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	0.0
	SS06	N/A	N/A	4.0	4.0	4.3	4.3	4.3	4.3	4.3	0.0
	SS08	4.0	4.0	4.25	4.0	4.0	4.0	4.0	4.0	4.0	0.0

Defoliation Index: 0 = Nil canopy; complete defoliation, 1 = <25% canopy, 2 = 25-50% canopy, 3 = 50-75% canopy, 4 = >75% canopy, 5 = complete full canopy.

3.2.3.4. Species Composition and Tree Density

The species composition and density of mangrove forests within each of the 23 surveillance monitoring sites was documented during program establishment in 2003 (URS, 2004). This data was recorded to provide a baseline for comparison of future change in mangrove health, forest structure and composition. Mangrove trees were defined in accordance with Brocklehurst and Edmeades (1996) as plants exceeding a height of 2 m and a diameter of 2 cm or more. Monitoring of tree density and species composition was conducted on a once-only data collection basis which may be repeated should any major change in forest health be detected, or at conclusion of the monitoring program.

3.2.3.5. Relative Ground Levels

Increased sedimentation rates have the potential to stress mangrove trees by burying or uncovering root systems. To understand sedimentation trends the relative mean sediment heights were surveyed from the top of each corner post at the surveillance sites. Net difference was then calculated to compare the sedimentation rate trend since baseline to each annual monitoring event. The last nine years (2016 to 2024) net difference since baseline results are presented in **Table 3-11** together with the change recorded between 2023 and 2024. For sites SS04, SS07, SS22 and SS23, where new posts were installed in 2018 post cyclone Marcus, a new baseline was set by establishing the difference between the 2017 height data and the newly established height in 2018 and subtracting this from the height data measured in 2024.

A positive result, indicating a higher ground level, suggests a potential sediment deposition whilst a negative net difference indicates lower ground level and potentially sediment erosion. **Figure 3-10** represents graphically the net difference since baseline to 2024 at all sites.

Key findings include:

- There was no evidence that substantial sedimentation or erosion has occurred that potentially impacts mangrove health. This is evidenced by:
 - Changes in sediment heights were consistent with previous years data and most changes were below the trigger value for accretion of 5-10 cm sediment deposition over a 6-12 month period. No sites recorded a net difference greater than +/-1.3 cm (note site SS20 in the Hinterland margin recorded -1.3 cm difference) over the 2023 to 2024 monitoring period (**Table 3-10**).
 - Since baseline monitoring in 2003 there has been a small increase in sediment height (0.3 cm – 12.1 cm) at a majority of the sites, indicating small sediment accretion rates over the monitoring period. Greater increases in sediment height (15.5 cm – 29.5 cm) since baseline have been recorded at sites SS8 to SS12 (located in the southwest section of Wickham Point, near the LNG jetty).
- The data recorded in 2024 remains consistent with previous monitoring events, and no indication of mangrove health deterioration can be noted.

Table 3-10: Net difference in mean relative sediment height (cm) from baseline (2003)

Assemblages	Site	2016	2017	2018	2019	2020	2021	2022	2023	2024	Difference between 2023-2024
Hinterland margin	SS01	1.8	2.3	2.9	2.4	2.5	2.2	2.9	3.2	2.9	-0.3
	SS02	1.2	2.0	2.3	1.5	1.5	4.3	2.9	3.0	2.5	-0.5
	SS03	1.7	1.9	1.1	2.1	2.2	1.4	1.7	1.7	2.1	0.3
	SS04 ^[1]	0.3	0.3	0.1	1.4	1.6	1.1	-10.4	-9.4	-9.7	-0.3
	SS07 ^[1]	-2.5	-3.0	-2.8	-2.8	-2.8	0.0	1.0	-7.5	-7.5	0.0
	SS09	12.7	12.9	16.8	15.8	15.9	16.0	17.8	19.0	19.4	0.3
	SS13	3.8	4.8	5.3	5.5	5.6	5.8	5.3	5.3	5.4	0.0
	SS14	2.7	2.7	2.5	1.8	2.2	3.4	4.7	4.7	4.3	-0.4
	SS19	-0.2	0.6	0.2	0.1	0.1	0.5	0.5	0.6	0.3	-0.3
	SS20	1.8	2.3	1.8	2.5	2.6	2.4	2.1	2.6	1.3	-1.3
	SS21	8.4	7.9	6.2	6.5	6.9	7.1	7.9	7.2	6.2	-1.0
Rhizopora forest	SS10	11.5	13.6	21.0	24.9	27.5	27.8	41.4	29.3	29.5	0.2
	SS11	10.8	11	8.3	10.5	11.3	16.4	17.0	18.4	18.3	-0.1
	SS12	10.6	12.6	13.8	13.9	14.6	15.4	15.8	16.5	17.0	0.5
	SS15A ^[2]	N/A	1.3	2.3	-4.1	-4.3	5.6	4.7	4.3	4.3	-0.1
	SS16A ^[2]	N/A	0	1.0	0.4	0.3	3.2	2.5	2.3	2.8	0.4
	SS17	3.2	3.2	4.2	4.2	4.4	5.0	4.7	4.8	5.7	0.9
	SS18	7.1	7.1	9.5	9.1	8.9	9.9	20.3	11.3	12.1	0.9
	SS22 ^[1]	0.3	-0.3	0.5	0.5	0.5	1.6	0.8	1.0	0.9	-0.1
	SS23 ^[1]	1.0	-0.5	1.3	-2.1	-1.0	-0.1	-0.3	-0.7	-1.7	-1.0
Ceriops forest / tidal flat	SS05	2.8	2.6	2.1	3.1	4.1	3.6	3.7	7.5	6.4	-1.1
	SS06	1.4	1.2	0.8	1.3	0.9	1.7	2.1	2.3	2.3	0.0
	SS08	8.9	10.1	11.1	11.4	11.6	13.3	13.9	15.2	15.5	0.3

Notes:

1 New corner posts were installed in 2018 after damages from cyclone Marcus. A new baseline was establish resulting in significant different data from the previous years.

2 Sites 15A and 16A were established in 2015

3 N/A indicates data unavailable

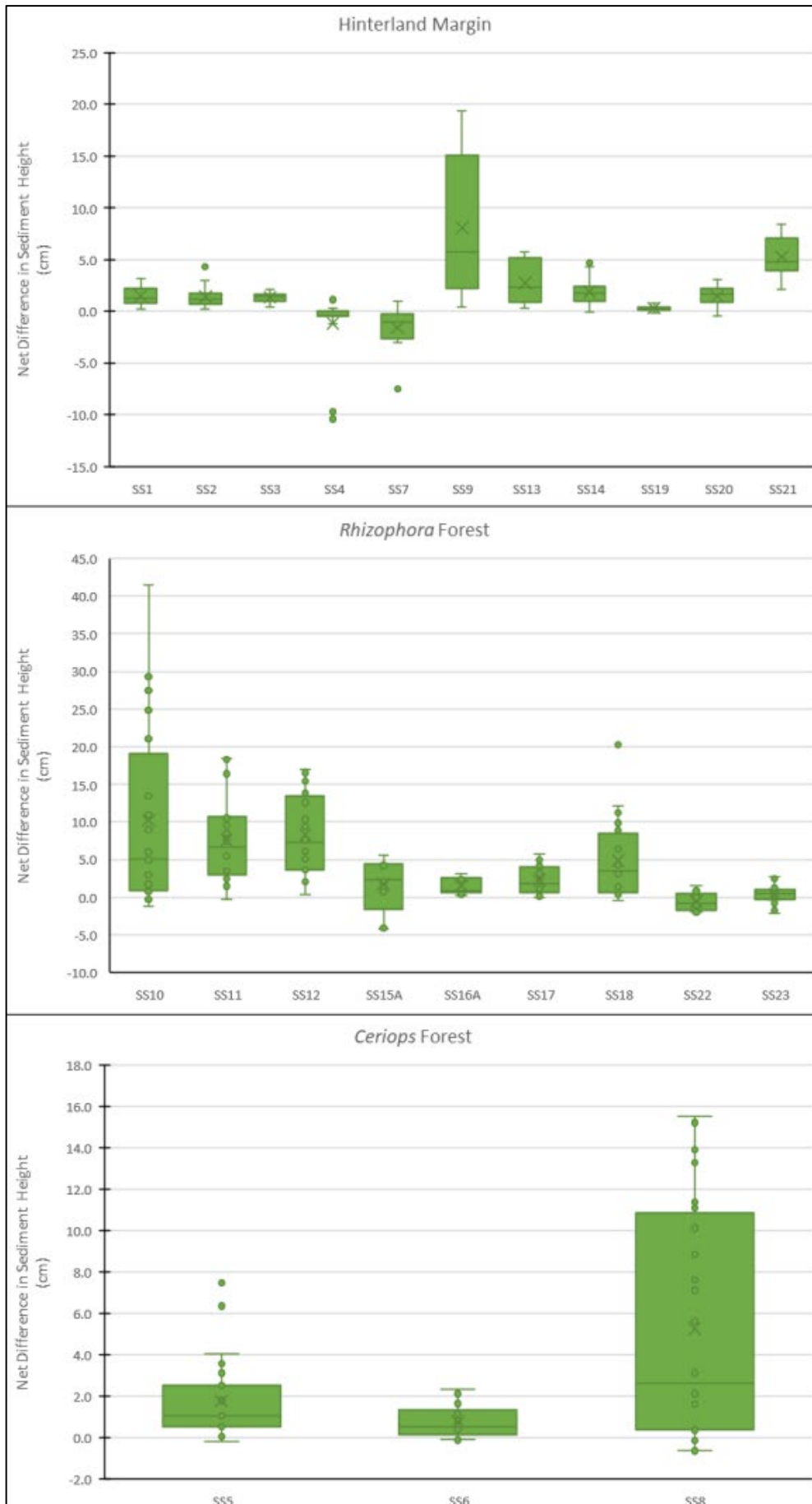


Figure 3-10: Change in sediment height distribution since baseline (2003 to 2024)

3.2.3.6. Groundwater Conditions

Groundwater monitoring was undertaken at sites potentially exposed to modification by freshwater input from the DLNG site, thus representing a potential impact to the mangrove health. A total of 15 shallow (<2 m) groundwater monitoring bores were installed in the “hinterland fringe” mangrove zone and are monitored for depth (below ground level) to the water table, salinity (TDS) and pH.

Groundwater monitoring results from hinterland monitoring sites from 2016 to 2024 are presented in **Table 3-11**. Boxplots of salinity results from baseline to 2024 are presented in **Figure 3-11**. Key findings include:

- Between 2003 and 2006, groundwater monitoring conditions were analysed quarterly. During the wet seasons, salinity concentrations were lower, and water levels were closer to the ground surface by comparison with the dry season when salinity levels increase, and water was lower in the bores. This data demonstrates the seasonal variability of rainfall patterns between annual wet and dry seasons.
- Since the end of the construction phase in 2006, mangrove monitoring events have been undertaken only during the dry season and mostly coincided with neap tides. In 2024 the mangrove monitoring survey was undertaken during spring tides which likely inundated majority of the 12 groundwater sampling sites. All groundwater sites were sampled, excluding SS1, SS2 and SS5 due to being dry.
- The 2024 salinity results remain consistent for some sites, however some sites (SS7, SS13, SS14 and SS21) recorded higher levels of salinity, likely due to seawater inundating the monitoring bores.
- Comparison of salinity for the 12 sites over the last nine years indicates there was minimal change.

Table 3-11: Groundwater salinity (TDS ‰) at hinterland mangrove monitoring sites

Site No.	2016	2017	2018	2019	2020	2021	2022	2023	2024	Salinity Range and Mean (PSU) ^[2]
SS1	N/A	NC	NC	NC	NC	NC	NC	NC	NC	49 (6 – 78)
SS2	NC	70	73	NC	65	NC	NC	51	NC	65 (51 – 73)
SS3	NC	69	67	68	66	64	51	50	47	64 (47 – 72)
SS4	NC	66	NC	NC	63	62	62	NC	NC	67 (61 – 73)
SS5	60	59	58	55	60	52	58	59	NC	60 (48 – 66)
SS6	70	61	NC	NC	62	56	52	NC	NC	63(52 – 76)
SS7	NC	48	NC	NC	45	42	39	32	53	47 (32 – 70)
SS9	67	70	72	70	60	68	33	49	NC	65 (33 – 73)
SS13	NC	NC	24	NC	52	50	NC	NC	66	52 (24 – 66)
SS14	68	67	69	66	37	58	NC	50	70	63 (37 – 71)
SS19	65	22	NC	NC	54	50	63	NC*	63	56 (2 – 68)
SS20	NC	NC	NC	NC	26	NC	65	NC	NC	59 (26 – 70)
SS21	NC	40	41	NC	41	22	NC	35	60	40 (19 – 67)

Note: 1. "NC" indicates that sample/data was not collected due to lack of water in the bore

2. Salinity range and mean data 2003 to 2023.

3. salinity data was not collected due to technical issues with the water quality meter.

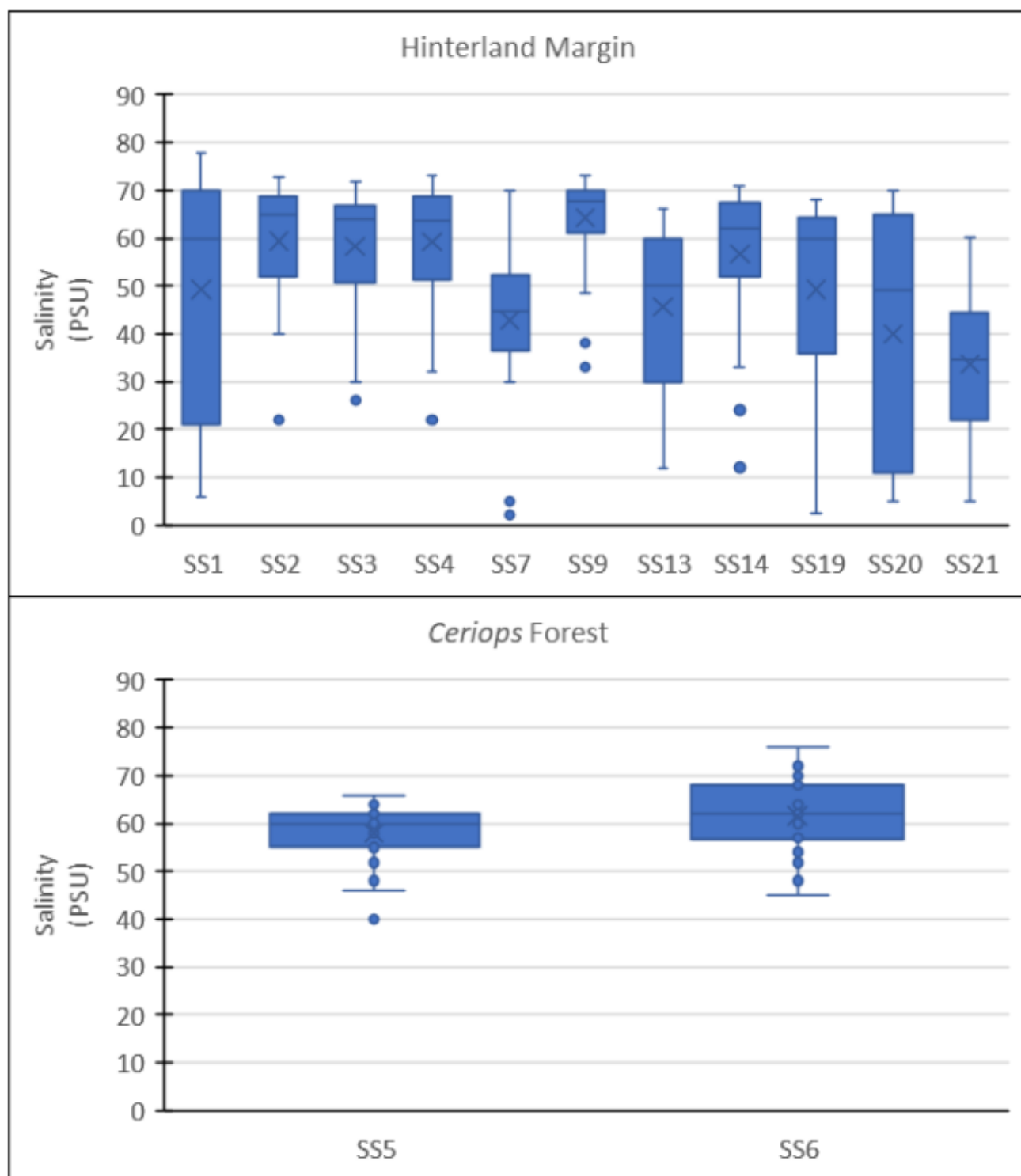


Figure 3-11: Boxplots of groundwater salinity for all monitoring periods (2003 to 2024)

3.2.4. Monitoring Results – Mangrove Sediments

Mangrove ecosystems are known to act as physical and biogeochemical barriers to pollutant transport. Sediments in mangrove ecosystems are also reservoirs of heavy metals and hydrocarbons due to their physical and chemical properties. Mangrove sediments are anaerobic and reduced, as well as rich in sulphide and organic matter, properties which have strong influences on metal mobilisation and bioavailability (Silva et al. 1990; Clark et al. 1998).

Sediment sampling was undertaken at 14 sites (refer to **Figure 3-8** and **Figure 3-9**). Sediment samples were analysed for particle size, acid soluble metals (cadmium, chromium, copper, iron, manganese, nickel, lead and zinc) and hydrocarbon concentration.

Metal concentrations in sediment samples were compared against the Australian and New Zealand Guidelines (ANZG) sediment guideline values (ANZG, 2018). ANZG (2018) provide two sediment quality guideline values, the 'DGV' (Default Guideline Value) and 'GV-high' values. The DGVs indicate the concentrations below which there is a low risk of unacceptable effects occurring, and should be used, with other lines of evidence, to protect aquatic ecosystems. In contrast, the 'upper' guideline values (GV-high) provide an indication of concentrations at which you might expect to observe toxicity-related adverse effects. As such, the GV-high value should only be used as an indicator of potential high-level toxicity problems, not as a guideline value to ensure protection of ecosystems. The ANZG (2018) guidelines therefore provide values which can be used to assess whether contaminant concentrations at the sites are likely to have adverse impacts on the biotic communities at those sites.

The 2024 results were compared with historical data and relevant criteria. Key findings are summarised in **Sections 3.2.4.1, 3.2.4.2 and 3.2.4.3** below.

3.2.4.1. Sediment Particle Size

During the 2024 monitoring event, roughly half the monitoring sites recorded a majority of fine material (silt and clay) whilst the other half recorded more coarse material (gravel and sand). There was no clear distinction in sediment grain size between the impact and reference monitoring sites.

3.2.4.2. Metals in Sediments

In 2024, concentrations for all metals were below the respective DGV's or GV-high trigger values, except for zinc at SP1. This is consistent with historical results where zinc has exceeded the guidelines at some of the sites downstream of Sedimentation Pond 1. An association with zinc, manganese and iron in sediments is still evident with the outfall from three sedimentation ponds, however the results show a decreasing trend in concentration as distance from the pond outfalls increases.

Concentrations of zinc derived from the acid soluble metals analysis exceeded the ANZG (2018) GV-high value (410 mg/kg) at site SP1 (530 mg/kg) (**Table 3-12**). Previous annual monitoring has recorded elevated levels of total zinc downstream from Sediment Pond 1 (sites SP1, SP1-A and SP1-B) since 2006, except for the years 2013, 2014, 2015 and 2017. Sediment analysis has moved from total metal analysis to acid soluble metals analysis only in 2020 as this represents the biologically available fraction (zinc still exceeded guideline values in 2020, 2021, 2023 and 2024, **Table 3-12**).

Figure 3-12 shows the zinc concentrations at sites located downstream to Sediment Pond 1. These sites include SP1 (23 m), SP1-A (60 m), SP1-B (80 m) and SP1-C (120 m) and the results show the decreasing trend in concentration as distance from the pond outfall increases indicating that some form of anthropogenic influence in the area immediately downstream of Sediment Pond 1. The scale of this influence appears to have been localised and confined to areas within the DLNG Approved Disturbance Boundary. This influence appears to be variable with historical data showing higher zinc concentration at SP1 or SP1-A. However, historical zinc concentration data for Sediment Pond 1 water includes the dissolved fraction only and is insufficient to assess discharge loads from this point source. Dissolved zinc discharge concentrations between 2020 and 2024 range from <5 µg/L to 420 µg/L.

The ANZG state that the GV-high value should only be used as an indicator of potential high-level toxicity problems, not as a guideline value to ensure protection of ecosystems. They recommend using multiple lines of evidence as part of the weight-of-evidence process to better assess the risk to a sediment ecosystem if a DGV is exceeded or even where toxicant concentrations in the sediment are trending towards the DGV. Assessments of toxicity may also be refined by assessing the organic carbon content. Using this assessment process, the occurrence of the zinc concentration exceedances is considered low risk based on the following conclusions:

- No consistent increasing trends.
- The extent of elevated concentrations appears small and localised (within the DLNG disturbance boundary).
- The environmental exposure is limited; and
- The broader mangrove metrics demonstrate system health.

It should be noted that monitoring is ongoing, and that further assessment may be warranted in the future.

Table 3-12: Zinc concentrations in mangrove sediments (mg/kg dry weight)

Location	Site	2018	2019	2020	2021	2022	2023	2024
ANZG (2018) DGV (Default Guideline Value)		200						
ANZG (2018) GV-high		410						
Wickham Pt	LG1	2	27	27	12	9.7	6.2	20
	LG2	3	18	30	17	11	5.0	22
	LG3	1	13	11	11	8.1	3.5	10
	SP1	170	33	520	210	150	710	530
	SP1-A	170	48	340	98	57	24	92
	SP1-B	73	64	13	51	18	34	65
	SP1-C	3	27	9	16	14	11	22
	SP2	9	30	64	37	17	42	24
	SP2-A	ND	ND	100	140	79	7.1	78
	SP3	ND	ND	46	70	44	34	82
	SP3-A	ND	ND	13	9	6.2	2.6	27
Control Site	M3	11	24	35	18	11	6.9	29
	E1	15	15	4	6	10	3.5	24
	C2	4.6	6	6	5	3.6	<1	3.7

Note: ND means no data collected.

Bold data means it has met or exceeded the DGV

Bold and red data means it has met or exceeded the GV-high

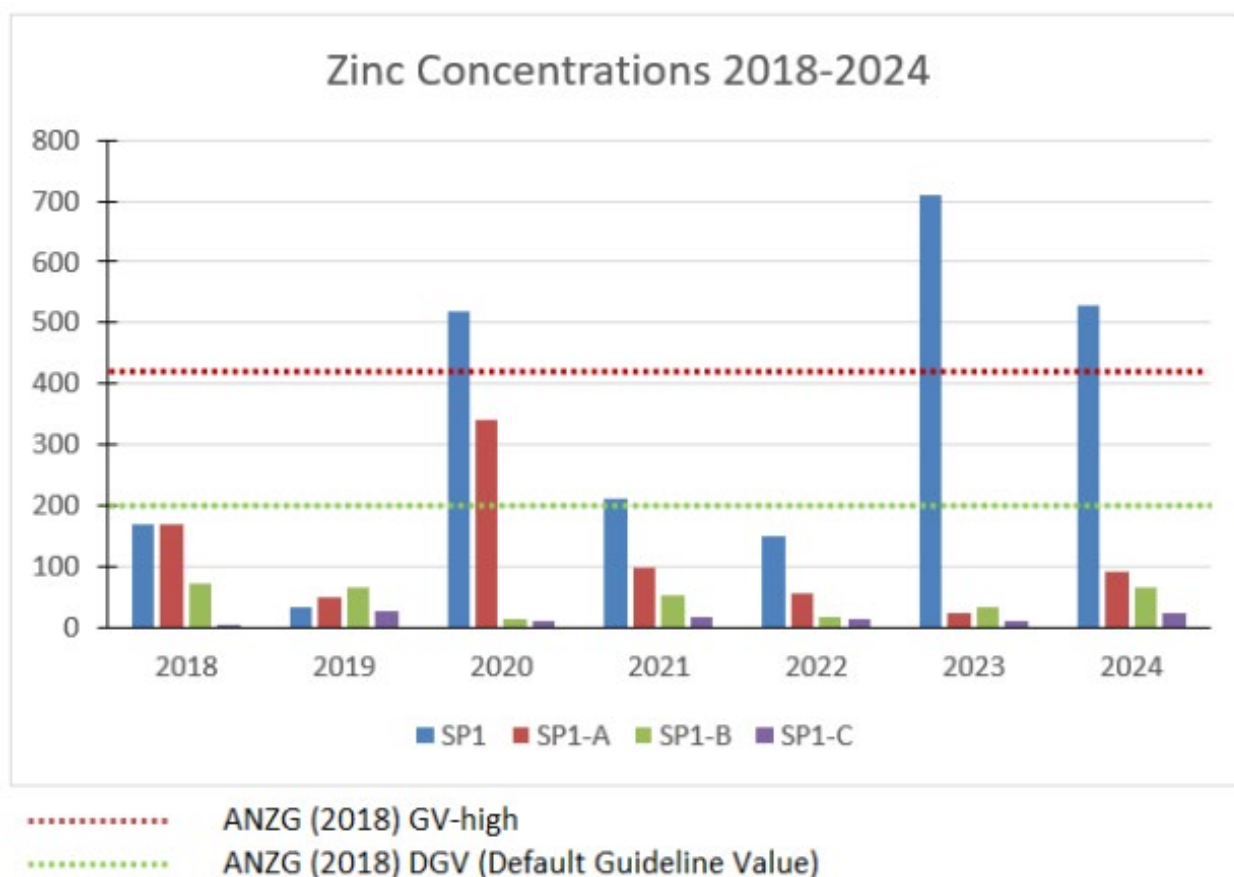


Figure 3-12: Zinc concentrations at sites located downstream to Sediment Pond 1

3.2.4.3. Hydrocarbons in Sediments

Historically hydrocarbons in sediments have been detected. However, in more recent years (2012-2020) levels have been below laboratory limits of reporting. In 2021 and 2023 hydrocarbons were detected across all sites and in 2022 four sites detected Total Petroleum Hydrocarbon (TPH), however it was discovered that they were not associated with site activities and likely reflect the regional conditions. During the 2024 mangrove monitoring program all sediment samples reported TPH below the laboratory LOR (**Table 3-13**).

Table 3-13: Hydrocarbons concentrations in sediments at all sites

TPH in sediments (mg/kg)																				
LOR		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
DGV		N/G																		
GV-High		N/G																		
Location	Site	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Wickham Pt	LG1	<0.1	65	82	28	5.5	28	<0.1	<2	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	150	<0.2	49	<0.2
Wickham Pt	LG2	<0.1	25	52	22	<0.1	7.7	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	42	<0.2	59	<0.2
Wickham Pt	LG3	<0.1	41	73	7.4	26	28	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	170	<0.2	62	<0.2
Wickham Pt	SP1	ND	ND	53	1.2	<0.1	26	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	120	830	140	<0.2
Wickham Pt	SP1-A	ND	85	54	1.9	66	4.6	<0.1	<2	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	160	<0.2	43	<0.2
Wickham Pt	SP1-B	<0.1	31	45	23	4.6	72	<0.1	<2	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	160	<0.2	51	<0.2
Wickham Pt	SP1-C	ND	88	46	21	8.8	27	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	150	<0.2	46	<0.2
Wickham Pt	SP2	<0.1	63	48	8.1	<0.1	12	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	96	<0.2	45	<0.2
Wickham Pt	SP2-A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.2	58	2,000	40	<0.2
Wickham Pt	SP3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.2	110	250	36	<0.2
Wickham Pt	SP3-A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.2	100	<0.2	41	<0.2
Control Site	M3	<0.1	94	100	10	20	21	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	220	<0.2	67	<0.2
Control Site	E1	<0.1	54	43	<0.1	22	20	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	120	410	41	<0.2
Control Site	C2	ND	ND	ND	ND	ND	ND	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	150	<0.2	37	<0.2

N/G" indicates no guidelines; "ND" indicates no data

3.2.4.4. Bioaccumulation

Biota analysis allows an assessment of bioavailability of specific elements in sediments and water which may be influenced by site activities. Telescopium or mudwhelks are an appropriate organism to assess bioavailability of sediments and pore waters. This is because they are benthic feeders and have limited mobility between areas and hence are likely to ingest surface contaminants representative of an area.

Mudwhelks were collected from a total of twelve sites (refer to **Figure 3-8** and **Figure 3-9**) and tested for moisture, metals and hydrocarbons and compared against the Food Standards Australia New Zealand (FSANZ 2005) guidelines. The FSANZ (2005) criteria for molluscs provides maximum levels (MLs) for contaminants to not be exceeded in the specified food items. Generally Expected Levels (GELs) have been introduced to maintain the lowest achievable levels of contaminants in food. GELs were derived from analysis of uncontaminated samples of various foods, with the 90th percentile representing the value below which 90% of the values fell. It should be emphasised that the criteria levels relate to potential human health risk and do not imply that the health of the molluscs would be adversely affected at metal concentrations exceeding these levels.

Key findings include:

- Metal concentrations observed in the 2024 mudwhelk samples were below the recommended FSANZ ML and GEL for all metals except copper. A copper concentration of 33 mg/kg was recorded at site SP3-A, exceeding the GEL of 30mg/kg. These concentrations are consistent with historical data and within the range of previous studies undertaken in Darwin Harbour (Peerzad *et al.*, 1990). Concentrations of copper in the mudwhelk colonies occurring in mangroves adjacent to the Darwin LNG do not suggest exposure to copper contamination.
- Exceedances of the zinc DGV have only been recorded three times since 2006, twice at site SP1 in 2012 (318 mg/kg) and 2023 (252 mg/kg), and once at site SP1-B in 2018 (414 mg/kg). Darwin Harbour wide sampling for 16 locations in previous studies have recorded elevated sediment zinc concentration. This suggests that the elevated concentrations of zinc is not conclusive of any influence from site and no increasing trend over time has been observed.
- In 2024, elevated zinc levels within mudwhelks were recorded at LG1 and SP1-B. No mudwhelks were present at SP1 during the 2024 event, therefore, zinc levels in mudwhelks for this site are unable to be compared to previous years. There is no relationship between the elevated zinc concentrations in mudwhelks and sediment at LG1 and therefore no connection to site activities. Zinc levels at SP1-B are typically not elevated, however, one exceedance of the GEL 90th percentile for zinc (in oysters*) has occurred previously at this site during 2018 (**Table 3-14**).
- There was no evidence of any hydrocarbon contamination within the mudwhelks sampled. All mudwhelk samples reported TPH below the laboratory limit of reporting in 2024.

Table 3-14: Metal concentrations in biota (mg/kg wet weight) (2024)

Location		Site	Metal Concentrations (mg/kg wet weight)							
			Cd	Cr	Cu	Fe	Mn	Pb	Ni	Zn
FSANZ Maximum			2	N/G	N/G	N/G	N/G	2	N/G	N/G
GEL 90th Percentile			N/G	N/G	30	N/G	N/G	N/G	N/G	290*
Wickham Pt	LG1		0.32	0.41	18.40	202.40	483.00	<0.23	1.82	126.50
	LG2		0.38	0.60	23.76	223.20	360.00	<0.24	3.84	55.20
	LG3		0.18	2.13	28.60	1378.00	65.00	0.70	1.56	21.58
	SP1-A		0.11	0.42	14.28	109.20	102.90	<0.21	0.44	39.90
	SP1-B		0.32	0.56	19.80	1044.00	1422.00	<0.18	3.06	270.00
	SP1-C		0.11	0.42	15.12	109.20	50.40	<0.21	0.53	29.40
	SP2		0.10	0.84	19.44	117.60	72.00	<0.24	0.70	36.00
	SP3-A		0.26	0.75	33.00	215.60	68.20	<0.22	0.92	37.40
Control Site	M3		0.60	1.34	22.08	696.00	240.00	0.43	2.30	74.40
	E1		0.18	2.75	23.75	2150.00	70.00	1.08	1.90	19.00
	C2		0.10	0.81	20.54	364.00	36.40	<0.26	1.01	15.34

Note: Exceedances are highlighted in bold.

N/G indicated no guideline

* The DGV for Zinc relates to the consumption specifically of Oysters and not Mudwhelks and therefore should be interpreted with this in mind.

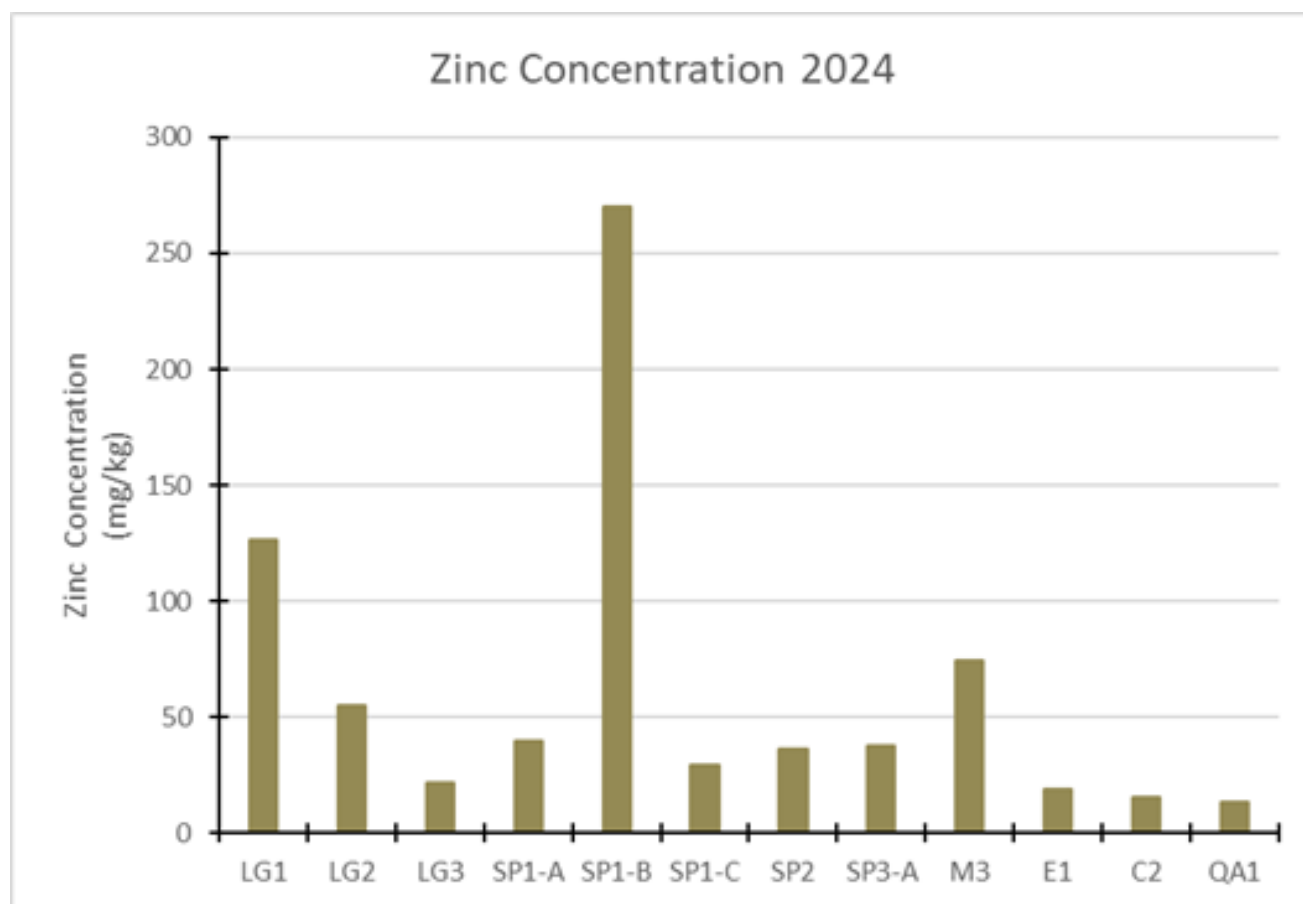


Figure 3-13: Zinc concentrations for biota at all sites

3.2.5. Data Management and Quality Control

The Quality Assurance and Quality Control results detailed in Darwin LNG Mangrove Monitoring 2024 Annual Report (CDM Smith, 2024e) indicate the results are acceptable for the purposes of the mangrove assessment.

A QA/QC program was implemented during the mangrove monitoring event, which included:

- Use of qualified staff for all sampling activities.
- Use of standardised sampling procedures including prescribed sample storage/transport and equipment decontamination.
- Use of NATA accredited laboratories to undertake the required analysis of samples.
- The collection and analysis of blind field duplicate samples.

Consultant CDM Smith assessed the data against the Data Quality Indicators and data acceptance criteria in order to assess whether the Data Quality Objectives were satisfied. A summary of the QA/QC results is as follows.

- One field duplicate for sediment and biota (QA1) was collected alongside the respective primary or 'parent' sample (LG3). RPD results for sediment were less than the acceptance criteria for all analytes. Sediments are known to be highly heterogenous and in consideration of the laboratory QA/QC results and weight of compliant results, the data is considered suitably reliable.
- Field duplicate samples of mudwhelk tissue were homogenised and separated into duplicates by the laboratory before analysis. Biota samples returned RPDs of greater than 50% for all analytes excluding cadmium, copper, zinc and TPH. The high RPDs were confirmed with the lab, however, due to nature of biota, results can vary a reasonable amount based on which parts of the animal are in the subsample that is taken.
- Laboratory QA/QC indicated no outliers occurred with the standard quality control processes including matrix spikes, duplicates or analysis of blanks. The useability of the dataset and laboratory's method precision and accuracy is considered unlikely to materially affect the outcomes of the assessment.

3.2.6. Discussion and Interpretation of Results

Canopy cover and defoliation index monitoring indicated that the mangroves surrounding DLNG remain in a healthy and stable condition with no significant deterioration in plant health detected. Where notable declines were observed these were due to natural events (past cyclones, lightning strikes and natural senescence) and not associated with DLNG activities.

Increases in cover were noted in the hinterland and tidal flats sites. This may be due to possible increased freshwater inflows or sea level rise. Long term results show no canopy declines greater than 20% since baseline. Forest resilience monitoring during the 2024 survey indicate that mangrove forests surrounding DLNG are in a healthy condition. Photo monitoring showed that the forest structure and composition has remained stable, with some active regrowth of seedlings within canopy gaps, some damage still evident from the 2018 cyclone and some minor structural changes in shoreline Rhizophora forests.

Changes in sediment heights were consistent with previous years monitoring at most sites and there was no evidence of substantial erosion or sedimentation that has the potential to affect mangrove health. Metal results in sediments indicate concentrations of zinc only exceeded the ANZG at site SP1. This is consistent with previous monitoring results. Detections of TPH were lower than the LOR in all sediment samples. TPH concentrations appear to be decreasing from levels recorded in 2021.

There was an exceedance in copper concentrations in mudwhelks at Wickham Point (SP3-A) in 2024. These concentrations are consistent with historical monitoring events and there was no evidence of any hydrocarbon contamination within mudwhelks sampled.

Overall, the results of mangrove monitoring indicate surface water discharged from DLNG has not had a significant impact on mangrove sediment and biota surrounding the facility since post-commissioning monitoring began in 2006. The discharge water quality from the sediment ponds is of low environmental risk.

4. Monitoring Discharges to Air

Conditions 45 to 53 of the Licence permits Santos to discharge emissions to air from the following sources:

- Stack emissions from the power generation turbines, compressor turbines, acid gas incinerator and process boiler (**Section 4.1**); and
- Hydrocarbon flaring and venting (**Section 4.2**).

Refer to **Figure 4-1**, which presents the locations within DLNG of point source emissions to air.

In addition, Condition 54 relates to ambient air quality and Conditions 67 to 69 of the Licence outline requirements to monitor air discharges.

The following section is also included in relation to monitoring discharges to air:

- Ambient air quality monitoring program (**Section 4.3**).

The objectives, methods, analysis, and discussion of results for each of these monitoring programs are provided in the sections below.

Following the cessation of production from the Bayu-Undan field in November 2023, DLNG has been in a shutdown phase with no Liquefied Natural Gas (LNG) production during 2024. Subsequently the power generation turbines, compressor turbines, AGI, acid gas vent and process boiler have not operated and therefore no stack emissions monitoring will be reported in this AEMR.

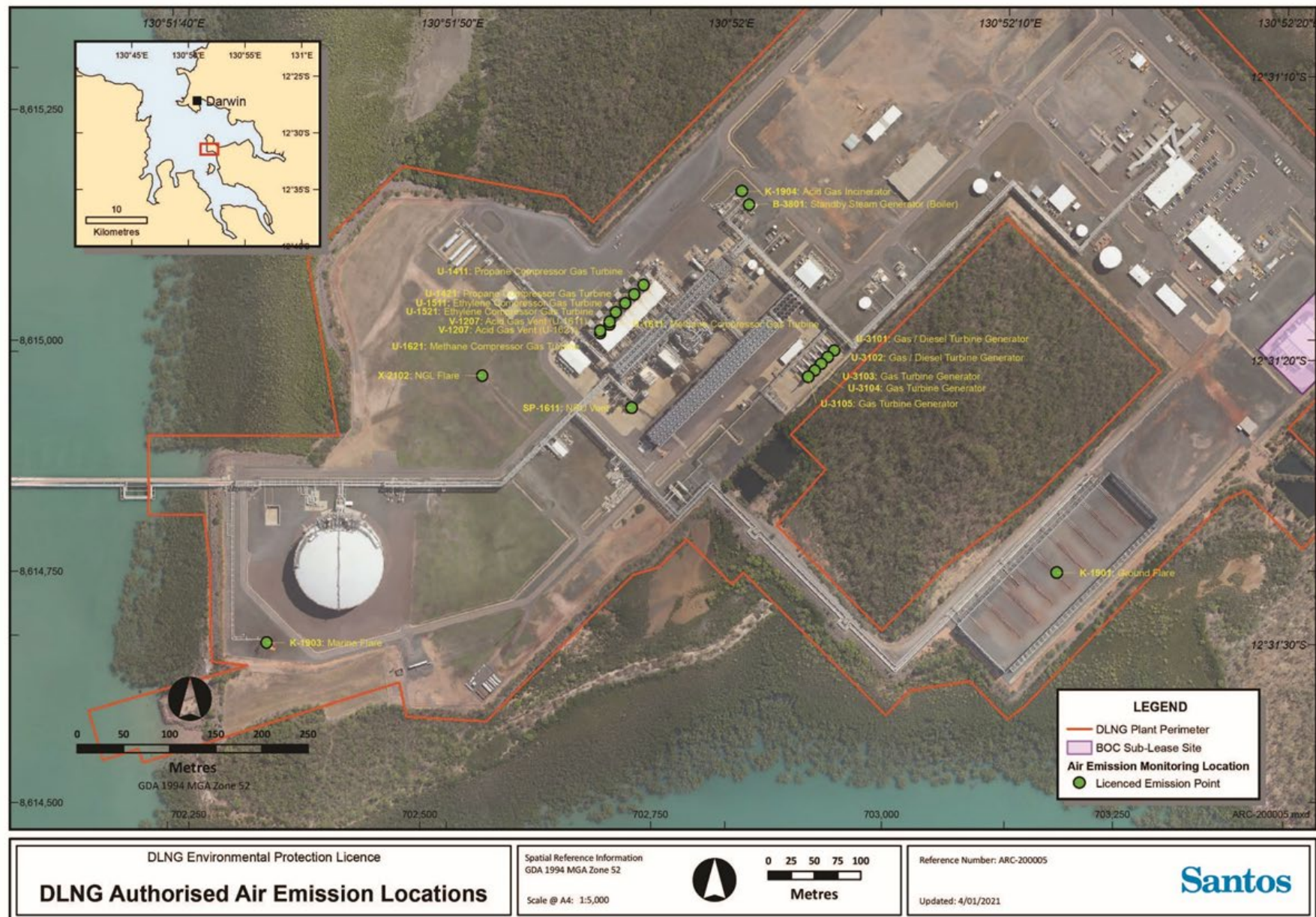


Figure 4-1: Map of emissions to air locations permitted by the Licence

4.1. Stack Emissions Monitoring Program

Most of the emissions from DLNG are from point sources, such as exhaust stacks. These stacks are a source of atmospheric pollutants, which are regulated under the Licence. The Licence specifies the locations of stack emissions that are permitted, the concentrations of pollutants that are allowed, the mass emission rates for pollutants and the frequency at which these must be monitored.

4.1.1. Monitoring Objectives

The objective of the stack emission monitoring program is to quantify the mass emission rates and concentrations of potential atmospheric pollutants at the point of emission. These results are considered in conjunction with other atmospheric monitoring programs, such as the ambient air quality monitoring program (**Section 4.3**). The monitoring program is also intended to ensure compliance with Conditions 67 to 69 of the Licence.

4.1.2. Monitoring Methods

The Licence requires stack sampling to be completed in accordance with NSW EPA document *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*. Santos has developed a stack emissions monitoring program, which is implemented by a specialist contractor in accordance with the approved methods stipulated by the Licence.

The required locations, parameters and frequency of monitoring is outlined in Appendix B Table 3 of the Licence. The locations are shown in **Figure 4-1**.

4.1.3. Monitoring Results

No stack emission monitoring results are available for the 2024 monitoring period. However, historic monitoring results for stack emission have been provided in **Attachment C**.

4.2. Hydrocarbon Flaring and Venting

Hydrocarbon flaring and venting is an unavoidable activity and is required to operate the DLNG facility in a safe manner. Santos seeks to reduce the volume of hydrocarbons flared where practicable and implements flare targets for DLNG. Methane is a much more potent Greenhouse Gas than Carbon Dioxide (CO₂), although methane has a shorter average residence time in the atmosphere. Hence, flaring of hydrocarbons to convert methane to CO₂ is the preferred disposal method.

The nitrogen stream from DLNG contains a commercially viable amount of helium, and the nitrogen stream removed from the liquefaction process is sent to an off-site helium extraction plant. Venting of nitrogen from the nitrogen rejection unit (NRU) occurs during routine operations where the helium extraction plant is unable to receive the nitrogen gas stream (e.g., during maintenance, when the DLNG stream exceeds the helium plant's capacity, etc.).

As part of a historical planned shutdown the acid gas cold vent pipework was removed and replaced with the hot vent pipework, which results in the acid gas stream being comingled with the compressor exhaust emissions to increase plume buoyance and mixing. Small quantities of acid gas are hot vented on occasions when the AGI is unavailable (e.g., AGI or plant trip)

4.2.1. Monitoring Objectives

The objective of the flaring and venting monitoring program is to understand the amounts of emissions associated with these activities. This information is used to quantify the atmospheric emissions and inform reporting to the NT EPA. The information is analysed in conjunction with other monitoring programs, such as the ambient air monitoring program. The monitoring is also intended to ensure compliance with the conditions of the Licence.

4.2.2. Monitoring Methods

Measurements of volumes of gas sent to the flares, NRU and acid gas vent are calculated based on metering of gas flows within DLNG.

4.2.3. Monitoring Results

4.2.3.1. Flaring

During the reporting period, the total flaring volume was 2,207.79 kNm³ (**Figure 4-2**). The flaring volume was lower than the previous years due to DLNG being in shutdown.

The majority of the flaring in 2024 was associated to the gradual warming and nitrogen purging of the LNG tank. The wet and dry flare headers remained online until 11 April 2024 with LPG bottles being used to fuel the flares following cessation of production (constant purge/pilot gas flowrate of 14.3 kNm³). The marine flaring constituted the remainder of the total flaring volumes.

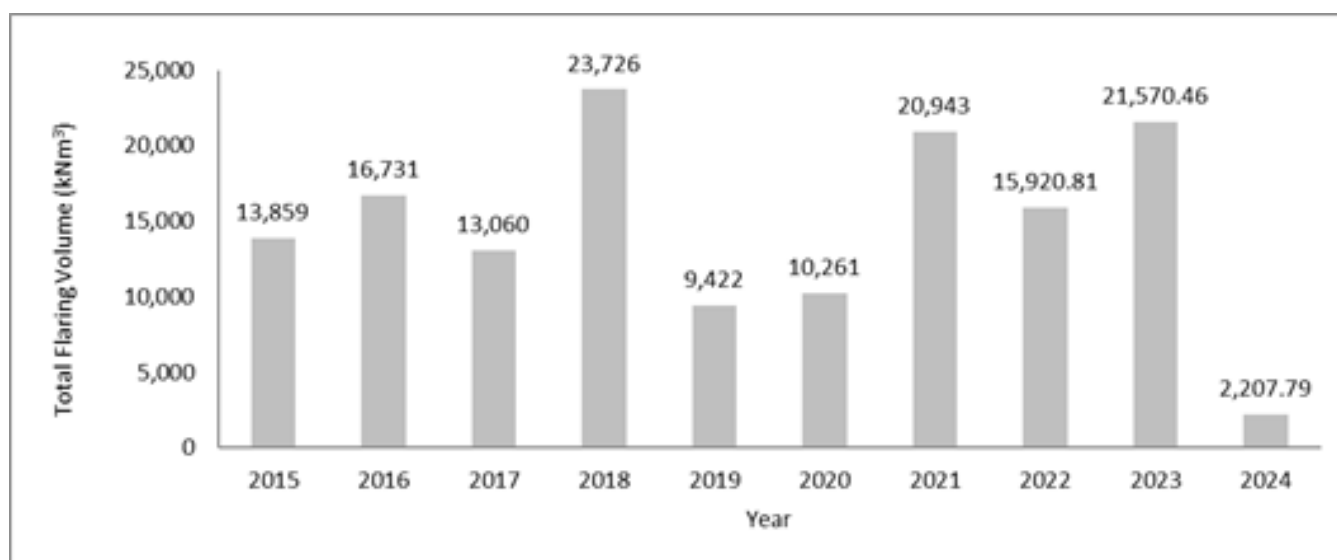


Figure 4-2: Annual flaring volumes

4.2.3.2. Nitrogen Rejection Vent

During the reporting period, the total venting from the Nitrogen Rejection Unit (NRU) was 0.00 kNm³ (**Figure 4-3**), given operations of the plant had been shut down. The NRU will not be required to be operated when Barossa gas is feeding DLNG upon restart in 2025, therefore whilst the NRU vent is still in-situ, it will no longer be operational.

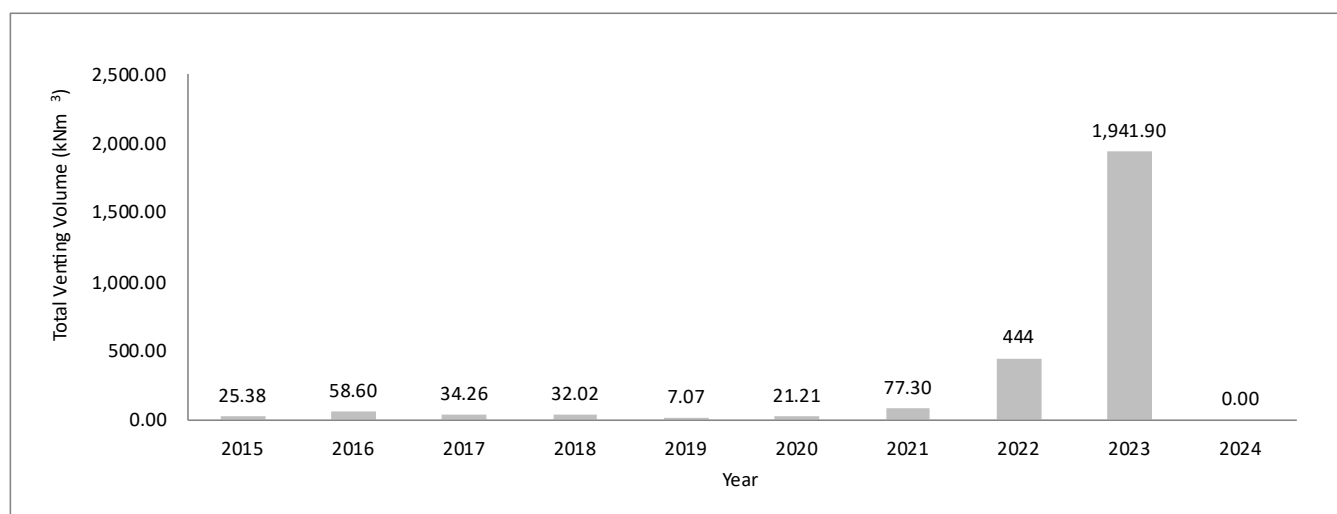


Figure 4-3: DLNG annual NRU venting volumes

4.2.3.3. Acid Gas Vent

During the reporting period, no acid gas was hot vented due to DLNG being in shutdown and the Acid Gas Incinerator being decommissioned and replaced under as approved by Environment Protection Approval 378 (Figure 4-4).

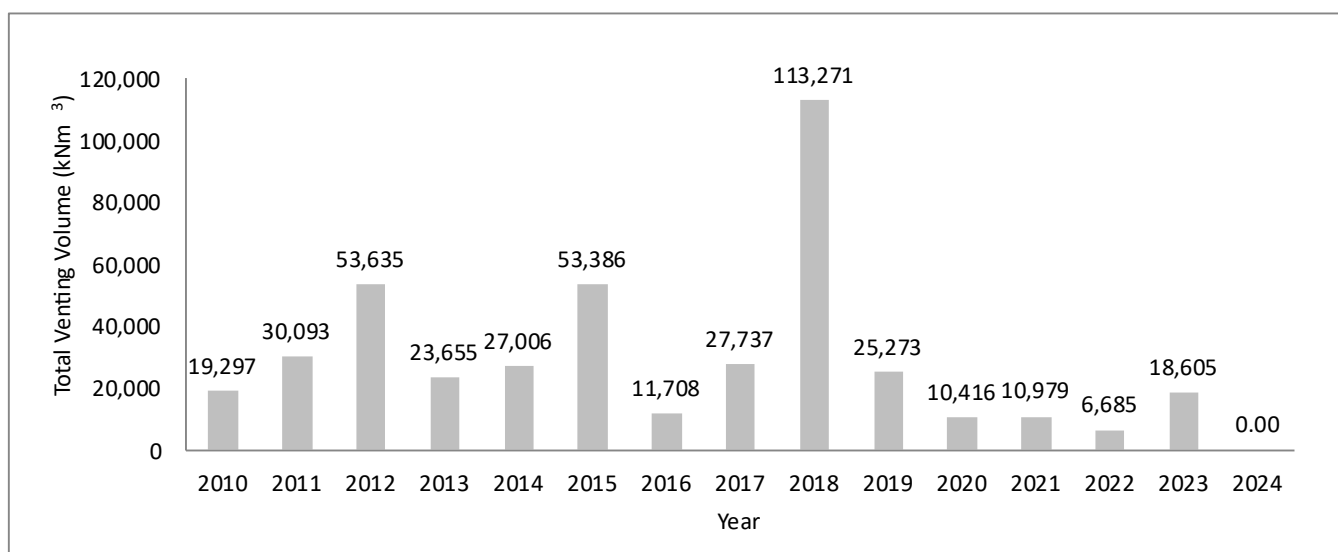


Figure 4-4: DLNG annual acid gas venting volumes

4.2.4. Data Management and Quality Control

Hydrocarbon flaring and venting volumes were calculated using Santos' plant operating process data system. This system is routinely monitored as part of the operation of DLNG and is considered reliable.

4.2.5. Discussion and Interpretation of Results

Given 'Shutdown' operations were in effect for the 2024 monitoring period stack emissions were considered nil, with exception of flaring associated with the gradual warming and nitrogen purging of the LNG tank.

Given that DLNG was shut down for 2024 and there were only minor discharges to air from flaring, there was a negligible impact on air quality.

4.3. Ambient Air Monitoring

As outlined in the summary of the 2024 stack emissions monitoring program results (Section 4.1), DLNG has air emissions points permitted by the Licence. While the stack emissions monitoring program provides information on the amounts of atmospheric releases from these authorised discharge points, it does not provide information on their potential impacts in the airshed around DLNG.

The NT EPA have established an Air Quality Network in the Darwin airshed, which via their website, provides real-time and historical air pollutant concentrations as well as meteorological data (refer to section 4.3.2).

Katestone Environmental Australia Pty Ltd is typically commissioned by Santos to collate, review, and interpret the ambient air monitoring data from NT EPA managed stations and subsequently summarised in this section of the AEMR. However, given that DLNG was in shutdown during 2024, a review of the NT EPA's historical air pollutant concentrations for 2024 has not been undertaken. This will recommence and be documented in the 2025 AEMR.

4.3.1. Monitoring Objective

The ambient air quality monitoring program aims to obtain robust data that accurately monitors the Darwin City and DLNG air sheds to determine the impact, if any, from DLNG air emissions. During annual period of typical operations, the data from the ambient air monitoring program is considered in conjunction with the stack emissions monitoring program and the operational activities at DLNG.

4.3.2. NT EPA Network

As stated in **Section 4.3**, NT EPA maintain their own network of three stations at Stokes Hill near Darwin city, Winnellie along the Stuart Highway, and Palmerston. These monitoring sites are shown in **Figure 4-5** and their location and classification are detailed in **Table 4-1**.

All three sites currently monitor particulate matter (PM₁₀ and PM_{2.5}), carbon monoxide (CO), oxides of nitrogen (NO_x, NO and NO₂), sulphur dioxide (SO₂), ozone (O₃) and meteorological parameters (wind speed and direction). This dataset is available on the public NT Air Quality Network website, however for the 2024 annual period the ambient air quality has not been discussed further due to DLNG being in shutdown.

In general, the primary air pollutant in Darwin and Palmerston is particulate matter in smoke from distant and local vegetation burning during the dry season. Other air pollutants CO, NO₂ and SO₂ all occur at very low levels compared to large cities in other parts of Australia, while O₃ occurs at moderate levels, typically due to natural processes.



Figure 4-5: Ambient air quality monitoring station locations

Table 4-1: NT EPA ambient air monitoring network

Site description		Palmerston	Stokes Hill	Winnellie
Geographical coordinates	Latitude	130.9483	130.8478	130.8933
	Longitude	-12.5078	-12.4600	-12.4240
Classification		Residential	Industrial	Generally Representative Upper Bound

4.3.3. Data Capture

Data from the ambient air quality monitoring network was not reviewed for the 2024 monitoring period, given DLNG was shutdown.

5. Monitoring Discharges to Land and Surrounding Environment

5.1. Irrigation Discharge and Groundwater Monitoring Program

As part of DLNG operations, several water and wastewater streams are authorised to be discharged from DLNG under the Licence. Authorised discharge occurs via the irrigation areas (located onsite within the DLNG boundary). A schematic of processes associated with irrigation discharge streams is shown in **Figure 3-1**.

The irrigation discharge comprises several streams arising from the operation of DLNG:

- Treated wastewater from the Sanitary Treatment Plant (STP). The STP receives wastewater from bathroom and kitchen facilities. The STP utilises biological (e.g. activated sludge) and physical (e.g. filters, settlement) treatment to reduce the nutrient levels, biological oxygen demand and suspended solid levels in the treated.
- Wastewater from the process area sumps, which is treated by an oily water separator - comprising a Corrugated Plate Interceptor/Dissolved Air Filtration Flotation (CPI/DAFF) system - to remove hydrocarbons. The separated hydrocarbons are stored and disposed of offsite by licenced waste transport and disposal contractors.
- Water from boiler blowdown and the turbine air humidifier system.

Each of these discharge streams are sent to the irrigation water holding tank (T-2903). The combined stream is periodically discharged to the irrigation areas located within the DLNG boundary (shown in **Figure 5-1**).

Contaminants in groundwater have the potential to be transported offsite from DLNG via groundwater flow. Where groundwater flow discharges to offsite area surrounding the site, this has the potential to impact the environment.

Santos has developed and implements a groundwater monitoring plan for DLNG. This program monitors groundwater conditions at DLNG. The groundwater monitoring plan is a requirement of the Licence (Conditions 70 to 72) and was previously submitted to, and approved by, the NT EPA.

The environmental consultant CDM Smith Australia Pty Ltd (CDM Smith) was commissioned by Santos to collect and assess groundwater monitoring data in accordance with the groundwater monitoring plan. The groundwater monitoring results are provided in an annual groundwater monitoring report (CDM Smith, 2024f), the results of which are summarised herein.

5.1.1. Monitoring Objectives

The objective of groundwater monitoring at DLNG is to investigate the presence and concentration of potential contaminants that may be present in the groundwater as a result of:

- Irrigation discharge at two areas within the DLNG boundary (known as the 'irrigation areas' as shown in **Figure 5-1**).
- The discharge of materials or substances to groundwater from other operations at DLNG.

The objectives of the irrigation discharge monitoring program are to:

- Characterise the quality and quantify the flow of the discharge water; and
- Assess compliance with the trigger values in the Licence (refer to Appendix B Table 2 within the Licence).

Characterising the quality of discharge water allows Santos to assess potential for discharged water to impact the environment. As outlined in the conceptual model (**Figure 2-2**), discharged water may interact with groundwater and Darwin Harbour. The results of the irrigation discharge monitoring program are also used to interpret results from other monitoring programs, such as the mangrove monitoring program (**Section 3.2**).

5.1.2. Monitoring Methods

The location of irrigation discharge is shown in **Figure 5-1**. Monitoring occurs throughout the year, the coordinates, sampling frequencies and the discharge sources are provided within the Licence (Appendix B Table 1 and Table 2).

Field measurements and samples are collected by DLNG laboratory staff or environmental consultants suitably trained and experienced with the methodologies used.

The irrigation discharge samples are collected via a flow meter sample valve positioned along the discharge pipe within the plant. Samples are sent to analytical laboratories for analysis. All laboratories used maintain National Association of Testing Authorities (NATA) accreditation for the analyses being carried out.

Groundwater samples were obtained by qualified personnel from a network of seven monitoring wells. The location coordinates and sampling frequencies of the monitoring wells are provided in **Table 5-1**, with the location of the wells shown in **Figure 5-1**.

Each monitoring well has characteristics that have the potential to influence the groundwater conditions observed, including proximity to coastal/tidal influences, water retention/flow capacity and strata chemistry. Key characteristics of the monitoring well network include:

- BH6 is installed in significantly different strata from other monitoring wells. A review of historical maps pre-dating the construction of DLNG, suggest that BH6 was the only monitoring well not located on the phyllite headland, which is the dominant geological feature underling most of the facility's infrastructure. BH6 is instead positioned in an area of the facility where natural clay and laterite has been deposited where a small inlet formerly existed.
- BH5 has significant difference in groundwater elevation due to hydraulic mounding. The mounding is inferred to be related to irrigation activities and low permeability water bearing strata that this well is installed within.
- BH2 is located closer to the coast and mangrove area, where groundwater conditions are more saline than other areas of DLNG. This is reflective of the proximity of this well to the marine environment within the phyllite strata that this well is installed within.
- Findings presented in past groundwater monitoring reports (CDM Smith, 2022), indicate that the integrity of monitoring well BH3 has likely been compromised, and monitoring results for this well may not reflect the actual groundwater conditions at DLNG. The potential exists for irrigation discharge to seep into groundwater preferentially via this well, and for this reason, monitoring results from well BH3 have not been used for trend analysis purposes since October 2022. Notwithstanding this, Santos has continued to monitor well BH3 in accordance with the Licence requirements.

During 2024, two groundwater monitoring events were undertaken during the reporting period to capture wet and dry seasonality (April 2024 and August 2024). Groundwater analysis was completed for physical parameters, major ions, TPH and dissolved metals listed for analysis in the DLNG Groundwater Monitoring Plan. Groundwater standing water levels were also measured in each well prior to sampling.

Samples were collected following stabilisation of the field parameters (water level, temperature, pH, conductivity and ORP) and stored in bottles and vials supplied by the laboratory.

Table 5-1: Groundwater monitoring bore locations

Bore	Location (Decimal Degrees)	Monitoring Frequency ^[1]
BH1	12.52388°S 130.8753° E	Monthly ^[2]
BH2	12.52099°S 130.8635°E	Biannually
BH3	12.52204°S 130.8637°E	Biannually
BH4	12.52316°S 130.8628°E	Biannually
BH5	12.52424°S 130.8638°E	Biannually

Bore	Location (Decimal Degrees)	Monitoring Frequency ^[1]
BH6	12.52455°S 130.8651°E	Biannually
BH7	12.52558°S 130.8641°E	Biannually

¹ Biannual groundwater monitoring to be undertaken once in the wet season and once in the dry season for the analytes specified in Table 2 with the exception of chlorophyll-a, which does not need to be monitored in groundwater.

² Monthly monitoring to establish a baseline data set over a 24-month period, then reverting to Biannually thereafter.

5.1.3. Assessment Framework

Under the DLNG Groundwater Monitoring Plan, no groundwater specific water quality objectives are nominated or are specified in the Licence. Therefore, to assess environmental risk a tiered assessment framework has been developed and includes the following three steps:

- Step 1 – Irrigation discharge quality assessment: comparison of the irrigation discharge against Licence requirements (listed in Table 2 of Appendix B of the Licence), the modelled ammonia trigger value, and the irrigation discharge historical 80th percentile values (based on data obtained between 2009 and 2024).
- Step 2 – Groundwater quality trend assessment: evaluation of changes in groundwater conditions compared to conditions reported previously via trends analysis. This level of assessment includes a comparison of the wet season groundwater quality against the DHWQO Marine and Estuarine Systems for Mid Estuary, the modelled ammonia trigger value and the groundwater historical 80th percentile values (based on data obtained between 2015 and 2024).
- Step 3 – Environmental risk assessment: analyse trends and correlations between groundwater conditions reported for each well and the irrigation discharge. This level of assessment includes statistics and further assessment to confirm potential environmental risk from the irrigation discharge.

A conservative trigger value of 9.0 mg/L for ammonium nitrogen in groundwater applied at the groundwater network boundary was developed using a fate and transport model (CDM Smith, 2019).

The model uses the Ogata Banks calculation to evaluate the maximum concentration of ammonium nitrogen in groundwater at DLNG, to meet the DHWQO for ammonium nitrogen in groundwater that may be discharged to the harbour from the facility. The calculation is based on the distance and time for groundwater to travel in groundwater, and the subsequent dispersion and degradation of ammonium nitrogen.

The assessment framework is illustrated in **Figure 5-2**.



DISCLAIMER: CDM Smith has endeavoured to ensure accuracy and completeness of the data. CDM Smith assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map. Drawn By: CASEYTC 31/01/2025.
C:\Users\CASEYTC\OneDrive - CDM Smith\Projects\1001723 - DLNG\DLNG Map\DLNG_Map_2025.aprx

Figure 5-1: Groundwater monitoring program bore locations

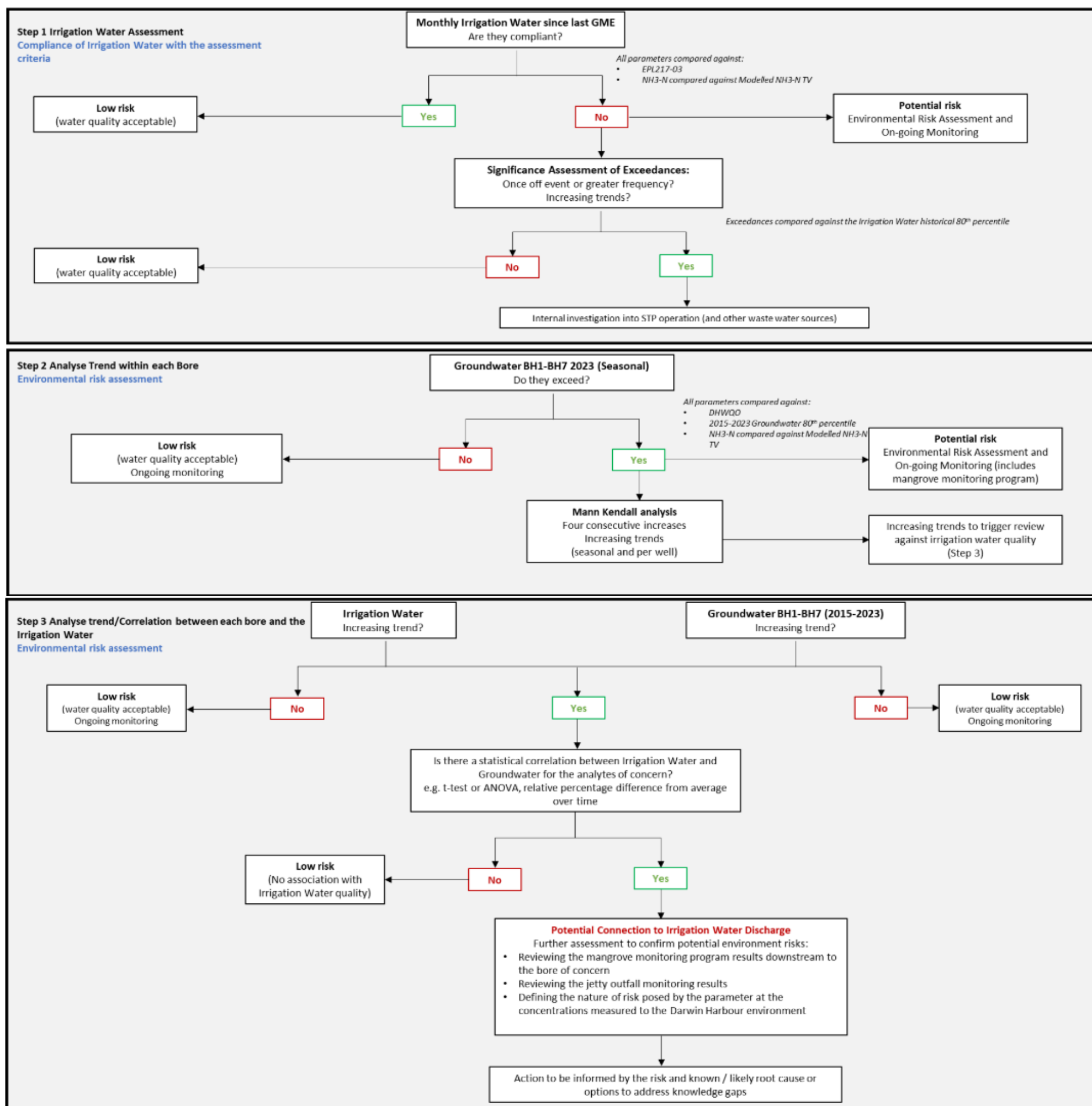


Figure 5-2: Assessment framework of impact to groundwater from irrigation discharge

5.1.4. Monitoring Results – Irrigation Discharge

5.1.4.1. Volume Discharged

A total of 1582.7 m³ was discharged to the irrigation area during the reporting period (**Figure 5-3**). This is approximately 6.09% of the 26 ML limit allowed for in the Licence. This volume is significantly lower than the volume discharged in 2023, and historical annual volumes of discharge.

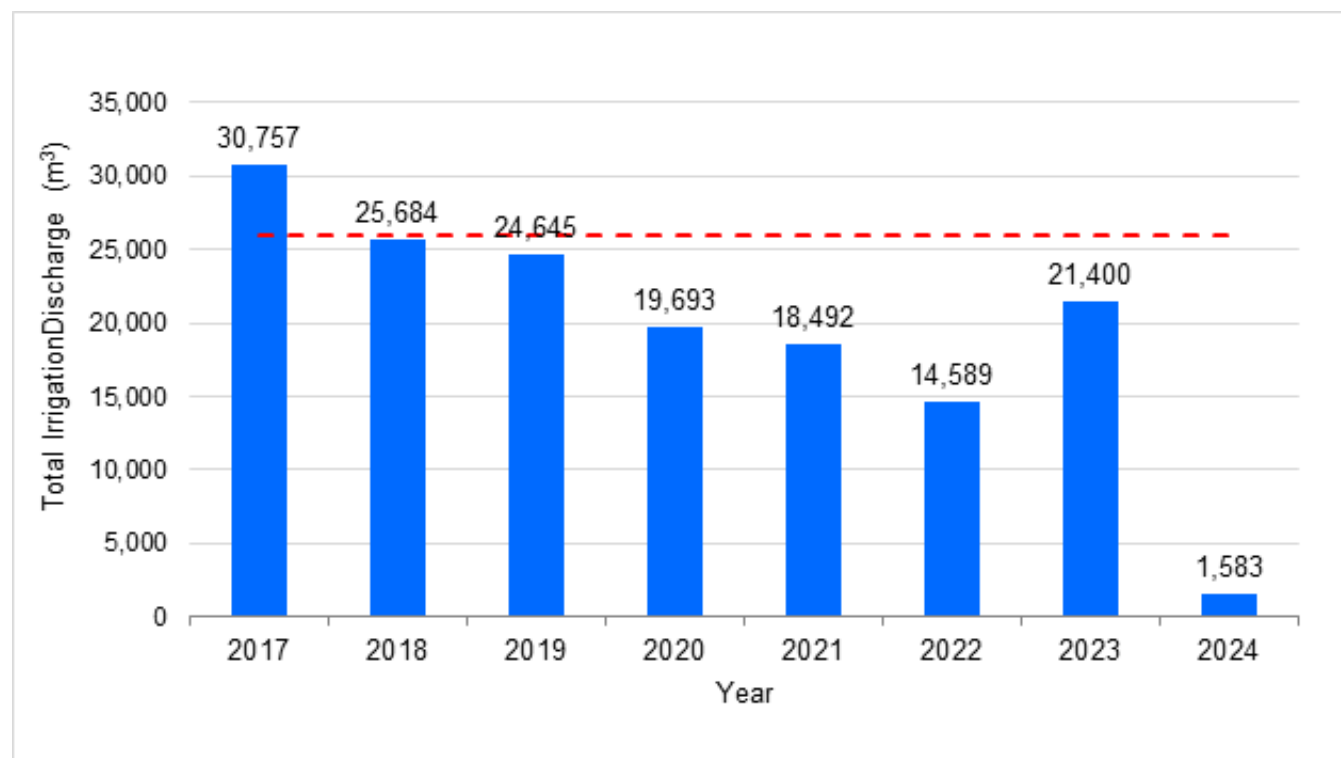


Figure 5-3: Water volumes discharged to the irrigation area

5.1.4.2. Irrigation discharge water quality monitoring results

A summary of the irrigation water quality monitoring results for 2024, including long term trends from 2015 to 2024 and Licence trigger value exceedances, are presented in **Table 5-2**. Monitoring of discharge water environmental indicators is undertaken as per the frequency outlined in **Table 5-2**. The environmental indicators (**Table 5-2**) form part of the water quality parameters measured to assess irrigation discharge water quality.

A new STP was installed during 2023 and discharge from the STP to the irrigation fields commenced in July 2024 after commissioning was complete and effluent quality was considered stable. However, after exceedances of the speciated nutrients (nitrate and DRP) were reported (and notified to NT EPA via a non-compliance notification), discharge to the irrigation field was ceased. Discharge to the irrigation fields was suspended for the remainder of 2024 whilst a licence amendment application was being processed.

The 2015 to 2024 dataset for irrigation discharge water quality monitoring results is provided in **Attachment A – Irrigation, Jetty Outfall and Sediment Pond data**; values exceeding current Licence trigger values are bolded. A summary of the water quality results for the irrigation discharge is provided below:

- There were exceedances of speciated nutrients (ammonia nitrogen, nitrate, nitrite, and/or DRP) in all samples taken during 2024, although in many cases the effluent was disposed of offsite and therefore the exceedance(s) did not constitute a reportable non-compliance. Compared to the long-term average (2017 to 2024 data), nitrate and DRP concentrations in 2024 were high, but still within historical ranges.
- Copper was reported at concentrations above the Licence trigger value during 2024 (reported at 130 µg/L compared to a trigger value of 69 µg/L). This exceedance did not constitute a reportable non-compliance as it was less than three times the trigger value and the effluent was discharged offsite. Copper was not reported above the trigger value during other monitoring events. Copper has in the past been reported at concentrations above the Licence trigger value, before returning to concentrations below the Licence trigger

value. The new STP started discharging to the irrigation water holding tank on the 22 July 2024, however it stopped on 14 August 2024 and there was no treated wastewater discharged from the STP for the remainder of 2024.

- Total Suspended Solids (TSS) was reported at values over thirty times the Licence limits during 2024 (reported at 1,130 mg/L compared to a trigger value of 30 mg/L). This exceedance did not constitute a reportable non-compliance as the effluent was discharged offsite. This was the only exceedance for TSS during 2024 and all other reported values were below Licence trigger values.
- pH was reported below the lower trigger level in January 2024 (6.84 compared to 7.0) and higher than the upper trigger value in December 2024 (8.81 compared to 8.5). These exceedances did not constitute a reportable non-compliance and the effluent from the December discharge was taken offsite (not discharged to land within the DLNG boundary).

Table 5-2: Summary of 2024 irrigation water quality monitoring results

Parameter	Units	Monitoring Frequency	Licence Trigger Value	2024 Maximum	2024 Minimum	2024 Average	Long-term Average (2015-2024)	2024 Reportable Non-Conformance ⁽¹⁾
Field Parameters								
pH	pH Units	Monthly	7 – 8.5	8.81	6.84	7.73	7.28	No ⁽⁴⁾
Electrical conductivity	µs/cm	Monthly	No trigger	724.90	91.36	395.55	251.00	N/A
TSS	mg/L	Monthly	≤ 30	1130.00	0.00	95.44	22.69	No ⁽⁴⁾
Turbidity	NTU	Monthly	No trigger	14.10	0.78	3.82	9.69	N/A
DO	mg/L	Monthly	No trigger	6.56	0.22	4.19	0.81	N/A
Temperature	°C	Monthly	No trigger	44.80	24.5	30.44	34.82	N/A
Environmental Indicators								
Ammonia (NH ₃ -N)	µg/L	Annual	20	819.00	3.00	126.71	2668.00	No ⁽⁴⁾
Nitrate (NO ₃ -N)	µg/L	Annual	17	8560.00	186.00	4619.43	1618.37	Yes
Nitrite (NO ₂ -N)	µg/L	Annual	17	54.00	1.00	22.67	99.36	No
DRP (PO ₄ -P)	µg/L	Annual	5	3870.00	0.05	2221.44	836.02	Yes
Total Nitrogen	mg/L	Annual	≤ 40.	9.63	0.37	5.61	7.23	No
Total Phosphorous	mg/L	Annual	≤ 10	3.89	0.05	2.30	1.37	No
Chlorophyll-a	µg/L	Biannual	2	4.00	1.00	2.50	1.50	No
BOD	mg/L	Monthly	≤ 25	7.60	1.00	2.93	46.65	No
TRH	mg/L	Annual	< 6	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾	No
<i>E. coli</i>	MPN/100 mL	Biannual	≤ 75.0	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾	393.50	No
<i>Enterococci</i>	MPN/100 mL	Biannual	50	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾	52.71	No
Metals & BTEX								
Arsenic	µg/L	Annual	10	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾	No
Cadmium	µg/L	Monthly	3.2	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾	0.13	No
Chromium	µg/L	Annual	10	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾	No
Copper	µg/L	Monthly	69	130.00	5.00	33.83	38.70	No
Iron	µg/L	Annual	1,300	24.00	15.00	19.50	201.39	No

Parameter	Units	Monitoring Frequency	Licence Trigger Value	2024 Maximum	2024 Minimum	2024 Average	Long-term Average (2015-2024)	2024 Reportable Non-Conformance ^[1]
Lead	µg/L	Annual	10	N/A ^[2]	N/A ^[2]	N/A ^[2]	N/A ^[2]	No
Manganese	µg/L	Annual	15,500	5.00	1.00	3.00	30.39	No
Mercury	µg/L	Monthly	0.1	N/A ^[2]	N/A ^[2]	N/A ^[2]	N/A ^[2]	No
Nickel	µg/L	Annual	290	1.00	1.00	1.00	1.67	No
Silver	µg/L	Annual	1.4	N/A ^[2]	N/A ^[2]	N/A ^[2,3]	N/A ^[1]	No
Zinc	µg/L	Monthly	1,780	54.00	6.00	19.67	24.93	No
BTEX	µg/L	Monthly	700	N/A ^[2]	N/A ^[2]	N/A ^[2]	3.60	No

Notes:

- Results from mandatory sampling are only considered when determining reportable non-conformances under the Licence
- All results less than LOR
- Only one sample taken (annual requirement)
- Exceedance not considered a reportable non-conformance as the effluent was taken offsite (not irrigated / discharged to land at DLNG).

*Yellow shading denotes exceedances of the Licence trigger values.

5.1.5. Monitoring Results and Discussion – Groundwater

The results of the 2024 groundwater monitoring program are discussed herein. The 2015 to 2024 groundwater quality dataset provided in **Attachment D – Groundwater Data**.

5.1.5.1. Groundwater Level and Flow Direction

The standing water level (SWL) was measured in the field for each well by recording the depth to groundwater from the top of the well casing. Groundwater elevation was then corrected to metres above the Australian Height Datum (mAHD) using survey data.

Key findings relating to groundwater level data:

- Groundwater elevations measured in the 2023/2024 wet season are generally lower than those measured for 2022/2023 wet season. This is likely linked to the lower-than-average rainfall during April 2024 when the annual groundwater monitoring event was undertaken. However, as with previous years; there is a distinct seasonal trend in response to the wet and dry seasons, with significantly higher groundwater levels during the wet season (**Figure 5-4**). During the wet season, a groundwater mound forms under the irrigation areas and is inferred to flow radially away from these areas towards Darwin Harbour. The mound then dissipates as groundwater elevations become flatter during the dry season. The rise and fall of groundwater levels appears to be predominantly influenced by rainfall driven recharge and not irrigation discharge which occurs all year round.
- Hydrograph records (CDM Smith, 2024g) for well BH3 indicate that the groundwater level may be responding to surface water ingress directly into the well, particularly during the wet season, and as such may not be representative of groundwater conditions at DLNG.

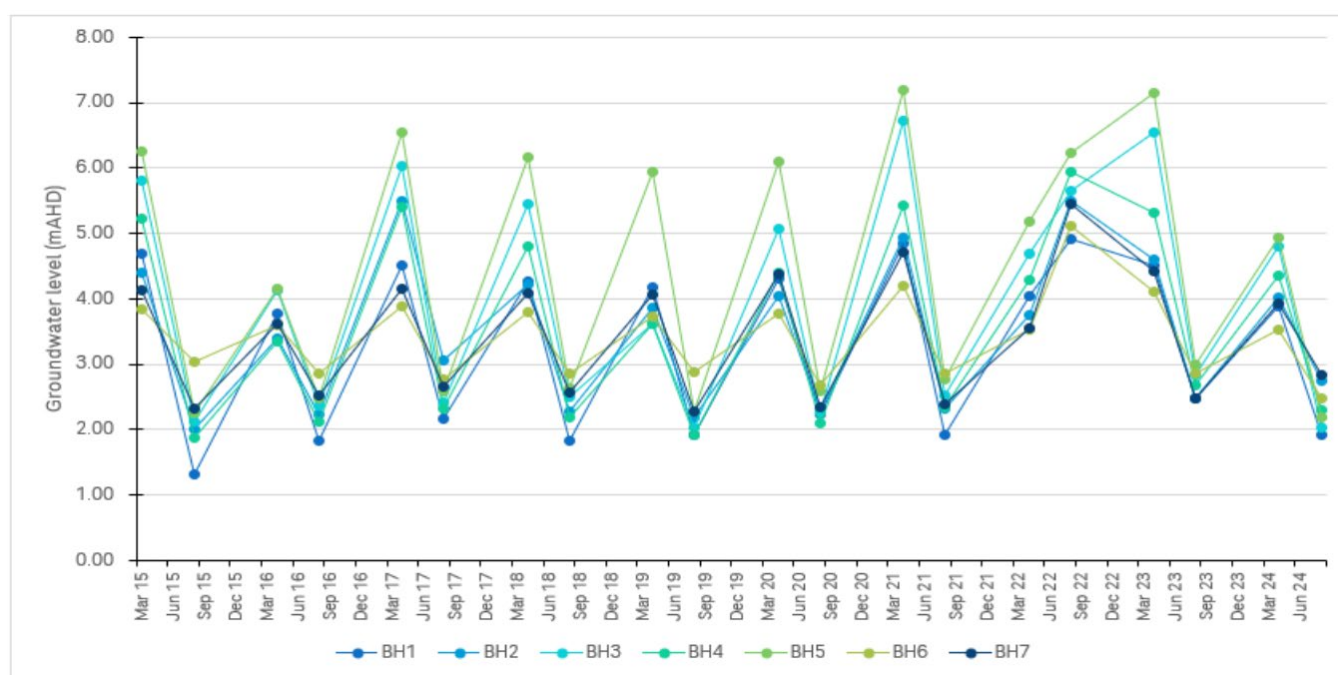


Figure 5-4: Groundwater elevations

5.1.5.2. Groundwater Quality Field Parameters

The following parameters were observed or measured for all wells: electrical conductivity (EC), pH, oxidation redox potential (ORP) and dissolved oxygen (DO). Key findings relating to groundwater field parameters obtained during 2024 are discussed herein.

- Field parameter measurements obtained during the 2024 groundwater monitoring event are generally consistent with the previous results.
- pH levels ranged from 4.32 (BH4) to 6.41 (BH7). This is a wider range, similar to the previous two years of monitoring, but different from what has been observed historically.

- Electrical Conductivity (EC) decreased for all wells during the wet and dry season. The variations in EC observed in the 2016 to 2024 groundwater dataset indicate that wells located either within or near the irrigation area generally have lower EC, in comparison to wells located at the perimeter of DLNG where groundwater which have higher EC. Exceedances of the historical 80th percentile values were identified in wells BH1 (wet season) and BH4 (dry season).
- Oxidation Reduction Potential (ORP) ranged from -28.2 mV (BH2) to 218.7 mV (BH4) during 2024, with the ORP at wells BH2 and BH7 tending to be predominantly negative and share the same trend over time. Exceedances of the historical 80th percentile values were identified in wells BH2 and BH6 (wet season).
- Dissolved Oxygen (DO) in groundwater ranged from 48.7% % (BH7) to 105.6 % (BH5) during 2024, indicating aerobic conditions that varied across the site. DO concentrations in all monitoring wells measured during the 2024 dry seasons show an upward trend from the dry and wet seasons when compared against the readings taken since 2015. Exceedances of the historical 80th percentile values were identified in all wells except BH5 (dry season only).

The variations in EC observed throughout the groundwater monitoring network appear to be linked to the geochemistry, transmissivity and relative location of each well to the perimeter of site and therefore saline influences. Wells located either within or near to the Irrigation Area demonstrate lower electrical conductivity levels than those located within closer proximity to the harbour.

Graphs illustrating the 80th percentile values for field water quality measurements obtained between 2015 and 2024, and the 2024 results for each well are provided in **Figure 5-5**. The results of field water quality measurements for the 2024 monitoring program were compared against the DHWQO trigger values (**Table 5-3**) and the groundwater historical 80th percentile (**Table 5-4**).

When compared against the assessment framework, pH and dissolved oxygen exceeded the DHWQO trigger values for all wells monitored during 2024. Field water quality results above historical 80th percentile values were recorded for all field parameters during the 2024 monitoring event.

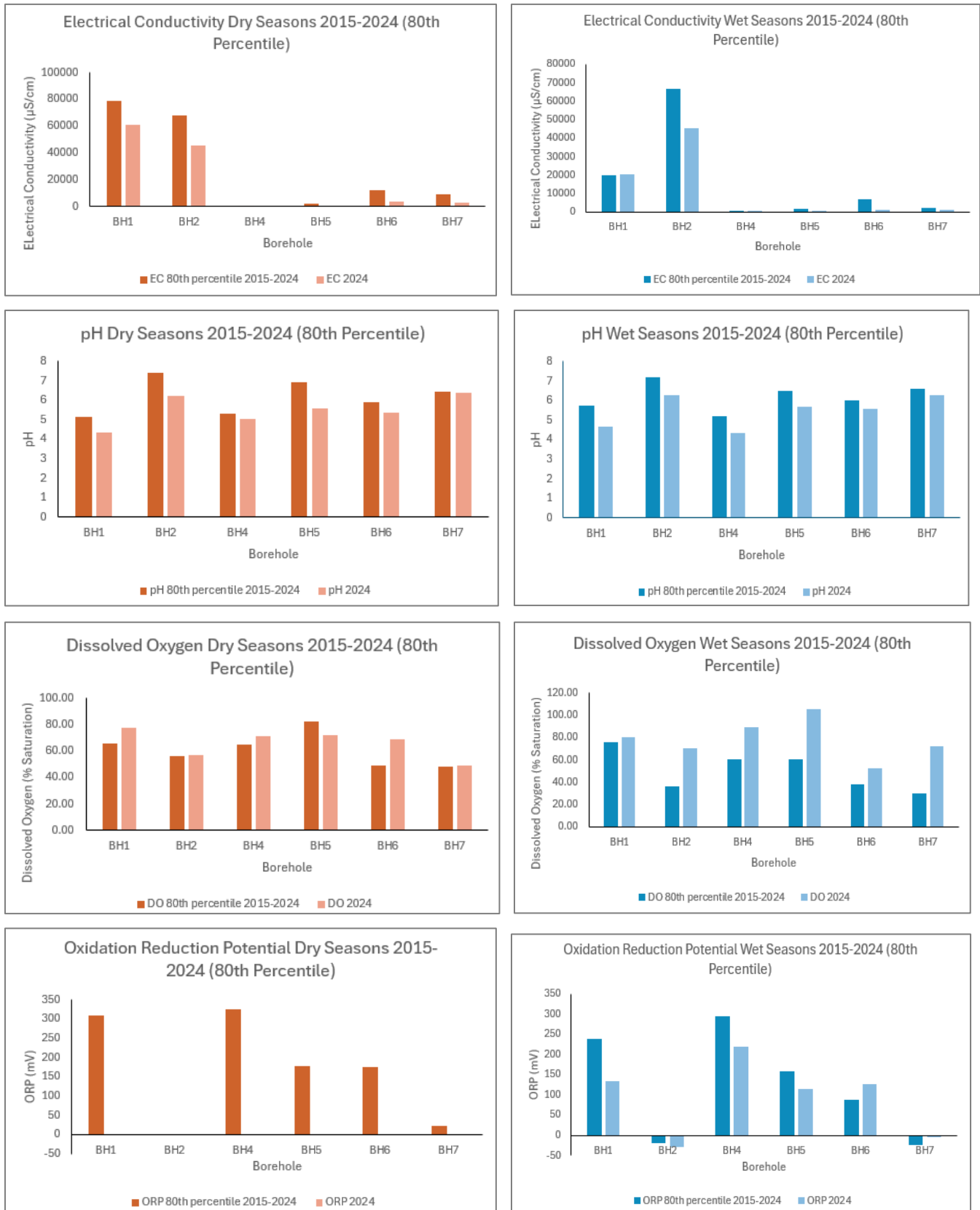


Figure 5-5: Field groundwater parameter trends

Table 5-3: Field groundwater parameters (2024)

Monitoring Bore	Date	EC (µS/cm)	pH	Redox Potential (mV)	Temperature	DO (% Saturation)
DHWQO	-	NA	7 – 8.5	NA	NA	80-100 %
BH1	30/04/2024	20,230	4.69	133	30.95	79.9
	13/08/2024	61,000	4.35			77.7
BH2	23/04/2024	45,440	6.29	-28.2	32.1	70.2
	13/08/2024	45,730	6.22			57
BH4	23/04/2024	378	4.32	218.7	26.5	88.9
	13/08/2024	844	5.05			70.9
BH5	30/04/2024	681	5.69	114.2	29.53	105.6
	12/08/2024	1,050	5.59			72
BH6	22/04/2024	1,444	5.59	126	30.6	52.7
	12/08/2024	3,509	5.38			68.7
BH7	22/04/2024	993	6.3	-6	38.09	72.4
	13/08/2024	3,093	6.41			48.7

Table 5-4: Field groundwater parameters (2024) compared against 80th percentiles (wet and dry season 2015-2024)

Wet Season (2015 – 2024)								
Parameters	EC 80th percentile	EC	pH 80th percentile	pH Unit	ORP 80th percentile	ORP	DO 80th percentile	DO
	2015-2024	2024	2015-2024	2024	2015-2024	2024	2015-2024	2024
Unit	(µS/cm)		pH Unit		mV		% Saturation	
BH1	20,126	20,230	5.71	4.69	238.86	133	76.03	79.9
BH2	66,800	45,440	7.20	6.29	-20.2	-28.2	36.72	70.2
BH3	-	-	-	-	-	-	-	-
BH4	454.4	378	5.20	4.32	294.9	218.7	60.46	88.9
BH5	1,880	681	6.48	5.69	158.96	114.2	60.84	105.6
BH6	6,780	1,444	6.03	5.59	86.56	126	38.14	52.7
BH7	2,212	993	6.60	6.3	-24.24	-6	30.19	72.4
Dry Season (2015 – 2024)								
Parameters	EC 80th percentile	EC	pH 80th percentile	pH Unit	ORP 80th percentile	ORP	DO 80th percentile	DO
	2015-2024	2024	2015-2024	2024	2015-2024	2024	2015-2024	2024
Unit	(µS/cm)		pH Unit		mV		% Saturation	
BH1	79,020	61,000	5.172	4.35	310.44	-	65.54	77.7
BH2	68,140	45,730	7.42	6.22	-2.6	-	55.81	57
BH3	-	-	-	-	-	-	-	-
BH4	568.8	844	5.33	5.05	325.6	-	64.71	70.9
BH5	1,968	1,050	6.95	5.59	178.44	-	82.68	72
BH6	12,426	3,509	5.93	5.38	173.92	-	49.16	68.7
BH7	9,448	3,093	6.44	6.41	22.42	-	48.46	48.7

5.1.5.3. Groundwater Quality Laboratory Results

The laboratory analytical results for the 2024 biannual groundwater monitoring are presented herein in accordance with the assessment framework outlined in **Section 5.1.3**.

5.1.6. Results: Step 1 – Irrigation Discharge Quality Assessment

Irrigation discharge has the potential to seep into the ground and groundwater. Key findings from a review of the irrigation discharge water quality against the assessment framework include:

- Irrigation discharge exceeded the assessment criteria for September 2023 to August 2024 (Licence trigger value for irrigation discharge, modelled trigger value and irrigation discharge historical 80th percentiles for the following analytes and the results are summarised in **Table 5-5** and **Table 5-8**).
- EC exceeded the 80th percentile value on two occasions during 2024.
- Ammonia exceeded the Licence trigger values once during 2024.
- Nitrate exceeded the Licence trigger value on three occasions, and the historical 80th percentile value on two occasions during 2024.
- pH exceeded the Licence trigger values on one occasion, and the historical 80th percentile values on five occasions during 2024.
- Irrigation discharge water quality is discussed in further detail in **Section 5.1.4**.

Table 5-5: Step 1: Summary of irrigation discharge exceedances against the assessment criteria from September 2023 to August 2024

Date Sampled / Analyte	Ammonia as N	Electrical Conductivity (Lab)	Nitrate (as N)	pH (Field)
Units	mg/L	Us/cm	mg/L	pH Unit
EPL 217-03	0.02	-	0.017	7 – 8.5
Modelled TV	9	-	-	-
80 th percentile	1.84	275	0.272	7.2 – 7.7
Wet Season				
04/10/2023	1.43 ²	151.2	0.996 ²	7.44
01/11/2023	-	104.1	-	8.32
06/12/2023	-	112.5	-	8.05
10/01/2024	-	145.8	-	6.84
14/02/2024	0.003	-	0.480 ²	-
05/03/2024	-	109.4	-	7.22
Dry Season				
01/05/2024	-	111.5	-	7.29
05/06/2024	-	607	-	-
03/07/2024	0.006	196.7	0.186 ²	-
07/08/2024	-	575.8	-	7.74

Notes

Grey text denotes value less than LOR

Blue cells denote concentrations exceeds the EPL 217-03 TV

Red text denotes values exceeds the historical 80th percentile of groundwater based on data since 2009 to 2024.

[1]. denotes values which register as non-compliant against conditions 77.1 of EPL217-03 – on three consecutive sampling occasions.

[2]. denotes values which register as non-compliant against conditions 77.2 of EPL217-03 – on a single sampling occasion of three times or more the trigger value.

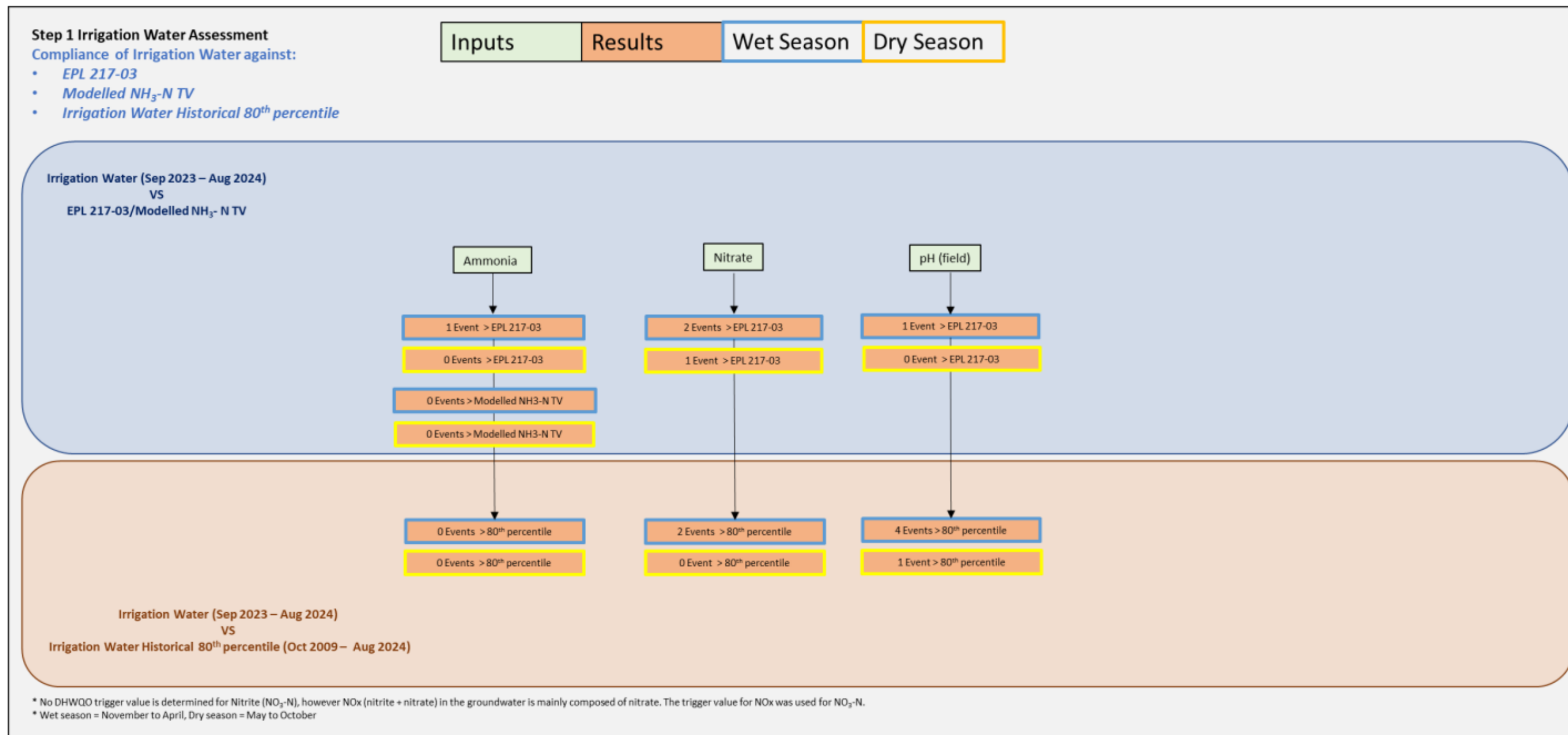


Figure 5-6: Step 1 Results (Licence trigger values, modelled $\text{NH}_3\text{-N}$ and 80th percentiles values)

5.1.7. Results: Step 2 – Compliance of Groundwater with Assessment Criteria

5.1.7.1. Comparison against the assessment criteria

All groundwater sample results obtained during the 2024 GMEs have been compared against the groundwater assessment criteria (i.e., the DHWQO, modelled ammonia trigger value and the seasonal historical 80th percentile values of each monitoring well). A total of ten parameters exceeded the DHWQOs, one well (BH2) exceeds the modelled ammonia TV and 33 parameters exceed the historical 80th percentile (2015 – 2024) during the 2024 GMEs.

Table 5-6 and **Table 5-7** summarise where exceedances have been recorded against the DHWQO, modelled ammonia TV and/or the historical 80th percentiles for the April and August GMEs respectively. Note, parameters which do not exceed a TV or 80th percentile have been excluded (refer to **Attachment D** – Groundwater Data for the full dataset). An illustration of the Step 2 risk assessment process is provided in **Figure 5-7**. For ease of interpretation, only those parameters which exceed both the DHWQO, and modelled TV/80th percentile have been included in this figure.

Field Parameters

Upon sampling of each monitoring well at the DLNG site, field parameters including electrical conductivity (EC), pH, oxidation reduction potential (ORP) and dissolved oxygen (DO) were measured as a preliminary step to laboratory analysis. When compared against the groundwater assessment criteria the following was concluded:

- Dissolved oxygen % saturation (field) exceeded the historical 80th percentiles in all bores (wet season only).
- Redox potential (field) exceeded the 80th percentile in BH2 and BH6 (wet season only).
- Temperature (field) exceeded the 80th percentile in BH7 (wet season only).

As previously reported by CDM Smith (2020), variations in EC observed throughout the groundwater monitoring network appear to be linked to the geochemistry, transmissivity, and relative location of each well to the perimeter of site and therefore saline influences. Wells located either within or near to the Irrigation Area tend to demonstrate lower EC levels than those within closer proximity to the harbour.

Microbiology

Elevated levels of Enterococci have been detected within BH5 during the 2024 GMEs triggering exceedance of the DHWQO Interim Recreation Guidelines and Objectives for Primary Contact (≤ 200 E. coli/100mL and ≤ 50 Enterococci/100 mL). No exceedances of E.coli were detected in 2024. The sample round conducted between the 12th and 13th of August 2024 measured Enterococci concentrations in BH5 of 201 MPN/100 mL.

Nutrients

The following nutrients exceed the assessment criteria during the 2024 GMEs:

- Ammonia as N (all bores except BH4 wet and dry season), nitrate as N (BH1 wet and dry season, BH2 dry, BH4 wet, BH5 wet and dry), nitrate + nitrite (BH1 wet and dry, BH2 dry, BH4 wet, BH5 wet and dry) and total nitrogen (all bores except BH4 wet and dry) when compared against the DHWQO.
- Ammonia s N (BH1 dry, BH2 wet, BH5 wet and dry), nitrate as N (BH1 dry), nitrate + nitrite as N (BH1 dry), Kjeldahl Nitrogen (BH2 wet, BH4 wet, BH5 wet and dry), total nitrogen BH1 dry, BH2 wet, BH4 wet, BH5 wet and dissolved reactive phosphorus (BH2 wet) when compared against the historical 80th percentile.
- Ammonia as N (BH2 wet) when compared against the modelled ammonia trigger value.

Petroleum Hydrocarbons

Total Petroleum Hydrocarbons (TPH), Total Recoverable Hydrocarbons (TRH), Benzene, Toluene, Ethylene, Xylene and Naphthalene (BTEXN) registered below the LOR during the 2024 GMEs, which is consistent with historical data (see **Attachment D** – Groundwater Data for the full groundwater dataset).

Metals

The following metals exceeded the assessment criteria during the 2024 GMEs:

- Copper (BH1 wet and dry, BH2 dry, BH4 wet and dry, BH5 dry, BH6 dry), nickel (BH1 dry, BH2 dry), silver (BH1 dry) and zinc (BH1 wet and dry, BH2 dry, BH4 wet and dry, BH5 wet and dry, BH6 dry) when compared against the DHWQO.
- Aluminium (BH1 dry, BH4 wet, BH6 dry), arsenic (BH5 wet, BH7 wet and dry), cadmium (BH1 dry), calcium (BH1 dry, BH5 wet and dry), copper (BH1 dry), iron (BH5 wet, BH6 wet), magnesium (BH1 dry, BH2 dry, BH4 dry), manganese (BH1 dry, BH4 dry, BH7 dry), nickel (BH1 dry, BH2 dry, BH7 dry), potassium (BH1 dry, BH5 wet and dry), sodium (BH1 dry) and zinc (BH1 dry, BH6 dry, BH7 dry) when compared against the historical 80th percentile values.

General Water Parameters

The following general water parameters exceeded the assessment criteria during the 2024 GMEs:

- Total Dissolved Solids (field) exceeded the 80th percentile in BH1 (dry season)
- Total Suspended Solids exceeded DHWQO in all bores (dry season only)
- Total Suspended Solids exceeded DHWQO in BH1, BH4, BH5, BH6 and BH7 (dry season only)
- Biochemical Oxygen Demand (BOD) (BH1, wet, BH7 wet) bicarbonate alkalinity (BH1 dry, BH5 wet), total alkalinity (BH1 dry, BH5 wet), total anions (BH1 dry), total cations (BH1 dry), chloride (BH1 dry), fluoride (BH2 wet, BH4 wet), ionic balance (BH2 dry, BH5 wet, BH6 dry, BH7 wet), sulfate SO₄ – turbidimetric (BH1 dry, BH4 dry, BH5 dry) and turbidity (BH1 dry, BH7 dry) when compared against the 80th percentile.

Table 5-6: Step 2 – Summary of groundwater exceedances from the wet season (April) 2024 GME

Sample Location	Date	Alkalinity (Bicarbonate as CaCO ₃)	Alkalinity (total) as CaCO ₃	Aluminium (filtered)	Ammonia as N	Arsenic (filtered)	Biochemical Oxygen Demand	Calcium (filtered)	Copper (filtered)	Dissolved reactive phosphorus	DO % Saturation (Field)	Fluoride	Ionic Balance	Iron (filtered)	Kjeldahl Nitrogen Total	Nitrate (as N)	Nitrite + Nitrate as N	Nitrogen (Total)	Potassium (filtered)	Redox Potential (Field)	Temperature (Field)	Zinc (filtered)
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	%Sat	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mV	°C	mg/L
DHWQO					0.02				0.001							0.02	0.02	0.27				0.015
Modelled TV					9																	
BH1	30-Apr-24	4	4	0.26	0.04	0.001	3	108	0.01	0.016	79.9	0.1	1.58	0.03	0.26	0.18	0.18	0.44	38	133	30.95	0.18
80th Percentile		7.6	7.6	0.53	0.06	0.001	2	161.4	0.026	0.004	64	0.1	6.77	0.54	0.4	0.04	0.04	0.41	45	268.36	32.04	0.35
BH2	23-Apr-24	335	335	<0.005	19	0.095	5	511	<0.0005	0.082	70.2	0.6	4.35	31.7	17.6	<0.020 ^{#1}	<0.020 ^{#1}	17.6	280	-28.2	32.1	0.01
80th Percentile		423.4	423.4	0.07	14.1	0.131	5.6	636	0.006	0.014	36.72	0.4	8.4	91.2	14.36	0.07	0.07	14.36	315	-27.32	32.5	0.04
BH4	23-Apr-24	<1	<1	1.43	0.01	0.002	<2	4	0.006	<0.010 ^{#1}	88.9	0.2	-	0.51	0.13	0.03	0.03	0.16	2	218.7	26.5	0.02
80th Percentile		1.6	1.6	0.99	0.02	0.004	2	5	0.007	0.008	46.79	0.16	2.98	1.2	0.07	0.05	0.05	0.07	4.6	297.24	33.38	0.03
BH5	30-Apr-24	31	31	0.06	0.18	0.006	2	29	0.001	0.018	105.6	<0.1	9.11	1.92	4.21	1.47	1.47	5.68	4	114.2	29.53	0.06
80th Percentile		9.4	9.4	0.23	0.08	0.001	2	26.8	0.013	0.018	60.84	0.2	6.99	0.36	0.58	2.16	2.16	2.75	3.8	174.52	30.78	0.17
BH6	22-Apr-24	11	11	<0.005	0.32	0.001	<2	12	0.001	0.002	52.7	<0.1	0.09	5.79	0.4	<0.020 ^{#1}	<0.020 ^{#1}	0.4	7	126	30.6	0.01
80th Percentile		13.6	13.6	0.04	0.34	0.004	2	147	0.007	0.003	38.14	0.1	9.37	5.45	0.63	0.01	0.01	0.64	31	86.56	34.2	0.02
BH7	22-Apr-24	51	51	<0.005	1.82	0.003	8	11	<0.0005	<0.001	72.4	0.2	6.58	19.5	1.92	<0.020 ^{#1}	<0.020 ^{#1}	1.92	9	-6	38.09	0
80th Percentile		57.2	57.2	0.01	1.89	0.002	2.6	12.2	0.001	0.002	39.12	0.26	4.58	19.66	1.99	0.03	0.03	1.99	11.2	-53.62	33.34	0

Notes

Grey text denotes value less than LOR
 Orange cells denote concentrations exceeds the DHWQO
 Bold cells denote concentrations exceeds the modelled ammonia TV
 Red text denotes values exceeds the historical 80th percentile of groundwater based on data since 2015 to 2023
 Blue text denotes 80th percentile value
 #1 denotes reported analyte LOR is higher than requested analyte LOR

Table 5-7: Step 2 – Summary of groundwater exceedances from the dry season (August) 2024 GME

Sample ID	Sampled Date	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (total) as CaCO3	Aluminium (filtered)	Ammonia as N	Anions Total	Arsenic (filtered)	Cadmium (filtered)	Calcium (filtered)	Cations Total	Chloride	Copper (filtered)	Enterococci	Ionic Balance	Kjeldahl Nitrogen Total	Magnesium (filtered)	Manganese (filtered)	Nickel (filtered)	Nitrate (as N)	Nitrite + Nitrate as N	Nitrogen (Total)	Potassium (filtered)	Silver (filtered)	Sodium (filtered)	Sulfate as SO4 - Turbidimetric (filtered)	Total Dissolved Solids	Total Suspended Solids	Turbidity	Zinc (filtered)
Units		mg/L	mg/L	mg/L	mg/L	meq/L	mg/L	mg/L	mg/L	meq/L	mg/L	mg/L	MPN/ 100 mL	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
DHWQO					0.02			0.0055				0.0013	50					0.07	0.02	0.02	0.27		0.001				10		0.015
Modelled TV					9																								
BH1	13/08/2024	5	5	2.16	0.31	801	0.005	0.0027	744	792	26,200	0.064	<10	0.61	0.4	1,890	14.8	0.263	0.381	0.381	0.78	285	0.002	13,600	2,980	48,900	294	135	1.36
80 th Percentile		1.6	1.6	2	0.13	579	0.01	0.00198	621	622	18,620	0	-	8.18	0.42	1486	10.59	0.1856	0.323	0.323	0.68	215	0.01	10660	2588	47749	133.8	21.3	0.955
BH2	13/08/2024	513	513	0.009	18	508	0.018	<0.0002	562	566	16,500	0.002	<10	5.42	22.5	1,160	15.7	0.0775	0.054	0.054	22.6	312	<0.0001	10,000	1,560	36,300	3,980	-	0.043
80 th Percentile		570	570	0.96	33.2	573	0.084	0.001	583	580	18,740	0	-	3.7	27.7	1144	42.88	0	0.064	0.064	27.7	320	0.01	10324	1633	44187	5932	816	0.051
BH4	13/08/2024	2	2	1.14	0.01	2.5	7E-04	<0.00005	4	2.5	65	0.0028	<10	-	<0.01	8	0.231	0.0042	0.016	0.016	0.01	3	<0.0001	36	30	176	2,920	-	0.031
80 th Percentile		2.2	2.2	1.552	0.03	2.99	0.003	1.00E-04	5	2.76	84.8	0.0095	-	2.27	0.08	7.6	0.2	0	0.045	0.045	0.08	3.2	0.001	40	28.6	281.1	1654	97.18	0.031
BH5	13/08/2024	6	6	0.036	0.08	11.7	7E-04	0.00026	20	11.2	355	0.0017	201	2.02	0.65	18	5.17	0.0638	0.403	0.403	1.05	3	<0.0001	199	74	766	856	-	0.103
80 th Percentile		11.4	11.4	3.986	0.03	12.7	0.003	#####	18	11.6	390.2	0.02	-	6.81	0.38	18.8	10.76	0.1324	1.047	1.048	1.14	2	0.001	211	73.4	1022	562.4	152	0.15
BH6	12/08/2024	8	8	0.02	0.24	21.9	8E-04	0.00022	29	31.4	642	0.002	<10	17.8	0.31	70	5.46	0.009	<0.020 ^{#1}	<0.020 ^{#1}	0.31	16	<0.0001	547	175	1,420	303	-	0.026
80 th Percentile		16.6	16.6	0.015	0.31	83.3	0.003	0.00038	106	100	2,645.20	0.00	-	9.6	0.38	281.4	5.694	0.009	0.02	0.02	0.38	32.6	0.001	1626	414	4100	183.6	1.2	0.024
BH7	13/08/2024	43	43	<0.005	1.34	41.7	0.008	<0.00005	39	43.8	1,210	<0.0005	<10	2.5	1.42	92	35.1	0.0058	<0.002	<0.002	1.42	34	<0.0001	769	322	2,750	1,500	710	0.01
80 th Percentile		71.6	71.6	0.01	2.09	52.3	0.005	1.00E-04	39.2	46	1,560	0	-	6.38	2.03	99.8	29.46	0.0044	0.02	0.02	2.03	37.6	0.001	805.8	336.8	4501	224	46.2	0.006

Notes
 Grey text denotes value less than LOR
 Orange cells denote concentrations exceeds the DHWQO
 Bold cells denote concentrations exceeds the modelled ammonia TV
 Red text denotes values exceeds the historical 80th percentile of groundwater based on data since 2015 to 2023
 Blue text denotes 80th percentile value
 #1 denotes reported analyte LOR is higher than requested analyte LOR

Step 2 Analyse trend within each well
Environmental risk assessment

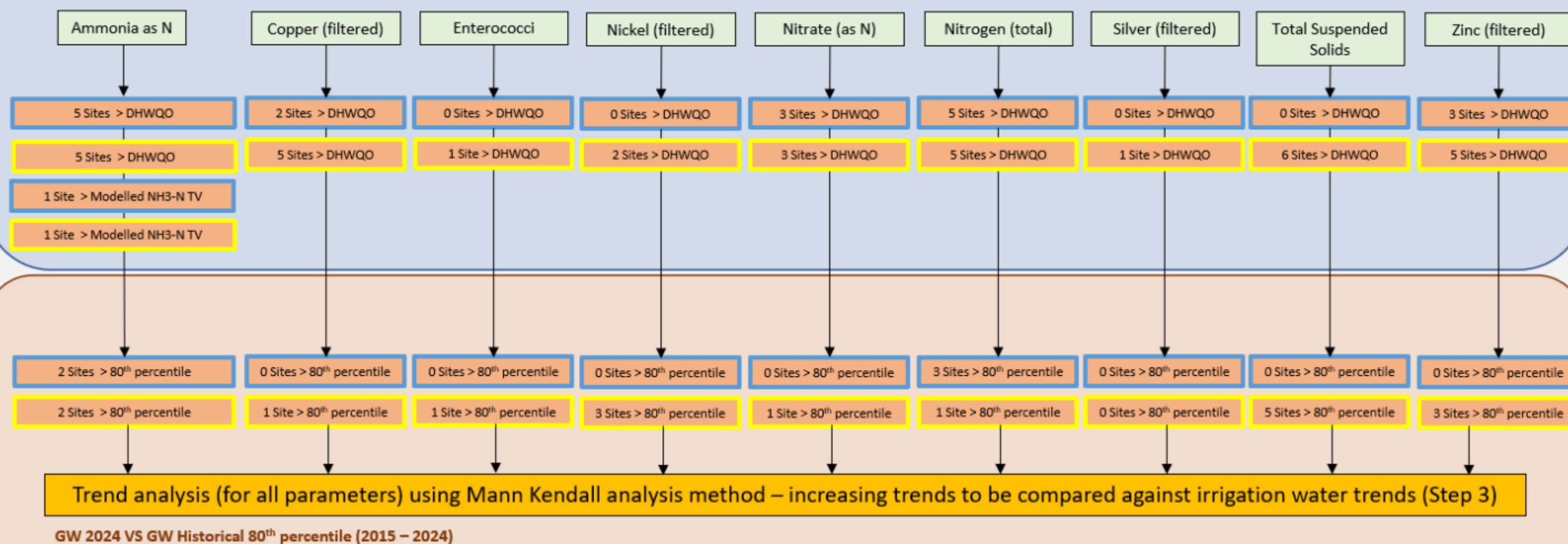
Inputs

Results

Wet Season

Dry Season

GW 2024 VS DHWQO/Modelled NH₃-N TV



* Wet season = November to April, Dry season = May to October

Figure 5-7: Summary of Step 2 Results – 2024 groundwater compared against the DHWQO, modelled NH₃-N and 80th percentiles (2015 – 2024)

5.1.7.2. Trend and Significance of Results

As per the risk assessment framework outlined in **Section 5.1.3**, a Mann–Kendall (MK) analysis was completed for the groundwater and irrigation water dataset to date. A MK analysis is used to analyse data collected over time to determine statistically significant trends (increasing or decreasing). The MK analysis has been incorporated into a broader tier assessment, which combines the MK results for individual parameters with their exceedances against respective TVs and 80th percentiles. A limitation of the MK trend approach is that a trend will be reported irrespective of the most recent laboratory results as the technique relies on the historical data record. For example, a parameter may report below LOR, but MK will still define a trend based on the historical dataset. Therefore, these results should be interpreted in light of this limitation.

The MK results for the groundwater parameters showing an increasing trend⁴ are presented in **Table 5-8**. In total, three groundwater parameters, pH (field) (BH4 wet season), oxidation reduction potential (BH5 wet season only) and temperature (field) (BH2 wet season only) show an increasing MK trend from the data collected between March 2015 and August 2024. Dissolved oxygen (%sat) also has an increasing trend but has been excluded from the below table as an increasing trend does not indicate decreasing water quality. Parameters (pH and TSS) have been ignored in past MK analyses due to naturally high concentrations of TSS and naturally low pH within the local groundwater. It is possible these results are due to the impact of Acid Sulfate soils (ERM, 2019) that have been identified to occur locally.

No trend was found from the MK analysis for seven parameters, despite these parameters having increased four consecutive times. Five of these parameters were metals in the BH1 dry season sampling (aluminium, copper, manganese, nickel and zinc). The remaining two parameters were pH (field) (BH4 wet season only) and oxidation reduction potential (BH2 dry season only).

Previous groundwater monitoring reports (CDM Smith, 2020) stated that the reasoning for the MK analysis being unable to detect a trend is due to the limited data set for each season. However, as the sample size of the dataset has grown, all parameters in the wet season are able to be considered by the MK analysis, though trends may still lack statistical significance. I.e., a MK trend can theoretically be calculated with as few as four samples, however, in practice, an environmental monitoring program requires that each well has sufficient sample to account for natural variability. In limited data sets, a MK trend can still be detected in situations where the data set is clearly increasing or decreasing, however, this suppresses the ability to detect potential trends in more variable wells until a larger data set is available.

To assist with the interim assessment of potential trends in wells with limited seasonal data, the consecutive increasing parameters as well as those identified by the MK analysis as having an increasing trend, have been considered for further analysis (under Step 3 of the risk assessment framework) and compared against the same irrigation water parameters to identify a potential correlation. The results of this analysis are provided in the following subsection (**Section 5.1.8**).

⁴ Defined by either a MK derived trend or as four consecutive increases between GMEs.

The use of parameters which have increased/decreased consecutively over four GMEs has been made to identify, where the MK analysis cannot (due to limited data), parameters which may (with less certainty) contain a statistical trend and therefore require consideration under the environmental risk assessment framework for further comparison against respective irrigation water parameters. The identification of such parameters, however, is not considered significant to trigger further statistical assessment or assessment of environmental risks and is used as a preliminary flag only to identify results which may eventually become statistically significant to be considered a trend by the MK analysis.

Table 5-8: Tiered environmental risk assessment framework – Step 2 results

Season	Parameter	Location	Min Concentration	Max. Concentration	Maan-Kendall Trend	General Trend ^[1] ^[2]	DHWQO	80 th Percentile
Wet Season	pH (field)	BH4	3.69	5.69	No Trend	Increasing	No criteria	Above Criteria
	Oxidation Reduction Potential (mV)	BH5	23.00	209.10	Increasing Trend	Increasing	No criteria	Above Criteria
	Temperature (field) (°C)	BH2	30.80	37.20	Increasing Trend	Variable	No criteria	Above Criteria
Dry Season	Oxidation Reduction Potential (mV)	BH2	-75.5	7.00	No Trend	Increasing	No criteria	Above Criteria
	Aluminium (mg/L)	BH1	0.92	2.16	No Trend	Increasing	No criteria	Above Criteria
	Copper (mg/L)	BH1	0.028	0.071	No Trend	Increasing	Above Criteria	Above Criteria
	Manganese (mg/L)	BH1	6.58	14.8	No Trend	Increasing	No criteria	Above Criteria
	Nickel (ug/L)	BH1	0.12	0.263	No Trend	Increasing	Above Criteria	Above Criteria
	Zinc (mg/L)	BH1	0.618	1.36	No Trend	Increasing	Above Criteria	Above Criteria

¹ Variable trend denotes trends have not increased or decreased over four consecutive GMEs.

² Increasing/decreasing refers to results for a parameter that has increased or decreased consecutively over four GME's.

General trends are shown to identify, where the MK analysis cannot (due to limited data), parameters which may (with less certainty) contain a statistical trend and therefore require consideration under the environmental risk assessment framework for further comparison against respective irrigation water parameters. The identification of such parameters, however, is not considered significant to trigger further statistical assessment or assessment of environmental risks and is used as a preliminary flag only to identify results which may eventually become statistically significant to be considered a trend by the MK analysis.

5.1.8. Results: Step 3 – Environmental Risk Assessment

5.1.8.1. Correlation between irrigation water and groundwater

MK results for groundwater and irrigation water have been analysed to understand whether a correlation between the irrigation water and groundwater potentially exists. A summary of the tiered assessment is provided in **Table 5-9**.

A total of eight parameters from the irrigation water and groundwater show an increasing trend identified by either a MK trend or as four consecutive GME increases (**Table 5-9**). pH (field), ORP and Temperature showed increasing MK trends with no MK increase in irrigation water.

Of these eight parameters, only two (copper and zinc) have corresponding trends between both irrigation water and groundwater. Copper and zinc show an increasing MK Trend for irrigation water with four increasing values over past GMEs, while groundwater results indicate these parameters have been increasing over the past four GMEs.

No further statistical assessment has been undertaken for these parameters as (i) no Mann Kendall Trend has been identified for groundwater, and (ii) BH1 is located outside of the Irrigation Area and expected to reflect background conditions. The lack of correlation between the trends in irrigation water and groundwater suggests that current irrigation practices present a low environmental risk to the groundwater system in the Wickham Point area.

Table 5-9: Tier assessment summary (2024) for irrigation and groundwater parameters with an increasing trend

Parameter	Units	Location	Season	Min Concentration	Max. Concentration	Maan-Kendall Trend	General Trend ^{[1] [2]}	DHWQO	EPL 217-03	80 th Percentile
Aluminium	mg/L	BH1	Dry	0.92	2.16	No trend found	Increasing	No Criteria		Above Criteria
Copper	mg/L	Irrigation	-	0.00	130.00	Increasing	Variable		Above Criteria	Above Criteria
		BH1	Dry	0.03	0.07	No trend found	Increasing	Above Criteria	-	Above Criteria
Manganese	mg/L	BH1	Dry	6.58	14.80	No trend found	Increasing	No Criteria	-	Above Criteria
Nickel	mg/L	BH1	Dry	0.12	0.26	No trend found	Increasing	Above Criteria	-	Above Criteria
Nitrate (as N)	mg/L	Irrigation	-	0.00	5.16	Increasing	Decreasing		Above Criteria	Above Criteria
pH (field)	pH units	BH4	Wet	3.69	5.69	No trend found	Increasing	No Criteria		Above Criteria
Dissolved Reactive Phosphorus	mg/L	Irrigation	-	0.00	0.77	Increasing	Increasing		Above Criteria	Above Criteria
Oxidation Reduction Potential	mV	BH5	Wet	23.00	209.10	Increasing	Variable	No Criteria	-	Above Criteria
		BH2	Dry	-75.50	7.00	No trend found	Increasing	No Criteria	-	Above Criteria
Temperature (Field)	°C	BH2	Wet	30.80	37.20	Increasing	Variable	No Criteria	-	Above Criteria
Zinc	mg/L	Irrigation	-	0.00	52.00	Increasing	Decreasing	-	Above Criteria	Above Criteria
		BH1	Dry	0.62	1.36	No trend found	Increasing	Above Criteria	-	Above Criteria

¹ Variable trend denotes trends have not increased or decreased over four consecutive GMEs.
² Increasing/decreasing refers to results for a parameter that has increased or decreased consecutively over four GME's.

General trends are shown to identify, where the MK analysis cannot (due to limited data), parameters which may (with less certainty) contain a statistical trend and therefore require consideration under the environmental risk assessment framework for further comparison against respective irrigation water parameters. The identification of such parameters, however, is not considered significant to trigger further statistical assessment or assessment of environmental risks and is used as a preliminary flag only to identify results which may eventually become statistically significant to be considered a trend by the MK analysis.

5.1.9. Data Management and Quality Control

5.1.9.1. Irrigation water monitoring

As outlined in **Section 3.1.2**, all samples and field measurements are collected by DLNG laboratory staff or environmental consultants, who are trained and experienced with the methodologies used.

With respect to the sampling of irrigation water, all samples are collected by DLNG laboratory staff in accordance with Santos document, *Laboratory Sampling – Monitoring of Wastewater [1U00-200-PRO-0596]*. All samples are analysed by laboratories accredited by the NATA for the analyses performed.

Field parameters (pH, DO, EC, TSS, turbidity and temperature) are recorded in-situ (i.e. directly from the discharge) using calibrated water quality meters, or using DLNG laboratory equipment.

All field measurements and analytical results are reviewed prior to being recorded in a Santos database. Where anomalous results are identified, the results are investigated further and additional sampling undertaken if required.

5.1.9.2. Groundwater monitoring

The QA and QC results detailed in Darwin LNG Groundwater Interim Report 2024 (CDM Smith, 2024f) and Darwin LNG Groundwater Interpretive Report 2024 (CDM Smith, 2024g) indicate the results are acceptable for the purposes of the groundwater assessment.

A QA/QC program was implemented during the GMEs (April and August 2024), as per Licence condition 71 and in accordance with the NEPM (2013) and Standard Operating Procedure Groundwater Sampling (CDM Smith, 2018). Key elements of the program included:

- Use of qualified staff for all sampling activities.
- Use of standardised sampling procedures including prescribed sample storage/transport and equipment decontamination.
- Use of NATA accredited laboratories to undertake the required analysis of samples.
- The collection and analysis of blind field duplicate and triplicate samples, trip blanks, field blanks and rinsate samples.

Consultant CDM Smith assessed the data against the Data Quality Indicators and data acceptance criteria in order to assess whether the Data Quality Objectives were satisfied. The assessment of QA/QC results across April and August 2024 GMEs found that overall, the majority of the laboratory QA/QC results achieved the data quality objectives for the GME, noting a couple of matrix outliers for the analysis which can be attributed to matrix interference (both wet and dry season GMEs) and holding time breaches (wet season GME), and are unlikely to affect the outcomes of the analysis undertaken for the monitoring programs. The field, laboratory and analytical QA/QC water results were within the specified requirements. Therefore, the data was considered to be valid and of sufficient quality to meet the data quality objectives for the assessment.

6. Conclusions

This Annual Environmental Monitoring Report has been prepared for the period of 1 January to 31 December 2024, in accordance with Condition 84 of the Licence. This report:

Has been prepared in accordance with the requirements of the 'Guidelines for Reporting on Environmental Monitoring' (NT EPA, 2016).

- Includes tabulated monitoring data (refer to Attachments).
- Includes long-term trend analysis for relevant parameters.
- Includes an assessment of the environmental impact of operations at DLNG.
- Includes analysis on the impacts of the operation of DLNG on ambient air quality.

The monitoring results obtained in 2024 indicate that the risk to the environment is low from the activities undertaken at DLNG in 2024.

7. 2023 Annual Report Errata

The 2024 Darwin LNG Annual Environmental Monitoring Report presented data that were subsequently reviewed and corrected. **Table 7-1** demonstrates the necessary corrections (no corrections at the time of reporting).

Table 7-1: 2023 Annual report corrections

2023 Darwin LNG Annual Environmental Monitoring Report information		Errata
N/A		

8. Certification

I Peter Kirkpatrick – General Manager DLNG have reviewed this report, and I confirm that to the best of my knowledge and ability all the information provided in the report is true and accurate.

9. References

- Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand, 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. ANZECC & ARMCANZ, Canberra.
- Brocklehurst, P. and Edmeades, B., 1996. The Mangrove Communities of Darwin Harbour. Technical Report No. R96/7. Department of Lands, Planning and Environment, Darwin.
- CDM Smith, 2022, DLNG Groundwater Monitoring Well BH3 discrepancies, Santos DLNG-1001264-LTR-001-0, prepared for Santos Ltd, 20 October 2022.
- CDM Smith, 2024a. DLNG Jetty Outfall Quarterly Monitoring Report – Q1 2024
- CDM Smith, 2024b. DLNG Jetty Outfall Quarterly Monitoring Report – Q2 2024
- CDM Smith, 2024c. DLNG Jetty Outfall Quarterly Monitoring Report – Q3 2024
- CDM Smith, 2024d. DLNG Jetty Outfall Quarterly Monitoring Report – Q4 2024
- CDM Smith, 2024e. Darwin LNG Mangrove Monitoring 2024 Annual Report
- CDM Smith, 2024f. Darwin LNG Groundwater Interim Report 2024, July 2024
- CDM Smith, 2024g. Darwin LNG Groundwater Interpretive Report 2024, October 2024
- Clark, M.W., McConchie, D., Lewis, D.W., Saenger, P., 1998. Redox stratification and heavy metal partitioning in *Avicennia*-dominated mangrove sediments: a geochemical model.
- ERM, 2019. Groundwater Solute Trend Assessment, ERM, Perth.
- Metcalf, K., 2007. The Biological Diversity, Recovery from Disturbance and Rehabilitation of Mangroves, Darwin Harbour, NT. Doctoral thesis, Charles Darwin University, Darwin.
- New South Wales Environmental Protection Authority, 2006. Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales. Department of Environment and Conservation NSW, Sydney.
- Northern Territory Environmental Protection Authority (NT EPA), 2016. Guidelines for Reporting on Environmental Monitoring. Environmental Protection Authority, Darwin.
- Peerzada, N., Eastbrook, C. and Guinea, M., 1990. Heavy metal concentration in *Telescopium* from Darwin Harbour, NT, Australia. *Marine Pollution Bulletin* 21(6): 307-308.
- Santos, 2022. Darwin LNG Annual Environmental Monitoring Report 2021
- Santos, 2023. Darwin LNG Annual Environmental Monitoring Report 2022
- Santos, 2024. Darwin LNG Annual Environmental Monitoring Report 2023
- Silva, C.A.R., Lacerda, L.D., Rezende, C.E., 1990. Heavy Metal Reservoirs in a Red Mangrove Forest. *Biotropica* 22, 339–345
- URS, 2004. Darwin LNG Plant Mangrove Monitoring Programme 2003-04 Annual Report - Results of Mangrove Mapping; Surveillance and Groundwater Monitoring; and Sedimentation/Erosion Monitoring. URS Australia, Perth.

Attachment A – Irrigation, Jetty Outfall and Sediment Pond data

IRRIGATION WATER (1SC-2919)

Date Sampled / Analyte	Sampling Reason (Compliance / Retest / Voluntary)	DO	Temp	Turbidity	pH	EC	TSS	TRH	E Coli	Enterococci	BOD	Chlorophyll a	TN	TP	NH3-N	NO3-N	NO2-N	PO4-P	As	Cd	Cr Total	Cr VI	Cu	Pb	Fe	Mn	Hg	Ni	Zn	Ag	Benzene	Toluene	Ethyl Benzene	Xylene	BTEX	
		mg/L	°C	NTU	pH units	µS/cm	mg/L	mg/L	MPN/100mL	MPN/100mL	mg/L	µg/L	mg/L	mg/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	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L		
EPL 217 Trigger Value		N/A	N/A	N/A	7-8.5	N/A	30	6	76	50	25	2	40	10	20	17	17	5	10	3.2	10	N/A	69	10	1,300	15,500	0.0001	290	1760	1.4	N/A	N/A	N/A	N/A	700	
LOR								0.65	10	<1	1	0.01	0.005	1	1	1	1	1	1	0.1	1	0.004	1	5	1	0.0001	1	5	1	0.5	0.5	0.5	0.5	1.5	3	
Testing Frequency		Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	Annual	Biannual	Biannual	Monthly	Biannual	Annual	Annual	Annual	Annual	Annual	Annual	Annual	Monthly	Annual	N/A	Monthly	Annual	Annual	Monthly	Annual	Monthly	Annual	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	
7/01/2015	C	0.07	34.8	13.60	8.41	399	7	<0.65	<1	1	250.0	<1	79.40	3	6,120	4,200	473	2,630	2	<0.1	<1	<0.005	159	<1	200	14	<0.0001	5	40	<1	<0.5	<0.5	<0.5	<1.5	<3	
4/02/2015	C	0.28	32.1	23.90	7.47	190	5	0.74	1	50	13.0	<1	10.60	1	3,340	<1	2	12	<1	<0.1	<1	<0.005	61	<1	220	48	<0.0001	2	15	<1	<0.5	<0.5	<0.5	<1.5	<3	
4/03/2015	C	0.10	35.9	8.96	7.36	195	8	<0.65	7	35	11.0	<1	8.59	1	6,050	732	31	616	<1	<0.1	<1	<0.005	23	32	150	32	<0.0001	<1	15	<1	<0.5	<0.5	<0.5	<1.5	<3	
4/03/2015	R																						25						15							
23/03/2015	R																						18						11							
1/04/2015	C	0.12	34.7	9.16	7.67	184	5	<0.65	67	48	6.7	<1	7.07	1	3,820	942	75	900	<1	<0.1	<2	<0.005	22	<1	64	27	<0.0001	<1	16	<1	<0.5	<0.5	<0.5	<1.5	<3	
6/05/2015	C	0.65	34.8	9.10	6.49	196	6	1.00	5	50	9.4	<1	7.56	1	4,560	2	7	539	<1	<0.1	<1	<0.005	15	<1	110	13	<0.0001	<1	8	<1	<0.5	<0.5	<0.5	<1.5	<3	
3/06/2015	C	0.25	36.6	12.70	7.27	296	6	<0.65	24	44	13.0	<1	7.43	1	45,670	89	26	600	<1	<0.1	<1	<0.005	15	<1	96	34	<0.0001	<1	8	<1	<0.5	0.5	<0.5	<1.5	<3	
1/07/2015	C	0.28	36.4	16.20	7.01	198	24	<0.65	11	99	22.0	<1	7.72	1	3,340	<1	2	12	<1	<0.1	<1	<0.005	13	<1	170	34	<0.0001	<1	26	<1	<0.5	<0.5	<0.5	<1.5	<3	
1/07/2015	R												7.56	1	4,220	<1	9	230	<1	<0.1	<1	<0.005	7	<1	300	43	<0.0001	<1	13	<1	<0.5	<0.5	<0.5	<1.5	<3	
5/08/2015	C	0.16	31.6	18.00	7.05	186	39	<0.65	206	1,203	24.0	<1	9.24	1	4,560	2	6	9	<1	<0.1	<1	<0.005	7	<1	300	43	<0.0001	<1	13	<1	<0.5	<0.5	<0.5	<1.5	<3	
10/08/2015	R							<1	84																											
2/09/2015	C	0.08	32.8	21.50	7.66	176	32	<0.65	3	26	35.0	<1	9.78	1	4,830	6	21	12	<1	<0.1	<1	<0.005	11	<1	420	32	<0.0001	1	13	<1	0.5	<0.5	<0.5	<1.5	<3	
7/10/2015	C	0.07	37.1	21.00	7.41	167	27	1.80	6	687	34.0	3	9.54	0.575	3,600	<1	<1	5	<1	<0.1	<1	<0.005	4	<1	160	32	<0.0001	<1	10	<1	<0.5	<0.5	<0.5	<1.5	<3	
21/10/2015	R																																			
28/10/2015	R																																			
4/11/2015	C	0.08	41.0	14.20	7.37	197	12	0.68	1	37	66.0	<1	7.48	0.61	1.92	4	<1	118	<1	<0.1	<1	<0.005	21	<1	310	31	<0.0001	<1	17	<1	0.7	<0.5	<0.5	<1.5	<3	
9/12/2015	C	0.05	33.7	3.35	7.96	762	<1	<0.65	<1	4	22.0	<1	8.84	0.78	3,170	166	98	293	<1	<0.1	<1	<0.005	13	<1	110	37	<0.0001	1	28	<1	0.60	<0.5	<0.5	<1.5	<3	
15/12/2015	V																			<1	<0.1	<1	<0.005	6	<1	120	40	<0.0001	<1	8	<1					
2016																																				
6/01/2016	C	0.17	37.4	11.80	7.24	187	17	<0.65	2	41	26	<1	4.19	0.25	2,370	<1	54	213	<1	<0.1	<1	<0.005	22	<1	62	38	<0.0001	2	33	<1	0.70	1.40	<0.5	2.70	5.00	
14/01/2016	R																																			
3/02/2016	C	0.17	36.4	2.82	7.70	212	0	<0.65	1	5	4.9	<0.2	7.07	0.75	3,530	741	207	548	<1	<0.1	<1	<0.005	21	<1	44	22	<0.0001	2	19	<1	<0.5	<0.5	<0.5	<1.5	<3	
18/02/2016	R																																			
2/03/2016	C	0.12	39.8	9.40	7.34	196	8	<0.65	<1	27	120	1	5.62	0.78	1,140	2	3	7	<1	<0.1	<1	<0.005	19	<1	25	39	<0.0001	<1	22	<1	<0.5	<0.5	<0.5	<1.5	<3	
2/03/2016	R																																			
9/03/2016	V																																			
4/04/2016	C	0.12	41.0	16.70	6.73	199	17	<0.65	1	5	68	<1	6.45	1.27	167	3	2	81	<1	<0.1	<1	<0.005	6	<1	56	41	<0.0001	<1	17	<1	<0.5	<0.5	<0.5	<1.5	<3	
4/06/2016	C	0.16	33.9	37.30	7.20	237	7	1.20	<1	38	140	2	5.60	0.97	798	<1	3	61	<1	<0.1	<1	<0.005	18	<1	130	50	<0.0001	2	24	<1	<0.5	<0.5	<0.5	<1.5	<3	
1/06/2016	C	0.12	33.0	16.30	7.24	272	22	<0.65	<10	31	100	<1	9.68	1.92	1,510	4	<1	580	<1	<0.1	<1	<0.005	11	<1	180	54	<0.0001	2	22	<1	<0.5	<0.5	<0.5	<1.5	<3	
5/07/2016	C	0.08	38.1	14.40	6.79	224	21	<0.65	<1	78	170	<1	7.09	0.95	133	3	2	8	<1	<0.1	<1	<0.005	9	<1	230	42	<0.0001	<1	12	<1	<0.5	<0.5	<0.5	<1.5	<3	
3/08/2016	C	0.14	38.3	12.70	6.93	214	21	<0.65	<10	<10	190	1	7.75	1.22	184	5	<1	12	<1	<0.1	<1	<0.005	9	<1	190	43	<0.0001	<1	15	<1	<0.5	<0.5	<0.5	<1.5	<3	
7/09/2016	C	0.09	39.9	13.20	7.59	239	14	<0.65	3	>2420	110	<1	7.28	1.25	191	8	3	19	<1	<0.1	<1	<0.005	5	<1	1,100	39	<0.0001	<1	<5	<1	<0.5	<0.5	<0.5	<1.5	<3	
5/10/2016	C	0.12	38.8	23.00	7.27	290	14	<0.65	23	219	29	<1	11.10	2.45	5,190	<1	<1	907	<1	<0.1	<1	<0.004	16	<1	560	44	<0.0001	1	16	<1	<0.5	<0.5	<0.5	<1.5	<3	
21/11/2016	C	0.05	39.9	15.60	6.81	231	21	<0.65	<10	<10	230	<1	6.69	1.16	1,320	2	1	65	<1	<0.1	<1	<0.004	8	<1	390	44	<0.0001	1	15	<1	<0.5	<0.5	<0.5	<1.5	<3	
7/12/2016	C																																			
16/12/2016	C																																			
19/12/2016	C	0.15	32.7	9.16	7.57	320	18					<1	17.40	0.70	13,500	<1	<1	169	<1	<0.1	<1	<0.004	10	<1	450	78	<0.0001	3	<5	<1	<0.5	0.70	<0.5	1.90	3.00	
2017																																				
4/01/2017	C	0.10	35.4	11.20	6.57	306	16	<0.65	<10	<10	18.0	<1	13.60	0.93	9,510	<1	2	202	<1	<0.1	<1	<0.004	15	<1	180	75	<0.00005	2	10	<1	<0.5	<0.5	<0.5	<1.6	<3.1	
1/02/2017	C	0.18	33.8	10.30	7.18	259	9	<0.65	<10	<10	8.1	1	11.50	0.60	7,170	61	8	134	<1	<0.1	<1	<0.004	18	<1	250	42	<0.0001	2	14	<1	0.70	0.60	<0.5	<1.8	<3.6	
1/03/2017	C	0.07	40.1	8.61	7.71	198	7	<0.65	<10	<10	33.0	<1	12.70	0.65	6,300	2	7	294	<1	<0.1	<1	<0.004	8	<1	110											

Date Sampled / Analyte	Sampling Reason (Compliance / Retest / Voluntary)	DO	Temp	Turbidity	pH	EC	TSS	TRH	E Coli	Enterococci	BOD	Chlorophyll a	TN	TP	NH3-N	NO3-N	NO2-N	PO4-P	As	Cd	Cr Total	Cr VI	Cu	Pb	Fe	Mn	Hg	Ni	Zn	Ag	Benzene	Toluene	Ethyl Benzene	Xylene	BTEX
		mg/L	°C	NTU	pH units	µS/cm	mg/L	mg/L	MPN/100mL	MPN/100mL	mg/L	µg/L	mg/L	mg/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	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
EPL 217 Trigger Value		N/A	N/A	N/A	7-8.5	N/A	30	6	75	50	25	2	40	10	20	17	17	5	10	3.2	10	N/A	69	10	1,300	15,500	0.0001	290	1780	1.4	N/A	N/A	N/A	N/A	700
LOR		N/A	N/A	N/A	N/A	N/A		0.65	10	10	<1	1	0.01	0.005	1	1	1	1	1	0.1	1	0.004	1	1	5	1	0.0001	1	5	1	0.5	0.5	0.5	1.5	3
Testing Frequency		Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	Annual	Biannual	Biannual	Monthly	Biannual	Annual	Annual	Annual	Annual	Annual	Annual	Annual	Monthly	Annual	N/A	Monthly	Annual	Annual	Annual	Monthly	Annual	Monthly	Annual	Monthly	Monthly	Monthly	Monthly	Monthly
2021																																			
6/01/2021	C	0.14	38.0	14.4	7.03	222	28		<10	<10	190		5.66	0.445	496	2	<1	13	<0.5	<0.05	<0.5		6	<0.2	200	40	<0.0001	<0.5	2	<1	<1	1	<1	<1	<2
20/01/2021	V				6.90	194	17																												
27/01/2021	V				6.80	173	22																												
3/02/2021	C	0.15	32.2	15.6	6.90	210	35						4.07	0.67	578	2	<1	83		<0.1			10			<0.0001		<5		<0.5	<0.5	<0.5	<1.5	<3	
10/02/2021	V				6.84		27																												
17/02/2021	V				6.91		24																												
23/02/2021	V				7.00		16																												
3/03/2021	C	0.13	38.7	13.2	6.83	26		<0.65	10	<10	85	<1	3.62	0.41	466	2	<1	70	<1	<0.1	<1		7	<1	400	43	<0.0001	<1	8	<1	<0.5	<0.5	<0.5	<1.5	<3
10/03/2021	V				6.93		22																												
15/03/2021	V				6.93		24																												
24/03/2021	V				6.83		87																												
31/03/2021	V				7.22		6																												
7/04/2021	C		27.1	12.3	6.76	205	13						1.15	0.56	641	2	<1	86		<0.1			19			<0.0001		20		<2.5	<2.5	<2.5	<7.5	<15	
14/04/2021	V				6.27		11																												
21/04/2021	V				6.62		13		<10	<10	230																								
28/04/2021	V				6.87		15																												
5/05/2021	C	0.13	33.0	18.10	6.85	315	14						7.82	0.74	1,250	4	<1	180		<0.1			25			<0.0001		6		<0.5	<0.5	<0.5	<1.5	<3	
19/05/2021	V				6.83		12																												
2/06/2021	C	0.14	33.0	24.40	6.84	276	18						8.04	1.64	2,730	2	2	137		<0.1			16			<0.0001		<5		<0.5	<0.5	<0.5	<1	<3	
16/06/2021	V		24.7		7.09		8																												
7/07/2021	C	0.10	35.9	12.70	6.83	159	27				100		4.61	0.36	226	<1	2	8		<0.1			6			<0.0001		<5		<0.5	<0.5	<0.5	<1	<3	
19/07/2021	V		24.4		6.90		28																												
4/08/2021	C	0.12	30.4	19.40	6.99	387	17				190		9.56	1.56	121	2	<1	287		<0.1			13			<0.0001		5		<0.5	<0.5	<0.5	<1	<3	
16/08/2021	V		27.1		6.78		16																												
1/09/2021	C	0.14	32.4	17.70	6.77	289	11				15												18			<0.0001		<5		<0.5	<0.5	<0.5	<1	<3	
22/09/2021	V		24.4		7.03		31				42																								
6/10/2021	C	0.07	34.4	35.60	6.79	261	32				15		11.30	0.38	375	<1	3	4		0.1			4						8		1	2	<0.5	<1.5	4
27/10/2021	C							<10	<10																										
10/11/2021	C	0.15	23.8	27.20	7.32	859	32				<1	<1								0.1						<0.0001			120		<0.5	<0.5	<0.5	<1.5	<3
1/12/2021	C	0.12	26.7	11.00	7.34	197	19				95.0		6.49	0.69	1,840	70	34	533		<0.1						<0.0001	<0.0001		23		<0.5	<0.5	<0.5	<1.5	<3
13/12/2021	C																									<0.0001			5						
2022																																			
5/01/2022	C	0.14	37.7	19.80	7.01	166	20				46.0		5.52	0.39	460	1	1	5		<0.1			37			<0.0001		6		0.6	0.8	<0.5	2.3	4	
1/02/2022	C	0.14	33.1	11.40	7.18	175	13		10	<10	8.9	<1	4.61	0.70	1,790	7	1	6	<1	<0.1	<1		18	<1	510	32	<0.0001	<1	20	<1	<0.5	<0.5	<0.5	<1.5	<3
8/03/2022	C	0.17	27.4	5.50	7.12	125	6				3.0		4.49	0.35	1,710	133	222	5		0.1			12			<0.0001		10		<0.5	<0.5	<0.5	<1.5	<3	
6/04/2022	C	0.15	37.8	0.48	7.04	157	14				10.0		4.70	0.55	1,800	1	2	7		<0.1			16			<0.0001		<5		<0.5	<0.5	<0.5	<1.5	<3	
4/05/2022	C	0.20	36.8	11.50	7.00	146	8				3.4		2.19	0.55	351	<1	<1	97		<0.1			11			<0.0001		7		<0.5	<0.5	<0.5	<1.5	<3	
1/06/2022	C	0.07	34.5	7.53	7.31	197	6						7.87	0.71	679	5,160	856	358		<0.1			15			<0.0001		13		<0.5	<0.5	<0.5	<1.5	<3	
12/07/2022	C	0.17	27.4	3.24	7.26	246	0				2.3		6.22	0.81	2,050	3,230	197	769		<0.1			20			<0.0001		11		<0.5	<0.5	<0.5	<1.5	<3	
3/08/2022	C	0.54	35.1	0.89	7.40	214	1				6.3									<0.1			26			<0.0001		16		<0.5	<0.5	<0.5	<1.5	<3	
7/09/2022	C	0.70	37.1	0.31	7.40	241	3				6.1									<0.1			45			<0.0001		15		<0.5	<0.5	<0.5	<1.5	<3	
5/10/2022	C	0.22	35.5	5.01	7.63	205	6													<0.1			27			<0.0001		11		<0.5	<0.5	<0.5	<1.5	<3	
2/11/2022	C	2.26	34.3	2.10	7.25	344	5					<1								<0.1			68			<0.0001		51		<0.5	<0.5	<0.5	<1.5	<3	
7/12/2022	C	0.73	33.8	3.87	7.16	319	1																												
2023																																			
4/01/2023	C	0.39	34.3	1.19	7.01	161	2													<0.1			70			<0.0001		52		<0.5	<0.5	<0.5	<1.5	<3	
1/02/2023	C	0.19	36.7	2.20	7.23	199	2	<0.65		<10	3.6	<1	9.07	0.52	3,710	4,300	26		<1	<0.1	<1		50	<1	52	31	<0.0001	<1	15	<1	<0.6	<0.6	<0.6	<1.6	<4
1/03/2023	C	2.29	36.8	1.24	7.42	200	0													<0.1			130			<0.0001		48		<0.5	<0.5	<0.5	<1.5	<3	
13/03/2023	Retest																			<0.1						<0.0001		120							
20/03/2023	Retest																			<0.1						<0.0001		37							
5/04/2023	C	0.49	35.6	1.18	7.81	189	8				<1									<0.2			43			<0.0001		12		<0.5	<0.5				

JETTY OUTFALL (1SC-2920)

Date Sampled / Analyte	Sampling Reason (Compliance / Ratest / Voluntary)	DO	Temp	Turbidity	pH	EC	TDS	TSS	TRH	E Coli	Enterococci	BOD	Chlorophyll a	TN	TP	NH3-N	NO3-N	NO2-N	P04-P	As	Cd	Cr Total	Cu	Pb	Fe	Mn	Hg	Ni	Zn	Ag	Benzene	Toluene	Ethyl Benzene	Xylene	BTEX
		mg/L	°C	NTU		µS/cm	mg/L	mg/L	mg/L	MPN/100mL	MPN/100mL	mg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EPL 217 Trigger Value		N/A	N/A	20	7-8.5	N/A	N/A	30	6	75	50	25	N/A	40	10	337	764	27	51	N/A	8.5	4.4	3	4.4	N/A	N/A	0.4	70	15	1.4	N/A	N/A	N/A	N/A	700
LGR		1	N/A	1	N/A	1	N/A	1	0.65	10	10	<1	1	0.01	0.005	1	1	1	1	0.0001	0.1	1	1	1	1	5	1	5	1	5	0.5	0.5	0.5	1.5	3
Testing Frequency		Monthly	Monthly	Monthly	Monthly	Monthly	N/A	Monthly	Biannual	Biannual	Biannual	Biannual	N/A	Quarterly	Biannually	Quarterly	Quarterly	Quarterly	Biannually	Biannually	Quarterly	Biannually	Quarterly	Biannually	Biannually	Biannually	Quarterly	Quarterly	Biannually	Biannually	Biannually	Biannually	Biannually	Biannually	Biannually
2016																																			
4/01/2016	C	0.03	31.0	2.23	7.68	824	574	0	<0.65	<10	<10	1.1	6	1.26	0.11	51	524	6	35	<1	<0.1	<1	<1	<1	140	2	<0.0001	1	<5	<1	<0.5	<0.5	<0.5	<1.5	<3
6/01/2016	C	0.05	33.5	3.08	8.06				<0.65	<1	<1	6.3	<1	1.34	0.14	118	315	32	64	<1	<0.1	<1	2	<1	240	8	<0.0001	2	<5	<1	<0.5	<0.5	0.6	3.8	5
14/01/2016	R																																		
3/02/2016	C	0.29	33.4	2.08	7.99	900	600	0	<0.65	<1	<1	2.9	<0.2	1.48	0.12	184	60	36	42	<1	<0.1	<1	<1	<1	170	21	<0.0001	2	<5	<1	<0.5	<0.5	<0.5	<1.5	<3
2/03/2016	C	3.21	35.0	0.77	8.15	857	576	0	<0.65	<1	629	<5	<0.2	1.37	0.10	162	366	14	38	<1	<0.1	<1	<1	<1	230	12	<0.0001	2	6	<1	<0.5	<0.5	<0.5	2.2	<3
4/04/2016	C	0.08	35.6	2.38	8.05	907	611	0	<0.65	<1	<1	3.3	<1	1.79	0.18	73	383	8	22	<1	<0.1	<1	<1	<1	260	3	<0.0001	1	<5	<1	<0.5	<0.5	<0.5	2.1	<3
4/05/2016	C	3.93	33.8	0.58	8.05	729	497	0	<0.65	<1	<1	2.3	<1	1.76	0.14	165	343	3	20	<1	<0.1	<1	<1	<1	270	6	<0.0001	1	9	<1	<0.5	<0.5	<0.5	<1.5	<3
1/06/2016	C	0.16	23.0	1.12	8.09	760	524	0	<0.65	<1	<1	2.4	<1	1.68	0.11	254	320	3	26	<1	<0.1	<1	<1	<1	220	2	<0.0001	1	<5	<1	<0.5	<0.5	<0.5	<1.5	<3
5/07/2016	C	0.17	30.6	1.76	8.02	775	550	0	<0.65	<1	<1	4.1	<1	1.90	0.12	369	295	5	42	<1	<0.1	<1	<1	<1	180	20	<0.0001	2	<5	<1	<0.5	<0.5	<0.5	<1.5	<3
3/08/2016	C	2.83	30.5	0.66	8.00	689	502	0	<0.65	<1	<1	3.2	<1	1.70	0.10	260	435	13	71	<1	<0.1	<1	<1	<1	180	29	<0.0001	1	<5	<1	<0.5	<0.5	<0.5	<1.5	<3
7/09/2016	C	0.03	32.9	2.50	7.76	703	494	0	<0.65	<1	<1	2.0	<1	1.22	0.08	113	484	10	31	<1	<0.1	<1	<1	<1	390	8	<0.0001	2	<5	<1	<0.5	<0.5	<0.5	<1.5	<3
5/10/2016	C	6.45	33.8	0.32	8.00	702	491	0	<0.65	<1	<1	2.4	<1	1.86	0.11	348	453	5	69	<1	<0.1	<1	<1	<1	400	12	<0.0001	2	5	<1	<0.5	<0.5	<0.5	<1.5	<3
2/11/2016	C	6.52	33.2	0.26	7.50	795	457	0	<0.65	<10	<10	3.7	<1	1.36	0.09	61	326	27	45	<1	<0.1	<1	<1	<1	350	8	<0.0001	2	<5	<1	<0.5	<0.5	<0.5	2	2
7/12/2016	C	1.01	34.8	2.12	7.89	815	550	0	<0.65	<1	40	2.5	<1	1.30	0.07	40	474	8	27	<1	<0.1	<1	<1	<1	190	2	<0.0001	1	<5	<1	<0.5	<0.5	<0.5	<1.5	<3
2017																																			
4/01/2017	C	0.03	31.0	2.23	7.68	826	561	1	<0.65	<10	<10	1.1	6	1.26	0.11	51	524	6	35	<1	<0.1	<1	<1	<1	140	2	<0.0005	1	<5	<1	<0.5	<0.5	<0.5	<1.5	<3
1/02/2017	C	6.34	33.5	0.28	7.32	99	68	1	<0.65	<10	<10	1.4	<1	1.40	0.11	101	667	10	46	<1	<0.1	<1	1	<1	300	3	<0.0001	1	<5	<1	<0.5	<0.5	<0.5	<1.5	<3
1/03/2017	C	3.34	33.2	0.63	8.10	780	538	1	<0.65	<10	<10	0.63	<1	0.81	0.07	113	156	10	62	<1	<0.1	<1	<1	<1	270	7	<0.0001	<1	<5	<1	<0.5	<0.5	<0.5	<1.5	<3
5/04/2017	C	6.77	33.6	0.49	8.00	730	496	0	<0.65	<10	<10	6.5	<1	1.79	0.05	335	442	10	23	<1	<0.1	<1	<1	<1	230	8	<0.0001	1	<5	<1	<0.5	<0.5	<0.5	8.80	<10.3
3/05/2017	C	0.15	32.7	2.74	8.20	702	477	1	<0.65	<10	<10	<1	<1	2.44	0.09	148	437	14	21	<1	<0.1	1	2	<1	490	4	<0.0001	2	7	<1	<0.5	<0.5	<0.5	<1.5	<3
7/06/2017	C	6.96	30.2	0.23	8.04	590	401	0	<0.65	<10	<10	4.6	<1	1.56	0.08	250	482	6	52	<1	<0.1	<1	1	<1	420	4	<0.0001	<1	<5	<1	<0.5	<0.5	<0.5	<1.5	<3
5/07/2017	C	0.25	31.9	1.88	7.82	685	466	0	<0.65	<10	<10	3.5	<1	1.34	0.06	156	327	4	17	<1	<0.1	<1	2	<1	860	8	<0.0001	<1	7	<1	<0.5	<0.5	<0.5	<1.5	<3
2/08/2017	C	0.16	30.6	3.76	8.04	704	478	0	<0.65	<1	<1	3.9	<1	1.73	0.07	316	312	7	11	<1	<0.1	<1	1	<1	470	6	<0.0001	<1	<5	<1	<0.5	<0.5	<0.5	<1.5	<3
6/09/2017	C	1.52	32.20	6.43	7.71	715	486	0	<0.65	<1	<10	10.0	<1	1.74	0.08	509	440	10	20	<1	<0.1	<1	7	<1	150	21	<0.0001	3	10	<1	<0.5	<0.5	<0.5	<1.5	<3
12/09/2017	R																																		
4/10/2017	C	0.16	33.7	2.98	7.90	697	481	0	<0.65	<10	<10	26.0	1	2.10	0.14	562	494	12	47	<1	<0.1	<1	<1	<1	110	10	<0.0001	<1	<5	<1	<0.5	<0.5	<0.5	<1.5	<3
1/11/2017	C	0.13	33.8	3.09	7.99	728	502	0		<1	<1	9.9									<0.1		1				<0.0001		<5		<0.5	<0.5	<0.5	2.00	<3
6/12/2017	C	0.19	33.5	2.31	7.83	708	489	0		<1		17.0									<0.1		<1				<0.0001		<5		<0.5	<0.5	<0.5	<1.5	<3
2018																																			
3/01/2018	C	1.63	33.7	1.29	8.10	673		0				20		2.14	0.045	370	325	43	8		<0.1		<1				<0.0001		7		<0.5	<0.5	<0.5	2.10	<3
7/02/2018	C	1.24	32.1	2.42	6.53	627						5.1		2.63	0.080	648	150	56	7		<0.1		<1				<0.0001		13		<0.5	<0.5	<0.5	1.80	<3
7/03/2018	C	1.94	32.6	1.42	7.52	717		0		<10	<10	8.1		3.07	0.050	839	189	78	7	<1	<0.1		<1	300	16	<0.0001		<5	<1	<0.5	<0.5	<0.5	<1.5	<3	
4/04/2018	C	3.29	33.1	1.69	7.58	421		0				<1		2.82	0.120	497	19	4	17		<0.1		<1				<0.0001		<5		<0.5	<0.5	<0.5	2.10	<3
2/05/2018	C	0.15	32.2	2.07	7.80	306		0				9.9		2.38	0.100	279	12	177	14		<0.1		<1				<0.0001		5		<0.5	<0.5	<0.5	<1.5	<3
6/06/2018	C	6.50	30.4	0.53	7.93	570		0				<1		5.82	0.080	134	3,270	421	71		<0.1		13				<0.0001		6		<0.5	<0.5	<0.5	<1.5	<3
6/06/2018	R																				<0.1		2				<0.0001		28						
18/06/2018	R																																		
4/07/2018	C	5.22	30.1	0.88	7.94	464		0				<1		3.14	0.065	1,150	430	16	20		<0.1		<1				<0.0001		7		<0.5	<0.5	<0.5	<1.5	<3
1/08/2018	C	6.75	30.5	2.45	8.15	780		0				22		3.35	0.055	843	223	91	15		<0.1		<1				<0.0001		<5		<0.5	<0.5	<0.5	<1.5	<3
5/08/2018	C	2.13																																	

Date Sampled / Analyte	Sampling Reason (Compliance / Retest / Voluntary)	DO	Temp	Turbidity	pH	EC	TDS	TSS	TRH	E Coli	Enterococci	BOD	Chlorophyll a	TN	TP	NH3-N	NO3-N	NO2-N	PO4-P	As	Cd	Cr Total	Cu	Pb	Fe	Mn	Hg	Ni	Zn	Ag	Benzene	Toluene	Ethyl Benzene	Xylene	BTEX	
		mg/L	°C	NTU		µS/cm	mg/L	mg/L	mg/L	MPN/100mL	MPN/100mL	mg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L		
EPL 217 Trigger Value		N/A	N/A	20	7-8.5	N/A	N/A	30	6	75	50	25	N/A	40	10	337	764	27	51	N/A	5.5	4.4	3	4.4	N/A	N/A	0.4	70	15	1.4	N/A	N/A	N/A	N/A	700	
LOR		N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.65	10	10	<1	1	1.64	0.015	224	318	19	8	1	0.1	1	1	1	1	0.0001	1	5	1	5	1	0.5	0.5	0.5	1.5	3
Testing Frequency		Monthly	Monthly	Monthly	Monthly	Monthly	N/A	Monthly	Biannual	Biannual	Biannual	Biannual	N/A	Quarterly	Biannually	Quarterly	Quarterly	Quarterly	Biannually	Biannually	Quarterly	Biannually	Quarterly	Biannually	Biannually	Biannually	Biannually	Quarterly	Quarterly	Biannually	Biannually	Biannually	Biannually	Biannually	Biannually	
22/08/2022	C	4.27	30.7	0.65	7.84	1,021	712	0					<1																							
7/09/2022	C	3.97	32.8	0.31	8.00	828		1																												
5/10/2022	C	2.62	33.7	0.69	7.98	984		3																												
2/11/2022	C	0.15	35.8	2.04	7.53	814		6																												
16/11/2022	C	5.11	33.00	0.56	7.69	698.00	404	0	0.13	<10	<10	4.0		1.25	0.03	183	337	3	16	<1	<0.1	<1	<1	<1	39	3	<0.0001	3	15	<1	<0.5	<0.5	<0.5	<1	<3	
7/12/2022	C	5.46	36.1	3.01	8.20	641		1																												
2023																																				
4/01/2023	C	4.80	31.7	0.51	7.61	732		2																												
1/02/2023	C	3.25	31.9	0.48	7.48	776		3	<0.05											<1	<0.1	<1	1	<1	15	7	<0.0001	1	11	<1	<0.5	<0.5	<0.5	<1	<3	
27/02/2023	C	3.62	28.4	1.20	7.55	650	333.3	9					16	1.20	0.035	249	106	6	3		<0.1		1					2	<0.5							
1/03/2023	C	4.51	32.0	1.52	7.62	742		0				15.0																								
5/04/2023	C	3.23	34.7	0.56	7.68	677		3																												
3/05/2023	C	4.37	33.9	0.62	7.97	731		0																												
31/05/2023	C	6.24	28.8	0.36	7.69	573	397	0	0.16	<10	<10			0.85	0.035	295	1	3.5	3.5																	
7/06/2023	C	7.00	30.2	0.36	7.73	605		0																												
5/07/2023	C	6.46	30.0	0.80	7.85	906		0																												
2/08/2023	C	6.51	29.6	0.51	8.07	811		0																												
28/08/2023	C	6.44	31.0	0.39	8.39	750		0					1	1.03	0.01	40	441	2	6		<0.1		2					2	12							
6/09/2023	C	6.25	32.0	0.63	8.13	778		0																												
4/10/2023	C	5.95	32.9	0.53	8.12	920		0																												
1/11/2023	C	6.28	34.5	0.52	8.43	769		0		<10	<10																									
8/11/2023	C	6.29	34.0	0.48	8.66	814		0	0.12	<1		3.0	<1	0.91	0.015	37	334	1	7	<1	<0.1	<1	1	<1	120	5	<0.0001	2	8		<0.5	<0.5	<0.5	<1	<3	
6/12/2023	C	2.73	31.1	0.89	8.05	692		0																												
19/12/2023	C	N/A	N/A	N/A	N/A	N/A		0		N/A	<10																									
2024																																				
10/01/2024	C	3.50	30.9	1.68	7.87	738.6		0																												
7/02/2024	C	2.78	30.1	0.96	7.91	715.1		0	<0.05	<10	<10	<1	<1	1.04	0.054	8	654	<1	55	<1	<0.1	<1	<1	<1	210	5	<0.0001	3	9	<1	<0.5	<0.5	<0.5	<1	<3	
5/03/2024	C	3.27	30.0	1.09	7.97	741.6	363	0					<1							<1	<0.1	<1	2	<1	190	10	<0.0001	3	12	<1	<0.5	<0.5	<0.5	<1	<3	
3/04/2024	C	3.97	30.3	0.56	7.86	663.3		0																												
1/05/2024	C	6.39	34.2	0.72	8.20	597.6		0																												
15/05/2024	C	4.95	27.7	0.50	8.01	574.5	370	0	<0.05	<10	<10	<1	<1	0.88	0.085	2	459	2	59	<1	<0.1	<1	1	<1	110	5	<0.0001	3	11	<1	<0.5	<0.5	<0.5	<1	<3	
5/06/2024	C	3.85	28.6	0.78	7.71	607.0		0																												
3/07/2024	C	1.81	27.3	0.74	7.76	745.9		2																												
7/08/2024	C	2.27	27.8	1.51	7.74	752.9		0																												
14/08/2024	C	1.91	25.7	0.98	7.68	800.7	392	0						0.99	0.205	11	434	<1	118		<0.2		2					6	45							
4/09/2024	C	1.59	29.6	1.22	7.74	842.8		0																												
21/10/2024	C	1.92	30.9	1.42	7.81	853.7		0																												
11/11/2024	C	2.02	32.2	4.74	7.98	876.6	430	0	<0.05	<10	<10	<1		1.20	0.135	180	317	4	103	<1	<0.1	1	<1	<1	120	54	<0.0001	2	15	<1	<0.5	<0.5	<0.5	<1	<3	
4/12/2024	C	1.97	30.1	0.35	7.99	890.1		2																												

SEDIMENT POND 1 (1SC-2915)

[illegible]

Date Sampled / Analyte	Sampling Reason (Compliance / Release / Voluntary)	DO	Temp	Turbidity	pH	EC	TDS	TSS	TRH	E Coll	Enterococci	BOD	Chlorophyll a	TN	TP	NH3-N	NO3-N	NO2-N	PO4-P	TKN	Al	As	Cd	Cr Total	Cr VI	Cu	Pb	Fe	Mn	Hg	Ni	Zn	Ag	Benzene	Toluene	Ethyl Benzene	Xylene	BTEX
		mg/L	°C	NTU		µS/cm	mg/L	mg/L	mg/L	MPN/100mL	MPN/100mL	mg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	mg/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	µg/L	µg/L	µg/L	
EPL 217 Trigger Value		N/A	N/A	28	6-8.5	N/A	N/A	75	6	305	261	25	N/A	40	10	94	145	17	5	N/A	N/A	N/A	5.5	4.4	N/A	2	4.4	N/A	N/A	0.4	70	1000	1.4	N/A	N/A	N/A	N/A	700
LOR		N/A	N/A		N/A				0.65	10	10	<1	N/A	0.01	0.005	1	1	1	1	10	5	1	0.1	1	0.004	1	1	5	1	0.0001	1	5	1	0.5	0.5	0.5	1.5	3
Testing Frequency		Monthly	Monthly	Monthly	Monthly	Monthly	N/A	Monthly	Annual	Biannual	Biannual	Monthly	N/A	Annual	Annual	Annual	Annual	Annual	Annual	N/A	N/A	Annual	Monthly	Annual	Monthly	Annual	Annual	Annual	Monthly	Annual	Monthly	Annual	Monthly	Monthly	Monthly	Monthly	Monthly	
2018																																						
3/01/2018	C	9.02	31.3	1.23	7.05	114						5.0													<1				<0.0001		93		<0.5	<0.5	<0.5	<1.5	<3	
7/02/2018	C	5.18	29.0	1.84	5.91	64						<1													<1				<0.0001		180		<0.5	<0.5	<0.5	<1.5	<3	
7/03/2018	C	5.34	31.5	1.43	7.55	109				31	62	1.0		0.22	0.01	11	18	2	6	<0.01		<1	0.2	<1	<0.004	<1	<1	130	47	<0.0001	<1	120	<1	<0.5	<0.5	<0.5	<1.5	<3
4/04/2018	C	5.5	30.7	1.20	7.66	137						1.3												<1					<0.0001		84		<0.5	<0.5	<0.5	<1.5	<3	
2/05/2018	C	5.94	29.1	0.75	7.22	137						<1		0.22	0.01	12	5	<1	2	<0.01				<1				<0.0001		24		<0.5	<0.5	<0.5	<1.5	<3		
6/06/2018	C	7.65	24.3	0.80	6.76	148						0		0.26	0.01	4	8	<1	1	0.29				<1				<0.0001		62		<0.5	<0.5	<0.5	<1.5	<3		
4/07/2018	C	7.36	28.1	0.49	7.75	111						0		0.24	<0.005	13	4	<1	3	0.20				<1				<0.0001		20		<0.5	<0.5	<0.5	<1.5	<3		
1/08/2018	C	0.56	26.9	0.71	7.56	146						0		0.5	<0.005	4	<1	2	4	0.19				<1				<0.0001		22		<0.5	<0.5	<0.5	<1.5	<3		
5/09/2018	C	6.13	30.3	0.77	6.95	164						0		0.26	<0.005	4	1	1	<1	0.33				<1				<0.0001		9		<0.5	<0.5	<0.5	<1.5	<3		
3/10/2018	C	5.79	29.4	1.50	7.46	151				52	20	<1		0.26	0.005	9	1	<1	2	0.17				<1				<0.0001		7		<0.5	<0.5	<0.5	<1.5	<3		
7/11/2018	C	5.61	30.3	0.82	6.95	172						<1		0.73	0.01	4	1	<1	<1	0.54				<1				<0.0001		<5		<0.5	<0.5	<0.5	<1.5	<3		
5/12/2018	C	5.64	32.4	0.74	6.34	152						0		0.21	0.01	8	1	2	1	0.16				<1				<0.0001		25		<0.5	<0.5	<0.5	<1.5	<3		
2019																																						
2/01/2019	C	5.07	30.1	0.96	6.51	121						2.8		0.32	0.01	8	42	<1	<1	0.28				0.1				<0.0001		130		<0.5	<0.5	<0.5	<1.5	<3		
6/02/2019	C	4.71	28.1	1.30	6.51	72						1.2		0.20	0.01	11	30	3	4	0.17				0.1				<0.0001		100		<0.5	<0.5	<0.5	<1.5	<3		
6/03/2019	C	4.81	31.9	1.03	6.42	74			<0.65	20	<10	1.9		0.18	0.02	10	<1	<1	16	0.02	<5	<1	<0.1	<1	<0.004	<1	<1	87	260	<0.0001	<1	72	<1	<0.5	<0.5	<0.5	<1.5	<3
18/03/2019	R																								<1	<1	<1	140	240	<0.0001	<1		<1	<0.5	<0.5	<0.5	<1.5	<3
25/03/2019	R																								<1				<0.0001									
3/04/2019	C											1.1		0.24	0.010	128	95	3	1	0.13																		
1/05/2019	C	5.2	29.6	0.93	6.66	108						0		0.14	0.010	25	<1	2	<1	0.13									<0.0001		28		<0.5	<0.5	<0.5	<1.5	<3	
5/06/2019	C	6.02	22.7	0.80	7.69	118						0		0.23	0.015	15	3	<1	<1	0.23									<0.0001		7		<1	<1	<1	<3	<6	
3/07/2019	C	6.26	24.8	2.12	7.29	114						0		0.21	0.010	13	<1	2	2	0.19									<0.0001		12		<0.5	<0.5	<0.5	<1.5	<3	
7/08/2019	C	6.74	22.4	0.78	7.23	111						0		0.20	0.005	17	<1	5	<1	0.20									<0.0001		16		<0.5	<0.5	<0.5	<1.5	<3	
4/09/2019	C	6.97	26.6	0.69	7.41	116						1		0.18	0.005	4	3	2	2	0.10									<0.0001		7		<0.5	<0.5	<0.5	<1.5	<3	
2/10/2019	C	6.37	30.1	0.72	7.43	120						2		0.29	0.005	35	<1	<1	3	0.28									<0.0001		<5		<0.5	<0.5	<0.5	<1.5	<3	
15/10/2019	R								<0.65																													
6/11/2019	C	3.77	28.7	4.97	6.77	279						3	<0.65	0.70	0.020	29	380	9	<1	0.45		<1	0.4	<1		<1	<1	150	790	<0.0001	2	520	<1	<0.5	<0.5	<0.5	<1.5	<3
11/11/2019	R																																					
4/12/2019	C	4.46	30.9	0.73	6.89	211						0		0.28	0.015	35	3	2	16	0.28				<1	<0.1	<1		99	150	<0.0001	<1	24	<1	<0.5	<0.5	<0.5	<1.5	<3
11/12/2019	V	4.89	31.7	0.73	7.16	182						5		0.38	<0.020	10	<5	<5	6	0.38				<1	<0.1	<1		120	190	<0.0001	<1	11	<1					
11/12/2019	V													0.28	0.015	27	<1	1	<1	0.06																		
17/12/2019	V	4.71	31.7	0.56	6.86	183						0		0.32	<0.02	29	97	6	5	0.22				<1	<0.1	<1	<0.004	<1	<1	39	220	<0.0001	<1	99	<1			
17/12/2019	V													0.71	0.010	18	92	5	2	0.67																		
2020																																						
8/01/2020	C	3.45	29.5	1.93	6.48	127						3		0.31	0.030	62	13	3	<1	0.29				<1	<0.1	<1	<0.001	<1	<1	6	3	<0.0005	<1	40	<1	<1	<1	<1
15/01/2020	V													0.32	0.020	20	63	4	<1	0.23									<0.0001		130						<4	
22/01/2020	V													0.24	0.020	17	83	3	7																			
5/02/2020	C	4.67	28.7	1.77	6.71	132						1																										
4/03/2020	C	5.88	29.6	1.36	7.07	139			<0.65	<10	10	<1		0.18	0.010	26	3	<1	<1											<0.0001		130		<0.5	<0.5	<0.5	<1.5	<3
1/04/2020	C	4.63	30.7	2.28	6.51	107						2																		<0.0001		14		<0.5	<0.5	<0.5	<1.5	<3
6/05/2020	C	3.25	26.1	5.49	6.80	87						4																		<0.0001		<5		<0.5	<0.5	<0.5	<1.5	<3
10/06/2020	C	5.36	24.9	3.85	6.98	97			<0.65			1																		<0.0001		7		<0.5	<0.5	<0.5	<1.5	<3
8/07/2020	C	5.41	23.9	3.41	6.96	98						4																		<0.0001		24		<0.5	<0.5	<0.5	<1.5	<3
5/08/2020	C	5.81	24.5	1.33	7.05	113						1																		<0.0001		12		<0.5	<0.5	<0.5	<1.5	<3
9/09/2020	C	5.51	28.5	1.36	7.30	122						0																										

SEDIMENT POND 2 (1SC-2916)

Date Sampled / Analyte	Sampling Reason (Compliance / Retest / Voluntary)	DO	Temp	Turbidity	pH	EC	TDS	TSS	TRH	E Coll	Enterococci	BOD	Chlorophyll a	TN	TP	NH3-N	NO3-N	NO2-N	PO4-P	TKN	Al	As	Cd	Cr Total	Cr VI	Cu	Pb	Fe	Mn	Hg	Ni	Zn	Ag	Benzene	Toluene	Ethyl Benzene	Xylene	BTEX	
		mg/L	°C	NTU		µS/cm	mg/L	mg/L	mg/L		MPN/100mL	MPN/100mL	mg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	mg/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	
EPL 217 Trigger Value		N/A	N/A	28	6-8.5	N/A	N/A	75	6	305	261	25	N/A	40	10	94	145	17	5	N/A	N/A	N/A	5.5	4.4	N/A	2	4.4	N/A	N/A	0.4	70	1000	1.4	N/A	N/A	N/A	N/A	700	
LOR			N/A Monthly	Monthly	N/A Monthly	Monthly	N/A	Monthly	0.65 Annual	10 Biannual	10 Biannual	<1 Monthly	1 N/A	0.01 Annual	0.005 Annual	1 Annual	1 Annual	1 Annual	1 Annual	10 N/A	5 N/A	1 Annual	0.1 Monthly	1 Annual	0.004 N/A	1 Monthly	1 Annual	5 Annual	1 Annual	0.0001 Monthly	1 Annual	5 Monthly	1 Annual	0.5 Monthly	0.5 Monthly	0.5 Monthly	1.5 Monthly	3 Monthly	
2016																																							
21/01/2016	V				5.89			10																															
3/02/2016	C	3.15	30.4	7.86	7.80	101	67	0	<0.65	11	34	37.0	3	7.3	0.03	308	89	9	<1	7.20	19	<1	<0.1	<1	<0.005	5	<1	29	17	<0.0001	<1	15	<1	<0.5	<0.5	<0.5	<1.5	<3	
25/02/2016	V				6.39			0																															
10/03/2016	V				6.10			1																															
16/03/2016	V				6.55			0																															
22/03/2016	V				6.02			3																															
21/09/2016	V				6.10			4																															
23/11/2016	V				7.42			0																															
30/11/2016	V				6.27			0																															
14/12/2016	V				6.82			1																															
21/12/2016	V				6.32			13																															
28/12/2016	V				6.95			8																															
2017																																							
4/01/2017	C	6.43	27.8	20.70	6.37	56	38	2	<0.65	85	216	<1	2	0.2	0.03	4	68	1	2	0.09	10	<1	<0.1	<1	<0.004	1	<1	19	64	<0.00005	<1	40	<1	<0.5	<0.5	<0.5	<1.5	<3	
9/01/2017	R																																						
25/01/2017	V				6.64			29																															
1/02/2017	C	6.55	30.7	20.10	6.68	45	31	2	<0.65	241	173	<1	5	0.3	0.02	8	16	<1	3	0.24	85	<1	<0.1	<1	<0.004	<1	<1	100	110	<0.0001	<1	44	<1	<0.5	<0.5	<0.5	<1.5	<3	
8/02/2017	R				6.33			0			10	120																											
15/02/2017	V				7.75			0																															
1/03/2017	C	6.75	32.2	1.63	7.94	121		1	0.65	10	<10	1.3	2	0.4	0.01	37	16	5	11		<5	<1	<0.1	<1	<0.004	1	<1	270	7	<0.0001	<1	5	<1	<0.5	<0.5	<0.5	<1.5	<3	
9/03/2017	V				6.44			4																															
15/03/2017	V				7.42			<1																															
22/03/2017	V				6.91			6																															
2018																																							
7/02/2018	C	5.74	29.0	9.35	6.22	48		0																															
7/03/2018	C	3.12	30.8	7.82	6.89	121		0	<0.65	<10	52	7.4		1.9	<0.005	270	116	8	2	1.49		<1	<0.1	<1	<0.004	1	<1	<1	2	<0.0001	<1	44	<5	<1	<0.5	<0.5	<0.5	<1.5	<3
2019																																							
2/01/2019	C	5.71	30.7	10.70	6.22	155		0					1.8										<0.1				2			<0.0001			74		<0.5	<0.5	<0.5	<1.5	<3
6/02/2019	C	5.98	28.3	14.00	6.18	61		0					<1									<0.1				1			<0.0001			45		<0.5	<0.5	<0.5	<1.5	<3	
6/11/2019	C	4.98	29.2	105.00	6.68	405		57	<0.65	933	620	<1		1.4	0.05	210	534	23	3	0.89		<1	0.2	<1		4	<1	290	3400	<0.0001	8	320	<1	<0.5	<0.5	<0.5	<1.5	<3	
11/11/2019	R									209	<10																												
4/12/2019	C	4.20	31.4	10.00	6.56	401		5		109	175	<1		0.9	<0.005	35	68	5	<1	0.84		<1	<0.1	<1		2	<1	200	1800	0.000	7	120	<1	<0.5	<0.5	<0.5	<1.5	<3	
11/12/2019	V	6.34	32.1	5.86	6.88	398		5		20	<10			1.2	<0.020	16	<5	<5	6	1.20		<1	<0.1	<1	<0.004	<1	<1	380	950	<0.0001	3	68	<1	<0.5	<0.5	<0.5	<1.5	<3	
11/11/2019	V													0.7	0.02	39	2	2	2	0.60																			
17/12/2019	V	4.31	30.9	22.00	6.49	253		10		160	336			1.4	0.03	150	500	12	<5	0.87		<1	0.2	<1	<0.004	2	<1	140	1,700	<0.0001	5	200	<1						
17/12/2019	V													1.1	0.02	120	511	13	13	0.29																			
2020																																							
8/01/2020	C	6.60	30.3	3.93	6.63	234		2		10	<10	<1		0.3	0.05	7	7	4	<1	0.28		<1	<0.1	<1	<0.001	1	<1	14	270	<0.00005	2	58	<1	<1	<1	<1	<1	<4	
15/01/2020	V													0.2	0.02	33	84	1	<1	0.07																			
22/01/2020	V													0.2	0.05	17	96	3	3																				
5/02/2020	C	5.83	30.3	20.60	6.85	106		15				<1																											
4/03/2020	C	6.26	30.4	3.80	6.69	107		1	<0.65	10	10	1.2		0.2	0.01	31	17	<1	3			<1	<0.1	<1	<0.004	1	<1	76	78	<0.0001	<1	27	<1	<0.5	<0.5	<0.5	<1.5	<3	
7/10/2020	C	4.61	29.7	92.70	6.47	359		197		285	417	<1		1.2	0.02	129	625	7	<1							4				<0.0001		270		<0.5	<0.5	<0.5	<1.5	<3	
19/10/2020	V	4.87	31.6	6.69	6.74	346		5		110	30																												
28/10/2020	V	3.60	30.8	4.37	6.44	331		0		<10	504																												
4/11/2020	V	6.18	31.7	4.31	6.48	359		0		10	209	<1																											
11/11/2020	V	6.53	30.7	2.87	6.47	376		0		20	404											<0.1					<1			<0.0001		75		<0.5	<0.5	<0.5	<1.5	<3	
18/11/2020	V	6.62	31.4	2.85	6.48	344		0		40	<10																												
25/11/2020	V	4.26	29.8		6.39	238		8		75	63																												
16/12/2020	V	5.45	28.7	51.90	6.31	112		56		161	521																												
2021																																							
3/02/2021	C	6.34	28.6	15.10	6.66																																		

SEDIMENT POND 3 (1SC-2917)

Date Sampled / Analyte	Sampling Reason (Compliance / Request / Voluntary)	DO	Temp	Turbidity	pH	EC	TDS	TSS	TRH	E Coli	Enterococci	BOD	Chlorophyll a	TN	TP	NH3-N	NO3-N	NO2-N	PO4-P	TKN	Al	As	Cd	Cr Total	Cr VI	Cu	Pb	Fe	Mn	Hg	Ni	Zn	Ag	Benzene	Toluene	Ethyl Benzene	Xylene	BTEX	
		mg/L	°C	NTU		µS/cm	mg/L	mg/L	mg/L	MPN/100mL	MPN/100mL	mg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	mg/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	µg/L	µg/L	µg/L	µg/L	
EPL 217 Trigger Value		N/A	N/A	28	6-8.5	N/A	N/A	75	6	305	261	25	N/A	40	10	94	145	17	5	N/A	N/A	N/A	5.5	4.4	N/A	2	4.4	N/A	N/A	0.4	70	1000	1.4	N/A	N/A	N/A	N/A	700	
LOR Testing Frequency		Monthly	Monthly	Monthly	Monthly	Monthly	N/A	Monthly	0.65 Annual	10 Biannual	10 Biannual	<1 Monthly	1 N/A	0.01 Annual	0.005 Annual	1 Annual	1 Annual	1 Annual	1 Annual	10 N/A	5 N/A	1 Annual	0.1 Monthly	1 Annual	0.004 N/A	1 Monthly	1 Annual	5 Annual	1 Annual	0.0001 Monthly	1 Annual	5 Monthly	1 Annual	0.5 Monthly	0.5 Monthly	0.5 Monthly	1.5 Monthly	3 Monthly	
2016																																							
21/01/2016	V				6.05			3																															
28/01/2016	V				6.50			0																															
3/02/2016	C	6.75	29.7	4.30	6.05	84	56	3	<0.65	6	3	1.9	3	0.1	0.02	19	<1	<1	<1	0.08	8	<1	<0.1	<1	<0.005	1	<1	31	19	<0.0001	<1	24	<1	<0.5	<0.5	<0.5	<1.5	<3	
25/02/2016	V				6.38			0																															
10/03/2016	V				6.19			0																															
16/03/2016	V				6.73			0																															
22/03/2016	V				5.96			0																															
7/09/2016	C	4.66	32.6	6.22	7.43	200	138	0	<0.65	50	7	2.7	6	0.4	0.05	19	52	5	<1	0.35	<5	<1	<0.1	<1	<0.004	1	<1	170	53	<0.0001	<1	14	<1	<0.5	<0.5	<0.5	<1.5	<3	
14/09/2016	V				6.96			0																															
21/09/2016	V				6.48			0																															
28/09/2016	V				8.10			0																															
5/10/2016	C	7.25	31.8	1.93	7.83	172	121	0	<0.65	46	31	1.1	2	0.2	0.03	27	<1	<1	1	0.14	<5	<1	<0.1	<1	<0.004	<1	<1	140	53	<0.0001	<1	<5	<1	<0.5	<0.5	<0.5	<1.5	<3	
19/10/2016	V				6.55			0																															
26/10/2016	V				7.67			0																															
2/11/2016	C	8.83	33.8	1.91	7.75	159	109	0	<0.65	20	20	1.5	2	0.2	0.02	24	<1	<1	6	0.15	<5	<1	<0.1	<1	<0.004	<1	<1	84	2	<0.0001	<1	<5	<1	<0.5	<0.5	<0.5	<1.5	<3	
9/11/2016	V				7.17			0																															
16/11/2016	V				8.40			0																															
23/11/2016	V				7.35			0																															
30/11/2016	V				6.25			0																															
7/12/2016	C	7.33	32.9	2.15	7.87	152	106	0	<0.65	8	7	1.6	3	0.2	0.02	7	4	2	5	0.10	<5	<1	<0.1	<1	<0.004	<1	<1	79	<1	<0.0001	<1	<5	<1	<0.5	<0.5	<0.5	<1.5	<3	
14/12/2016	V				6.86			0																															
21/12/2016	V				6.34			3																															
28/12/2016	V				6.63			0																															
2017																																							
4/01/2017	C	6.98	28.2	7.91	6.35	104	71	0	<0.65	156	130	<1	2	0.1	0.01	<1	46	<1	<1	0.04	<5	<1	<0.1	<1	<0.004	<1	<1	21	1	<0.00005	<1	26	<1	<0.5	<0.5	<0.5	<1.5	<3	
9/01/2017	R							0		<10	41																												
11/01/2017	V				6.60			0																															
17/01/2017	V				7.15			0																															
25/01/2017	V				6.47			3																															
1/02/2017	C	6.79	31.3	7.19	6.60	84	58	0	<0.65	41	74	<1	3	0.1	0.01	<1	11	<1	2	0.11	33	<1	<0.1	<1	<0.004	<1	<1	120	38	<0.0001	<1	16	<1	<0.5	<0.5	<0.5	<1.5	<3	
8/02/2017	V				6.39			0																															
15/02/2017	V				8.58			0																															
22/02/2017	V				7.34			0																															
1/03/2017	C	6.75	32.2	1.63	7.94	121	83	0	<0.65	10	<10	1.3	2	0.4	0.01	37	16	5	11	0.37	<5	<1	<0.1	<1	<0.004	<1	<1	93	8	<0.0001	<1	<5	<1	<0.5	<0.5	<0.5	<1.5	<3	
9/03/2017	V				6.51			0																															
15/03/2017	V				6.27			0																															
22/03/2017	V				6.91			0																															
29/03/2017	V				7.32			0																															
5/04/2017	C	8.71	32.0	1.46	7.36	112	76	0	<0.65	41	20	1.8	1	0.1	0.01	5	3	<1	3	0.11	<5	<1	<0.1	<1	<0.004	<1	<1	41	<1	<0.0001	<1	<5	<1	<0.5	<0.5	<0.5	<1.5	<3	
11/04/2017	V				6.60			0																															
18/04/2017	V				7.17			0																															
26/04/2017	V				6.86			0																															
3/05/2017	C	8.62	30.5	1.76	6.87	119	81	1	<0.65	52	318	<1	5	0.2	0.01	6	<1	<1	5	0.15	<5	<1	<0.1	<1	<0.004	<1	<1	82	<1	<0.0001	<1	<5	<1	<0.5	<0.5	<0.5	<1.5	<3	
10/05/2017	V				7.16			0																															
17/05/2017	V				7.90			0																															
24/05/2017	V				6.23			0																															
31/05/2017	V				8.02			0																															
7/06/2017	C	6.53	26.6	1.11	7.59	105	71	0	<0.65	20	41	1.5	2	0.2	0.01	3	<1	<1	4	0.19	<5	<1	<0.1	<1	<0.004	<1	<1	77	<1	<0.0001	<1	<5	<1	<0.5	<0.5	<0.5	<1.5	<3	
14/06/2017	V				7.59			0																															
21/06/2017	V				6.04			0																															
28/06/2017	V				7.76			0																															
5/07/2017	C	6.97	28.5	0.95																																			

Date Sampled / Analyte	Sampling Reason (Compliance / Release / Voluntary)	DO	Temp	Turbidity	pH	EC	TDS	TSS	TRH	E Coll	Enterococci	BOD	Chlorophyll a	TN	TP	NH3-N	NO3-N	NO2-N	PO4-P	TKN	Al	As	Cd	Cr Total	Cr VI	Cu	Pb	Fe	Mn	Hg	Ni	Zn	Ag	Benzene	Toluene	Ethyl Benzene	Xylene	BTEX	
		mg/L	°C	NTU		µS/cm	mg/L	mg/L	mg/L	MPN/100mL	MPN/100mL	mg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/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	µg/L	µg/L		
EPL 217 Trigger Value		N/A	N/A	28	6-8.5	N/A	N/A	75	6	305	261	25	N/A	40	10	94	145	17	5	N/A	N/A	N/A	5.5	4.4	N/A	2	4.4	N/A	N/A	0.4	70	1000	1.4	N/A	N/A	N/A	N/A	700	
LOR			N/A		N/A				0.65	10	10	<1	N/A	0.01	0.005	1	1	1	1	10	N/A	1	0.1	1	0.004	1	1	1	5	1	0.0001	1	5	1	0.5	0.5	0.5	1.5	3
Testing Frequency		Monthly	Monthly	Monthly	Monthly	Monthly	N/A	Monthly	Annual	Biannual	Biannual	Monthly	N/A	Annual	Annual	Annual	Annual	Annual	Annual	N/A	N/A	Annual	Monthly	Annual	N/A	Monthly	Annual	Annual	Annual	Monthly	Annual	Monthly	Annual	Monthly	Monthly	Monthly	Monthly	Monthly	
2022																																							
5/01/2022	C	7.79	30.3	3.19	6.92	90		0				<1																											
1/02/2022	C	7.28	28.0	3.80	6.68	90.5		1	<0.05	52.00	63.00	<1		0.17	0.02	8.00	39.00	<1	<1			<1	<0.1	<1		<1	<1												
8/03/2022	C	5.67	30.9	2.53	6.99	132.2		3				1.8																											
6/04/2022	C	4.13	28.8	14.40	6.37	77		7				2.9																											
4/05/2022	C																																						
Jun-22	no flow																																						
Jul-22	no flow																																						
Aug-22	no flow																																						
Sep-22	no flow																																						
Oct-22	no flow																																						
5/10/2022	C	5.6	30.2	14.90	6.49	163.6		7				<1																											
Nov-22	no flow																																						
16/11/2022	C	5.49	30.4	5.46	6.32	172.4		2		158	31	<1																											
21/12/2022	sample (crocodile sighting)																																						
2023																																							
4/01/2023	C	7.5	27.9	5.95	6.67	135.1		3																															
1/02/2023	C	7.47	30.4	2.27	7.11	92		2		107	10	2.4		<0.01	0.01	<1	2	<1	<1			<1	<0.1	<1		<1	<1												
1/03/2023	C	7.38	27.6	5.67	7.32	98.15		0				<1																											
5/04/2023	C	6.95	31.3	2.81	6.89	105.8		4																															
May-23	no flow																																						
Jun-23	no flow																																						
Jul-23	no flow																																						
Aug-23	no flow																																						
Sep-23	no flow																																						
Oct-23	no flow																																						
Nov-23	no flow																																						
Dec-23	no flow																																						
2024																																							
10/01/2024	C	3.61	30.3	10.10	7.02	124		1				<1		0.81	0.010	265	19	2	<1			<0.1																	
7/02/2024	C				8.45	110		0	<0.05	86	10	<1		0.17	<0.005	9	4	<1	3			<1	<0.1	<1		<1	<1												
7/03/2024	C																																						
3/04/2024	C	6.64	30.7	1.56	6.94	112		0				<1																											
May-24	no flow																																						
Jun-24	no flow																																						
Jul-24	no flow																																						
Aug-24	no flow																																						
Sep-24	no flow																																						
Oct-24	no flow																																						
11/11/2024	no flow (sample taken)	8.56	24.9	4.10	7.59	322		0	<0.05	63	171	4.0		0.39	0.080	8	<1	5	2			1	<0.1	<1		<1	<1												
4/12/2024	no flow (sample taken)	6.47	27.1	16.00	8.26	143		5				2.0																											

Attachment B – Mangrove Data

Mangroves - Canopy, Sediment Height and Groundwater

Site	SS1	SS2	SS3	SS4	SS5	SS6	SS7	SS8	SS9	SS10	SS11	SS12	SS13	SS14	SS15	SS15A	SS16	SS16A	SS17	SS18	SS19	SS20	SS21	SS22	SS23	Comments
MEAN CANOPY COVER (%)																										
2003	90	90	90	94	37	*	85	*	79	94	97	92	92	81	88	*	93	*	*	*	52	61	*	*	*	2017 and 2018 use the standard densiometer data (not that recorded using the 17 point densiometer) so the following graphs display data collected using the same method
2004	92	90	91	93	40	*	87	59	74	91	95	93	90	84	84	*	72	*	92	92	63	74	93	92	93	
2005	93	88	85	92	45	*	84	66	80	92	94	94	89	80	86	*	77	*	93	92	67	74	94	91	90	
2006	85	88	86	91	51	*	82	57	71	84	89	86	83	75	82	*	76	*	88	89	65	73	89	85	88	
2007	88	87	84	92	47	*	80	53	77	87	88	86	83	83	86	*	77	*	89	89	61	75	91	84	87	
2008	91	86	93	96	41	*	84	56	75	84	91	91	88	79	85	*	81	*	96	94	54	69	92	87	88	
2009	89	88	85	91	47	*	83	58	81	87	90	89	88	79	90	*	74	*	90	90	72	66	94	89	89	
2010	81	84	83	94	62	*	82	49	74	88	90	88	90	82	84	*	62	*	91	91	63	64	91	89	90	
2011	91	88	86	93	49	*	81	61	78	89	89	89	92	82	90	*	62	*	91	91	52	54	90	86	91	
2012	87	84	71	88	46	*	82	55	79	87	89	85	90	80	87	*	55	*	86	86	53	58	92	88	89	
2013	88	84	75	92	53	*	81	56	76	85	86	90	89	74	87	*	59	*	90	89	55	59	92	83	89	
2014	85	83	74	91	53	*	77	65	81	87	87	89	89	73	93	*	53	*	90	90	51	64	92	88	90	
2015	90	88	74	93	47	*	83	63	78	90	91	92	92	79	*	74	*	64	93	89	52	67	96	89	92	
2016	91	94	74	94	47	*	79	62	82	89	92	87	93	82	*	76	*	69	94	90	52	57	95	88	88	
2017	91	93	76	95	53	22	78	56	85	88	89	91	94	84	*	71	*	74	92	85	51	48	95	85	88	
2018	97	99	78	98	80	66	90	84	91	85	90	95	98	94	*	87	*	77	98	97	80	80	96	93	84	17-point densiometer method (data change from previous report) 17-point densiometer method
2019	97	98	76	98	75	56	83	79	90	87	90	96	97	83	*	83	*	74	97	91	70	68	98	92	79	
2020	94	98	79	98	76	68	89	73	91	89	92	97	99	84	*	84	*	80	97	93	69	70	97	94	79	
2021	96	97	81	99	72	65	87	70	93	92	94	98	100	86	*	81	*	79	98	95	63	67	99	98	79	
2022	97	97	81	98	72	63	86	70	93	92	90	96	99	82	*	79	*	79	98	92	56	61	93	93	79	
2023	90	97	75	96	68	62	81	65	90	89	88	94	97	81	*	81	*	79	97	90	54	59	95	94	74	
2024	86	96	77	96	65	60	79	61	90	90	91	95	98	76	*	76	*	79	97	90	51	58	96	95	73	
MEAN RELATIVE SEDIMENT HEIGHT (cm)																										
2003	76	76	73	77	85	83	76	74	90	94	76	100	85	93	*	E	*	E	119	113	90	114	89	E	E	"R" indicates that the site was filled in by site reclamation works and a replacement site was established in Nov 2003
2004	77	76	73	77	85	83	77	75	88	94	76	97	86	92	*	E	*	E	119	113	90	114	86	108	119	
2005	77	76	73	78	84	83	76	74	88	93	74	98	86	92	*	E	*	E	119	113	90	113	85	110	118	
2006	76	75	72	77	85	83	77	73	86	92	72	95	85	92	*	E	*	E	118	111	90	112	85	109	119	E indicates that the site had not yet been established
2007	76	76	73	77	85	82	77	73	86	91	72	96	85	93	*	E	*	E	118	112	90	112	84	110	119	
2008	76	75	72	77	85	83	77	73	86	92	72	95	85	92	*	E	*	E	118	111	90	112	85	109	119	
2009	76	76	72	77	85	83	77	73	86	92	72	96	85	91	*	E	*	E	118	112	90	113	85	110	120	Sediment height measurements were collected at a quarterly frequency during the construction phase (2003-2006) and the annual values provided above for 2003-2006 are the mean values calculated from the quarterly data
2010	75	75	72	77	85	83	77	72	85	90	72	94	84	91	*	E	*	E	118	110	90	112	84	110	121	
2011	76	75	72	77	85	83	77	71	84	89	70	94	84	91	*	E	*	E	118	110	90	112	85	110	119	
2012	76	75	72	77	83	83	77	71	82	89	69	92	84	92	*	E	*	E	117	109	89	112	85	110	120	
2013	76	75	72	77	84	82	79	69	82	89	69	92	83	92	*	E	*	E	116	108	89	112	85	108	119	
2014	75	75	72	77	83	81	78	67	80	86	69	91	83	91	*	E	*	E	117	107	90	111	82	108	119	
2015	75	75	72	77	83	81	78	67	78	84	68	91	83	91	*	70	*	67	117	107	90	111	82	107	119	
2016	75	75	72	77	82	81	78	66	77	83	67	91	83	90	*	70	*	66	116	106	90	112	81	108	119	
2017	75	74	72	77	83	82	79	64	77	81	67	89	82	90	*	68	*	66	116	106	90	111	81	108	120	
2018	74	74	73	77	83	82	79	63	73	74	69	87	81	90	*	68	*	66	115	104	90	112	83	107	118	
2019	75	75	72	75	82	81	79	63	74	70	67	87	81	91	*	74	*	66	115	104	90	111	83	110	122	
2020	75	75	72	75	81	82	79	63	74	67	66	87	81	91	*	75	*	67	115	105	90	111	82	107	121	
2021	75	72	72	76	81	81	76	61	74	67	61	86	81	90	*	65	*	64	114	104	90	111	82	106	120	
2022	74	73	72	87	81	81	75	60	72	53	61	85	81	88	*	66	*	64	115	93	90	111	81	107	120	
2023	74	73	72	86	78	80	83	59	71	65	59	85	81	88	*	66	*	64	115	102	90	111	82	107	120	
2024	74	74	72	87	79	80	83	59	71	65	59	84	81	89	*	66	*	64	114	101	90	112	83	107	121	

Site	SS1	SS2	SS3	SS4	SS5	SS6	SS7	SS8	SS9	SS10	SS11	SS12	SS13	SS14	SS15	SS15A	SS16	SS16A	SS17	SS18	SS19	SS20	SS21	SS22	SS23	Comments
GROUNDWATER DEPTH (cm BGL)																										
2003	NI	80	70	30	NI	15	50	*	5	*	*	*	NI	18	*	*	*	*	*	*	NI	NI	42	*	*	"NC" indicates that sample/data was not collected due to lack of water in the bore
2004	20	5	9	7	10	5	18	*	15	*	*	*	22	7	*	*	*	*	*	*	1	17	19	*	*	
2004	12	0	3	3	5	6	1	*	1	*	*	*	4	9	*	*	*	*	*	*	0	1	1	*	*	
2004	NC	53	48	51	12	29	52	*	10	*	*	*	54	44	*	*	*	*	*	*	59	20	43	*	*	
2004	NC	70	71	52	62	41	80	*	4	*	*	*	NC	40	*	*	*	*	*	*	90	NC	69	*	*	
2004	38	43	47	41	28	45	44	*	42	*	*	*	51	24	*	*	*	*	*	*	56	31	53	*	*	
2005	22	2	5	11	9	6	7	*	23	*	*	*	10	9	*	*	*	*	*	*	6	0	11	*	*	
2005	60	80	90	NC	52	41	95	*	51	*	*	*	NC	60	*	*	*	*	*	*	NC	NC	88	*	*	
2005	NC	80	86	NC	21	44	99	*	40	*	*	*	NC	56	*	*	*	*	*	*	NC	NC	57	*	*	
2005	34	27	35	40	24	22	32	*	25	*	*	*	31	20	*	*	*	*	*	*	25	0	22	*	*	
2006	16	2	0	1	3	0	0	*	2	*	*	*	5	8	*	*	*	*	*	*	1	7	2	*	*	
2006	NC	80	86	NC	37	41	95	*	29	*	*	*	NC	61	*	*	*	*	*	*	NC	55	105	*	*	
2007	NC	79	84	NC	28	37	90	*	29	*	*	*	NC	49	*	*	*	*	*	*	NC	55	86	*	*	
2008	NC	74	55	40	25	29	53	*	38	*	*	*	NC	31	*	*	*	*	*	*	72	NC	60	*	*	
2009	NC	54	50	40	40	40	58	*	56	*	*	*	54	30	*	*	*	*	*	*	60	NC	43	*	*	
2010	NC	39	25	38	0	20	61	*	40	*	*	*	48	34	*	*	*	*	*	*	55	50	40	*	*	
2011	NC	63	65	44	27	44	67	*	64	*	*	*	NC	22	*	*	*	*	*	*	70	NC	51	*	*	
2012	NC	78	72	37	48	40	78	*	9	*	*	*	NC	36	*	*	*	*	*	*	81	NC	64	*	*	
2013	NC	NC	84	6	3	4	NC	*	0	*	*	*	NC	56	*	*	*	*	*	*	NC	NC	NC	*	*	
2014	NC	12	15	9	3	7	35	*	0	*	*	*	40	57	*	*	*	*	*	*	27	27	12	*	*	
2015	NC	62	53	43	15	39	65	*	32	*	*	*	68	55	*	*	*	*	*	*	78	NC	79	*	*	
2016	NC	NC	NC	NC	0	46	NC	*	50	*	*	*	NC	75	*	*	*	*	*	*	65	NC	NC	*	*	
2017	NC	74	55	21	1	0	46	*	8	*	*	*	NC	26	*	*	*	*	*	*	42	NC	46	*	*	
2018	NC	16	70	NC	52	7	2	*	99	*	*	*	11	26	*	*	*	*	*	*	47	1	96	*	*	
2019	NC	NC	18	NC	109	NC	NC	*	88	*	*	*	NC	13	*	*	*	*	*	*	NC	NC	NC	*	*	
2020	NC	75	21	49	90	49	76	*	110	*	*	*	18	59	*	*	*	*	*	*	65	21	80	*	*	
2021	NC	NC	29	63.5	119	42	107.4	*	149	*	*	*	23	85.6	*	*	*	*	*	*	92.5	NC	22	*	*	
2022	NC	NC	10.5	NC	102.5	40	77	*	114	*	*	*	NC	7.5	*	*	*	*	*	*	92	66	NC	*	*	
2023	NC	22	52	NC	81	NC	20	*	54	*	*	*	NC	32	*	*	*	*	*	*	17	NC	65	*	*	
2024	NC	NC	23.5	52.5	9	34.5	34	*	32.5	*	*	*	47.5	51	*	*	*	*	*	*	30.5	50.5	46.5	*	*	
GROUNDWATER PH																										
2018	NC	5.94	6.07	NC	6.34	NC	NC	*	6.39	*	*	*	6.14	5.7	*	*	*	*	*	*	NC	NC	5.95	*	*	"NC" indicates that sample/data was not collected due to lack of water in the bore
2019	NC	NC	6.4	NC	6.26	NC	NC	*	6.49	*	*	*	NC	5.71	*	*	*	*	*	*	NC	NC	NC	*	*	
2020	NC	6.01	5.9	6.26	6.46	6.33	5.48	*	6.4	*	*	*	5.4	5.4	*	*	*	*	*	*	5.93	6.53	6.31	*	*	
2021	NC	NC	5.62	6.04	6.54	5.31	2.27	*	6.58	*	*	*	5.86	5.35	*	*	*	*	*	*	4.79	NC	4.64	*	*	
2022	NC	NC	NC	NC	NC	NC	NC	*	NC	*	*	*	NC	NC	*	*	*	*	*	*	NC	NC	NC	*	*	
2023	NC	NC	NC	NC	NC	NC	NC	*	NC	*	*	*	NC	NC	*	*	*	*	*	*	NC	NC	NC	*	*	
2024	NC	NC	6.56	6.59	NC	5.96	6.14	*	6.35	*	*	*	5.34	5.93	*	*	*	*	*	*	6.02	611	5.9	*	*	

Location	Wickham Pt											Control Site						
Site	LG1	LG2	LG3	SP1	SP1-A	SP1-B	SP1-C	SP2	SP2-A	SP3	SP3-A	M3	E1	E2	C2	QA1	Comments	
SEDIMENTS																		
	CADMIUM IN SEDIMENTS (total mg/kg)																	
ANZG (2018) DGV (Default Guideline Value)	1.5																"N/G" indicates no guidelines; "ND" indicates no data In 2012 Site C2 was established to replace site C1 Changed to weak acid extractable metals analysis only in 2020	
ANZG (2018) GV-High	10.0																	
2006	0.1	0.1	0.1	ND	ND	0.1	ND	0.1	ND	ND	ND	0.1	0.1	0.1	ND	ND		
2007	0.1	0.1	0.1	ND	0.1	0.1	0.1	0.1	ND	ND	ND	0.1	0.1	0.1	ND	ND		
2008	0.1	0.1	0.1	ND	0.1	0.1	0.1	0.1	ND	ND	ND	0.1	0.1	0.1	ND	ND		
2009	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	ND	ND	ND	0.1	0.1	0.1	ND	ND		
2010	0.3	0.4	0.3	0.5	1.0	0.2	0.1	0.5	ND	ND	ND	0.2	0.4	0.3	ND	ND		
2011	0.1	0.1	0.1	0.1	0.3	0.1	0.1	0.1	ND	ND	ND	0.1	0.1	0.1	ND	ND		
2012	0.1	0.2	0.1	0.7	0.1	0.1	0.1	0.2	ND	ND	ND	0.1	0.1	0.1	0.2	ND		
2013	0.5	0.9	0.6	1.0	0.5	0.1	0.2	0.4	ND	ND	ND	0.6	0.4	0.7	1.1	ND		
2014	0.6	0.6	0.4	1.1	0.4	0.5	0.4	0.4	ND	ND	ND	0.8	0.8	0.8	0.5	ND		
2015	0.1	0.9	0.7	0.2	0.6	0.4	0.6	0.3	ND	ND	ND	1.3	1.0	1.1	0.8	ND		
2016	0.2	0.2	0.1	0.2	0.5	0.4	0.5	0.3	ND	ND	ND	0.4	0.3	0.3	0.2	ND		
2017	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	ND	ND	ND	0.1	0.1	0.1	0.1	ND		
2018	0.4	0.1	0.3	0.1	0.6	0.4	0.5	0.4	ND	ND	ND	0.5	0.5	ND	0.6	0.9		
2019	<0.1	<0.1	<0.1	<0.1	0.4	<0.1	<0.1	<0.1	ND	ND	ND	<0.1	<0.1	ND	<0.1	<0.1		
	CADMIUM IN SEDIMENTS (weak acid mg/kg)																	
ANZG (2018) DGV (Default Guideline Value)	1.5																Commenced weak acid analysis in 2018	
ANZG (2018) GV-High	10.0																	
2018	0.1	0.2	0.1	0.1	0.6	0.2	0.1	0.1	ND	ND	ND	0.3	0.3	ND	0.3	0.4		
2019	0.1	0.1	0.1	0.1	0.4	0.1	0.1	0.1	ND	ND	ND	0.1	0.1	ND	0.1	0.1		
2020	0.1	0.1	0.1	1.1	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	ND	0.1	0.1		
2021	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	ND	0.1	0.1		
2022	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	ND	0.1	<0.1		
2023	<0.1	<0.1	<0.1	0.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND	<0.1	<0.1		
2024	<0.1	<0.1	<0.1	0.4	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND	<0.1	<0.1		
	CHROMIUM IN SEDIMENTS (total mg/kg)																	
ANZG (2018) DGV (Default Guideline Value)	80																"N/G" indicates no guidelines; "ND" indicates no data In 2012 Site C2 was established to replace site C1 Changed to weak acid extractable metals analysis only in 2020	
ANZG (2018) GV-High	370																	
2006	14.0	25.0	21.0	ND	ND	14.0	ND	12.0	ND	ND	ND	16.0	20.0	20.0	ND	ND		
2007	30.0	29.0	17.0	ND	26.0	6.3	14.0	18.0	ND	ND	ND	21.0	28.0	25.0	ND	ND		
2008	40.0	34.0	24.0	44.0	10.0	6.2	7.6	17.0	ND	ND	ND	24.0	21.0	19.0	ND	ND		
2009	34.0	33.0	8.8	46.0	11.0	9.8	15.0	17.0	ND	ND	ND	17.0	23.0	17.0	ND	ND		
2010	16.0	23.0	9.0	48.0	18.0	5.9	4.9	14.0	ND	ND	ND	12.0	14.0	14.0	ND	ND		
2011	19.0	15.0	10.0	31.0	14.0	3.1	9.0	16.0	ND	ND	ND	16.0	11.0	21.0	ND	ND		
2012	38.0	32.0	27.0	31.0	12.0	4.1	7.3	31.0	ND	ND	ND	8.8	32.0	29.0	1.9	ND		
2013	28.0	47.0	25.0	25.0	14.0	3.0	10.0	17.0	ND	ND	ND	29.0	25.0	34.0	26.0	ND		
2014	32.0	27.0	20.0	16.0	11.0	11.0	18.0	16.0	ND	ND	ND	39.0	25.0	31.0	25.0	ND		
2015	28.0	24.0	20.0	38.0	12.0	5.0	12.0	7.5	ND	ND	ND	19.0	21.0	24.0	23.0	ND		
2016	31.0	34.0	18.0	47.0	14.0	8.3	17.0	12.0	ND	ND	ND	39.0	25.0	25.0	22.0	ND		
2017	28.0	36.0	22.0	16.0	16.0	21.0	36.0	29.0	ND	ND	ND	39.0	21.0	29.0	26.0	ND		
2018	9.0	19.0	3.0	16.0	10.0	4.0	7.0	6.0	ND	ND	ND	31.0	22.0	ND	12.0	13.0		
2019	39.0	36.0	18.0	27.0	17.0	6.0	20.0	15.0	ND	ND	ND	48.0	21.0	ND	22.0	21.0		
	CHROMIUM IN SEDIMENTS (weak acid mg/kg)																	
ANZG (2018) DGV (Default Guideline Value)	80																Commenced weak acid analysis in 2018	
ANZG (2018) GV-High	370																	
2018	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	ND	ND	ND	7.1	4.7	ND	7.2	4.9		
2019	12.0	9.0	8.0	5.0	3.0	2.0	5.0	5.0	ND	ND	ND	9.0	4.0	ND	9.0	8.0		
2020	36.0	45.0	8.0	18.0	11.0	2.0	4.0	18.0	27.0	24.0	16.0	54.0	11.0	ND	22.0	24.0		
2021	11.0	12.0	6.0	9.0	8.0	2.0	4.0	4.0	9.0	6.0	6.0	16.0	4.0	ND	7.0	5.0		
2022	2.5	3.6	<1	1.2	<1	<1	<1	1.6	1.6	3.1	1.8	5.0	2.4	ND	<1	2.2		
2023	<1	1.7	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.1	<1	ND	<1	<1		
2024	12.0	21.0	9.2	16.0	14.0	2.8	4.8	8.5	8.7	8.7	11.0	25.0	17.0	ND	7.8	12.0		

Location	Wickham Pt											Control Site					
Site	LG1	LG2	LG3	SP1	SP1-A	SP1-B	SP1-C	SP2	SP2-A	SP3	SP3-A	M3	E1	E2	C2	QA1	Comments
	COPPER IN SEDIMENTS (total mg/kg)																
ANZG (2018) DGV (Default Guideline Value)	65																"N/G" indicates no guidelines; "ND" indicates no data In 2012 Site C2 was established to replace site C1 Changed to weak acid extractable metals analysis only in 2020
ANZG (2018) GV-High	270																
2006	4.5	4.4	5.3	ND	ND	12.0	ND	4.5	ND	ND	ND	2.0	3.4	3.1	ND	ND	
2007	9.5	5.0	3.4	ND	17.0	3.3	4.2	11.0	ND	ND	ND	3.4	3.6	8.7	ND	ND	
2008	6.9	5.0	3.4	8.9	17.0	3.3	4.2	11.0	ND	ND	ND	3.4	3.6	8.7	ND	ND	
2009	7.4	7.2	1.4	11.0	5.4	2.8	3.5	7.0	ND	ND	ND	4.0	3.5	2.9	ND	ND	
2010	4.1	7.7	2.4	8.2	15.0	2.9	2.1	9.7	ND	ND	ND	2.6	3.4	2.8	ND	ND	
2011	6.6	6.6	3.4	4.7	11.0	2.2	4.1	11.0	ND	ND	ND	4.4	3.3	5.7	ND	ND	
2012	7.0	8.5	5.1	4.9	4.1	1.1	1.3	19.0	ND	ND	ND	0.6	5.0	4.6	1.9	ND	
2013	4.1	9.6	3.0	2.9	5.9	1.1	2.0	5.7	ND	ND	ND	7.6	4.6	5.6	1.4	ND	
2014	5.8	7.7	4.0	2.1	3.0	4.9	3.0	4.7	ND	ND	ND	5.9	4.9	5.6	2.4	ND	
2015	6.8	6.5	3.7	5.1	2.9	1.9	3.6	2.9	ND	ND	ND	4.8	3.7	1.9	2.6	ND	
2016	7.1	11.0	3.7	6.5	5.5	2.2	4.4	4.6	ND	ND	ND	8.6	5.2	4.8	2.2	ND	
2017	6.0	8.0	3.0	5.0	4.0	4.0	3.0	10.0	ND	ND	ND	5.0	4.0	6.0	2.0	ND	
2018	2.0	3.0	1.0	2.0	4.0	2.0	1.0	2.0	ND	ND	ND	3.6	4.8	ND	0.5	0.6	
2019	8.0	8.0	4.0	9.0	5.0	1.0	4.0	5.0	ND	ND	ND	6.0	4.0	ND	<1	<1	
	COPPER IN SEDIMENTS (weak acid mg/kg)																
ANZG (2018) DGV (Default Guideline Value)	65																Commenced weak acid analysis in 2018
ANZG (2018) GV-High	270																
2018	1.0	1.0	1.0	2.0	2.0	1.0	1.0	1.0	ND	ND	ND	3.3	3.5	ND	0.8	0.6	
2019	3.0	2.0	1.0	3.0	2.0	1.0	1.0	3.0	ND	ND	ND	4.0	2.0	ND	1.0	1.0	
2020	2.0	6.0	3.0	43.0	6.0	1.0	1.0	8.0	7.0	6.0	1.0	2.0	1.0	ND	1.0	1.0	
2021	2.0	5.0	1.0	6.0	2.0	1.0	1.0	1.0	9.0	8.0	1.0	3.0	2.0	ND	1.0	1.0	
2022	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	7.3	6.3	1.0	1.1	1.0	ND	1.0	1.0	
2023	1.5	1.6	1.0	4.4	1.0	1.0	1.0	4.2	1.6	3.3	1.1	3.1	1.0	ND	1.0	3.7	
2024	3.8	4.2	2.2	11.0	7.7	1.3	1.8	2.9	21.0	12.0	4.0	6.1	4.7	ND	<1	2.2	
	IRON IN SEDIMENTS (total mg/kg)																
ANZG (2018) DGV (Default Guideline Value)	N/G																"N/G" indicates no guidelines; "ND" indicates no data In 2012 Site C2 was established to replace site C1 Changed to weak acid extractable metals analysis only in 2020
ANZG (2018) GV-High	N/G																
2016	19,000	24,000	11,000	86,000	12,000	6,400	14,000	8,700	ND	ND	ND	26,000	23,000	24,000	26,000	ND	
2017	21,000	26,000	16,000	12,000	15,000	18,000	42,000	25,000	ND	ND	ND	23,000	23,000	27,000	24,000	ND	
2018	6,000	17,000	3,700	16,000	5,600	6,300	7,400	5,200	ND	ND	ND	18,000	16,000	ND	21,000	30,000	
2019	28,000	29,000	14,000	42,000	30,000	7,500	17,000	12,000	ND	ND	ND	44,000	26,000	ND	57,000	56,000	
	IRON IN SEDIMENTS (weak acid mg/kg)																
ANZG (2018) DGV (Default Guideline Value)	N/G																Commenced weak acid analysis in 2018
ANZG (2018) GV-High	N/G																
2018	500	2,000	140	11,000	2,100	200	450	400	ND	ND	ND	8,800	10,000	ND	9,200	14,000	
2019	19,000	11,000	5,700	17,000	19,000	2,600	4,400	10,000	ND	ND	ND	18,000	19,000	ND	21,000	16,000	
2020	18,000	25,000	7,100	32,000	20,000	2,100	1,600	9,800	38,000	28,000	7,400	38,000	14,000	ND	14,000	19,000	
2021	5,800	9,900	3,500	37,000	9,400	1,700	3,500	2,700	24,000	15,000	5,200	19,000	10,000	ND	9,700	4,900	
2022	1,300	3,400	590	24,000	3,200	1,200	490	810	11,000	10,000	1,900	7,900	5,400	ND	350	1,100	
2023	2,700	3,100	2,100	20,000	400	940	400	810	590	1,300	1,200	4,500	910	ND	240	760	
2024	6,600	14,000	5,400	57,000	54,000	3,200	6,200	6,300	56,000	14,000	13,000	21,000	16,000	ND	6,100	5,400	

Location	Wickham Pt											Control Site					
Site	LG1	LG2	LG3	SP1	SP1-A	SP1-B	SP1-C	SP2	SP2-A	SP3	SP3-A	M3	E1	E2	C2	QA1	Comments
	LEAD IN SEDIMENTS (total mg/kg)																
ANZG (2018) DGV (Default Guideline Value)	50																"N/G" indicates no guidelines; "ND" indicates no data In 2012 Site C2 was established to replace site C1 Changed to weak acid extractable metals analysis only in 2020
ANZG (2018) GV-High	220																
2006	4.1	6.0	6.2	ND	ND	9.3	ND	5.9	ND	ND	ND	2.9	6.2	6.2	ND	ND	
2007	13.0	9.0	6.6	ND	25.0	3.1	5.7	13.0	ND	ND	ND	5.5	9.8	18.0	ND	ND	
2008	12.0	11.0	8.4	21.0	5.6	3.6	2.5	11.0	ND	ND	ND	8.3	9.8	9.5	ND	ND	
2009	12.0	13.0	2.0	29.0	4.7	3.5	5.0	9.4	ND	ND	ND	4.7	6.0	4.4	ND	ND	
2010	7.0	8.0	3.9	23.0	19.0	3.7	2.3	14.0	ND	ND	ND	5.3	8.1	7.6	ND	ND	
2011	8.2	6.0	4.7	17.0	11.0	2.6	3.5	17.0	ND	ND	ND	7.3	6.3	12.0	ND	ND	
2012	10.0	7.7	7.0	12.0	5.0	1.8	2.6	25.0	ND	ND	ND	1.6	11.0	9.4	2.7	ND	
2013	12.0	18.0	11.0	9.6	8.8	1.7	3.9	10.0	ND	ND	ND	16.0	12.0	16.0	7.2	ND	
2014	15.0	12.0	9.3	9.8	6.4	7.1	8.6	9.1	ND	ND	ND	19.0	13.0	16.0	8.4	ND	
2015	14.1	12.3	4.3	24.8	6.9	4.3	6.6	5.4	ND	ND	ND	12.4	5.8	6.6	6.9	ND	
2016	14.0	16.0	6.9	26.0	8.8	4.3	9.1	8.2	ND	ND	ND	20.0	13.0	13.0	7.7	ND	
2017	10.0	13.0	8.0	8.0	6.0	8.0	8.0	13.0	ND	ND	ND	13.0	10.0	13.0	6.0	ND	
2018	7.0	11.0	4.0	31.0	13.0	7.0	6.0	7.0	ND	ND	ND	12.0	12.0	ND	5.0	7.0	
2019	11.0	9.0	6.0	13.0	10.0	3.0	8.0	12.0	ND	ND	ND	18.0	8.0	ND	6.0	6.0	
	LEAD IN SEDIMENTS (weak acid mg/kg)																
ANZG (2018) DGV (Default Guideline Value)	50																Commenced weak acid analysis in 2018
ANZG (2018) GV-High	220																
2018	1.0	4.0	1.0	8.0	6.0	2.0	1.0	3.0	ND	ND	ND	9.0	7.0	ND	3.0	4.0	
2019	11.0	9.0	6.0	7.0	10.0	2.0	5.0	12.0	ND	ND	ND	18.0	8.0	ND	5.0	4.0	
2020	6.0	9.0	6.0	21.0	18.0	2.0	2.0	5.0	22.0	21.0	3.0	13.0	2.0	ND	5.0	5.0	
2021	10.0	15.0	9.0	17.0	13.0	5.0	9.0	8.0	13.0	16.0	6.0	12.0	7.0	ND	11.0	5.0	
2022	3.4	2.6	1.2	6.0	2.0	1.7	1.5	2.2	7.2	7.2	2.1	4.5	1.3	ND	<1	2.6	
2023	4.5	5.0	2.8	7.0	<1	1.4	1.4	6.5	2.1	5.2	1.6	6.7	1.8	ND	<1	5.2	
2024	6.0	8.6	4.4	13.0	16.0	2.2	3.3	5.1	26.0	9.7	12.0	17.0	10.0	ND	1.6	4.4	
	NICKEL IN SEDIMENTS (total mg/kg)																
ANZECC & ARMCANZ (2000)ISQG-Low (Trigger value)	21																"N/G" indicates no guidelines; "ND" indicates no data In 2012 Site C2 was established to replace site C1 Changed to weak acid extractable metals analysis only in 2020
ANZECC & ARMCANZ (2000) ISQG-High	52																
2006	6.6	9.7	9.2	ND	ND	15.0	ND	6.1	ND	ND	ND	5.9	8.7	8.8	ND	ND	
2007	10.0	9.5	6.2	ND	18.0	5.5	5.0	9.3	ND	ND	ND	6.0	7.5	8.6	ND	ND	
2008	12.0	11.0	7.3	12.0	8.6	3.6	2.4	6.8	ND	ND	ND	5.6	6.2	6.0	ND	ND	
2009	10.0	9.6	2.6	13.0	3.9	3.2	4.2	5.9	ND	ND	ND	4.7	6.0	4.4	ND	ND	
2010	4.7	6.9	2.2	8.2	9.0	2.0	1.4	5.5	ND	ND	ND	3.0	3.9	4.0	ND	ND	
2011	6.6	4.7	2.8	6.4	8.9	1.7	2.7	5.8	ND	ND	ND	4.6	3.5	6.9	ND	ND	
2012	11.0	8.9	6.7	6.2	2.7	1.3	2.0	10.0	ND	ND	ND	0.9	7.9	7.3	4.1	ND	
2013	6.7	11.0	4.6	3.4	4.1	0.8	2.1	4.1	ND	ND	ND	6.9	5.3	7.4	2.4	ND	
2014	8.7	8.3	4.9	3.5	2.6	3.9	4.4	5.0	ND	ND	ND	11.0	7.1	8.4	3.0	ND	
2015	9.7	8.2	3.6	7.2	2.5	2.5	3.7	2.4	ND	ND	ND	6.0	4.0	2.0	2.8	ND	
2016	8.3	8.6	3.3	8.6	3.9	1.7	4.2	3.4	ND	ND	ND	8.5	5.8	5.2	2.6	ND	
2017	8.0	10.0	6.0	3.0	3.0	5.0	2.0	8.0	ND	ND	ND	8.0	5.0	7.0	3.0	ND	
2018	2.0	6.0	1.0	9.0	3.0	2.0	2.0	2.0	ND	ND	ND	7.3	6.3	ND	4.8	6.6	
2019	7.0	7.0	4.0	3.0	3.0	2.0	4.0	3.0	ND	ND	ND	6.0	2.0	ND	7.0	6.0	
	NICKEL IN SEDIMENTS (weak acid mg/kg)																
ANZG (2018) DGV (Default Guideline Value)	21																Commenced weak acid analysis in 2018
ANZG (2018) GV-High	52																
2018	1.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	ND	ND	ND	2.5	2.0	ND	2.1	3.4	
2019	4.0	3.0	3.0	2.0	2.0	1.0	2.0	2.0	ND	ND	ND	5.0	2.0	ND	7.0	4.0	
2020	3.0	13.0	2.0	12.0	6.0	1.0	1.0	2.0	15.0	6.0	2.0	14.0	1.0	ND	1.0	1.0	
2021	2.0	5.0	2.0	3.0	3.0	1.0	2.0	2.0	5.0	3.0	1.0	5.0	1.0	ND	2.0	1.0	
2022	<1	1.2	<1	2.9	1.0	<1	<1	<1	1.7	2.0	<1	2.1	1.1	ND	<1	<1	
2023	1.1	1.2	<1	5.6	<1	<1	<1	<1	<1	1.2	<1	1.1	<1	ND	<1	<1	
2024	3.2	6.4	2.4	11.0	3.3	<1	1.5	2.6	9.1	3.8	4.8	7.3	5.9	ND	1.6	2.4	

Location	Wickham Pt												Control Site					
Site	LG1	LG2	LG3	SP1	SP1-A	SP1-B	SP1-C	SP2	SP2-A	SP3	SP3-A	M3	E1	E2	C2	QA1	Comments	
	ZINC IN SEDIMENTS (total mg/kg)																	
ANZG (2018) DGV (Default Guideline Value)	200																"N/G" indicates no guidelines; "ND" indicates no data In 2012 Site C2 was established to replace site C1 Changed to weak acid extractable metals analysis only in 2020	
ANZG (2018) GV-High	410																	
2006	20	33	33	ND	ND	210	ND	53	ND	ND	ND	11	28	54	ND	ND		
2007	44	24	24	ND	450	95	21	67	ND	ND	ND	13	25	37	ND	ND		
2008	29	23	23	200	62	32	9.4	56	ND	ND	ND	12	21	18	ND	ND		
2009	30	27	6.2	380	51	38	32	52	ND	ND	ND	18	19	14	ND	ND		
2010	15	20	6.4	140	510	47	12	65	ND	ND	ND	10	18	17	ND	ND		
2011	22	14	8	180	350	19	17	49	ND	ND	ND	12	14	29	ND	ND		
2012	31	24	18	210	69	19	14	85	ND	ND	ND	4.7	28	25	6.7	ND		
2013	16	26	8.9	87	170	21	4.9	50	ND	ND	ND	28	18	28	5	ND		
2014	27	23	15	84	92	150	26	66	ND	ND	ND	28	25	30	7.8	ND		
2015	33	24	12	140	62	48	24	37	ND	ND	ND	28	6	9	11	ND		
2016	29	29	9.4	200	180	16	28	38	ND	ND	ND	31	27	25	10	ND		
2017	24	25	17	53	48	42	40	68	ND	ND	ND	21	19	27	7	ND		
2018	8	18	4	440	290	110	19	20	ND	ND	ND	22	28	ND	9	12		
2019	35	30	15	42	210	70	35	32	ND	ND	ND	36	19	ND	13.00	11.00		
	ZINC IN SEDIMENTS (weak acid mg/kg)																	
ANZG (2018) DGV (Default Guideline Value)	200																Commenced weak acid analysis in 2018	
ANZG (2018) GV-High	410																	
2018	2	3	1	170	170	73	3	9	ND	ND	ND	11	15	ND	5	6		
2019	27	18	13	33	48	64	27	30	ND	ND	ND	24	15	ND	6	5		
2020	27	30	11	520	340	13	9	64	100	46	13	35	4	ND	6	8		
2021	12	17	11	210	98	51	16	37	140	70	9	18	6	ND	5	2		
2022	10	11	8.1	150	57	18	14	17	79	44	6	11	10	ND	4	8		
2023	6	5	3.5	710	24	34	11	42	7	34	3	7	3.5	ND	<1	53		
2024	20	22	10	530	92	65	22	24	78	82	27	29	24	ND	4	10		
	TPH IN SEDIMENTS (mg/kg wet weight)																	
FSANZ maximum level	N/G																	
GEL 90th percentile	N/G																	
2006	<0.1	<0.1	<0.1	ND	ND	<0.1	ND	<0.1	ND	ND	ND	<0.1	<0.1	ND	ND	ND		
2007	65	25	41	ND	85	31.0	88	63	ND	ND	ND	94	54	ND	ND	ND		
2008	82	82	52	73	53	54	45	46	48	ND	ND	100	43	ND	ND	ND		
2009	28	22	7.4	1.2	1.9	23	21	8	ND	ND	ND	10	<0.1	ND	ND	ND		
2010	5.5	<0.1	26	<0.1	66.0	4.6	8.8	<0.1	ND	ND	ND	20	22	ND	ND	ND		
2011	28	7.7	28	26	4.6	72	27	12	ND	ND	ND	21	20	ND	ND	ND		
2012	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND	ND	ND	<0.1	<0.1	<0.1	<0.1	ND		
2013	<2	<0.2	<0.2	<0.2	<2	<2	<0.2	<0.2	ND	ND	ND	<0.2	<0.2	<0.2	<0.2	ND		
2014	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND	ND	ND	<0.1	<0.1	<0.1	<0.1	ND		
2015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND	ND	ND	<0.1	<0.1	<0.1	<0.1	ND		
2016	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND	ND	ND	<0.1	<0.1	<0.1	<0.1	ND		
2017	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND	ND	ND	<0.1	<0.1	<0.1	<0.1	ND		
2018	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	ND	ND	ND	<0.2	<0.2	<0.2	<0.2	ND		
2019	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	ND	ND	ND	<0.2	<0.2	ND	<0.2	ND		
2020	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	ND		
2021	150	42	170	120	160	160	150	96	58	110	100	220	120	ND	150	ND		
2022	<0.2	<0.2	<0.2	830	<0.2	<0.2	<0.2	<0.2	2000	250	<0.2	<0.2	410	ND	<0.2	ND		
2023	49	59	62	140	43	51	46	45	40	36	41	67	41`	ND	37	ND		
2024	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	ND	<0.2	ND		

Location	Wickham Pt												Control Site						
Site	LG1	LG2	LG3	SP1	SP1-A	SP1-B	SP1-C	SP2	SP2-A	SP3	SP3-A	M3	E1	E2	C2	QA1	Comments		
MUDWHELKS																			
	CADMIUM IN MUDWHELKS (mg/kg wet weight)																		
FSANZ maximum level	2.00																"N/G" indicates no guidelines; "ND" indicates no data - in 2012 Site C2 was established to replace site C1		
GEL 90th percentile	N/G																		
2006	0.2	0.14	0.11	ND	ND	0.12	NC	0.2	ND	ND	ND	0.08	0.22	0.2	ND	ND			
2007	0.1	0.1	0.1	ND	0.1	0.1	0.1	0.1	ND	ND	ND	0.1	0.25	0.1	ND	ND			
2008	0.1	0.1	0.1	ND	0.1	0.2	0.1	0.1	ND	ND	ND	0.1	0.1	0.1	ND	ND			
2009	0.1	0.1	0.1	ND	0.1	0.1	0.1	0.1	ND	ND	ND	0.1	0.1	0.1	ND	ND			
2010	0.1	0.1	0.1	ND	0.1	0.1	0.1	0.1	ND	ND	ND	0.1	0.1	0.1	ND	ND			
2011	0.05	0.05	0.05	ND	0.05	0.05	0.05	0.05	ND	ND	ND	0.05	0.05	0.05	ND	ND			
2012	0.10	0.10	0.10	ND	0.20	0.05	0.05	0.10	ND	ND	ND	0.10	0.10	0.10	0.10	ND			
2013	0.10	0.10	0.10	ND	0.10	0.10	0.10	0.10	ND	ND	ND	0.05	0.10	0.10	0.10	ND			
2014	0.42	0.34	0.32	ND	0.17	0.14	0.19	0.08	ND	ND	ND	0.17	0.47	0.48	0.12	ND			
2015	0.20	0.11	0.11	ND	0.01	0.09	0.08	0.13	ND	ND	ND	0.12	0.05	0.05	0.08	ND			
2016	0.03	0.06	0.03	ND	0.03	0.03	0.03	0.03	ND	ND	ND	0.03	0.03	0.03	0.03	ND			
2017	0.03	0.03	0.03	ND	0.03	0.06	0.03	0.03	ND	ND	ND	0.03	0.03	0.03	0.03	ND			
2018	0.07	0.66	0.09	0.06	0.06	0.19	0.13	0.05	ND	ND	ND	0.12	0.11	ND	0.10	0.07			
2019	0.09	0.18	0.20	0.10	0.23	0.24	0.30	0.08	ND	ND	ND	0.31	0.11	ND	0.18	0.10			
2020	0.03	0.03	0.16	0.03	0.11	0.05	0.10	0.05	ND	ND	0.10	0.08	0.10	ND	0.02	<0.1			
2021	0.06	0.10	0.10	0.10	0.08	0.10	0.10	0.10	ND	ND	0.10	0.11	0.10	ND	0.10	0.02			
2022	0.14	0.08	0.33	0.11	0.12	0.02	0.02	0.08	ND	ND	0.62	0.18	0.32	ND	0.22	0.30			
2023	0.10	0.07	0.08	0.15	0.06	0.02	<0.03	0.08	ND	ND	0.29	0.11	0.02	ND	<0.03	0.30			
2024	0.32	0.38	0.18	ND	0.11	0.32	0.11	0.10	ND	ND	0.26	0.60	0.18	ND	0.10	0.13			
	CADMIUM IN MUDWHELKS (mg/kg dry weight)																		
2006	0.7	0.5	0.4	ND	ND	0.5	ND	0.8	ND	ND	ND	0.3	0.8	<0.04	ND	ND			
2007	0.1	0.2	<0.1	ND	0.1	<0.2	<0.2	0.2	ND	ND	ND	0.1	0.2	0.4	ND	ND			
2008	0.10	0.1	<0.1	ND	0.1	0.4	0.1	0.1	ND	ND	ND	<0.1	0.1	0.1	ND	ND			
2009	0.1	0.1	0.1	ND	0.1	<0.1	0.1	0.1	ND	ND	ND	0.1	0.1	<0.1	ND	ND			
2010	<0.1	<0.1	0.1	ND	0.1	<0.1	<0.1	<0.1	ND	ND	ND	<0.1	<0.1	<0.1	ND	ND			
2011	<0.1	<0.1	<0.1	ND	<0.1	<0.1	<0.1	<0.1	ND	ND	ND	<0.1	<0.1	<0.1	ND	ND			
2012	0.3	0.1	0.1	ND	0.3	<0.1	<0.1	0.1	ND	ND	ND	0.1	0.2	0.2	0.2	ND			
2013	0.2	0.2	0.2	ND	0.2	0.3	0.2	0.2	ND	ND	ND	<0.1	0.2	0.2	0.2	ND			
2014	0.1	0.2	0.1	ND	<0.1	<0.1	0.1	0.1	ND	ND	ND	<0.1	0.1	0.2	<0.1	ND			
2015	0.7	0.4	0.5	ND	<0.1	0.4	0.3	0.5	ND	ND	ND	0.5	0.2	0.2	0.4	ND			
2016	0.1	0.2	0.1	ND	0.1	0.1	0.1	0.1	ND	ND	ND	0.1	0.1	0.1	0.1	ND			
2017	0.1	0.1	0.1	ND	0.1	0.2	0.1	0.1	ND	ND	ND	0.1	0.1	0.1	0.1	ND			
2018	0.3	2.2	0.4	0.3	0.3	1	0.5	0.2	ND	ND	ND	0.4	0.5	ND	0.4	0.3			
2019	0.3	0.6	0.7	0.4	0.9	0.9	1	0.3	ND	ND	ND	1.3	0.4	ND	0.7	0.4			
2020	0.1	0.1	0.8	0.1	0.5	0.2	<0.1	0.2	ND	ND	0.4	0.3	0.1	ND	0.1	<0.1			
2021	0.3	0.1	0.1	0.1	0.4	0.1	0.1	0.1	ND	ND	0.1	0.6	0.1	ND	0.1	0.1			
2022	0.6	2.4	1.3	0.6	0.5	0.1	0.1	0.3	ND	ND	2.6	0.7	1.6	ND	0.9	0.3			
2023	0.4	0.3	0.3	0.7	0.3	0.1	<0.1	0.3	ND	ND	1.2	0.5	0.1	ND	<0.1	0.3			
2024	1.4	1.6	0.7	ND	0.5	1.8	0.5	0.4	ND	ND	1.2	2.5	0.7	ND	0.4	0.6			

Location	Wickham Pt												Control Site							
Site	LG1	LG2	LG3	SP1	SP1-A	SP1-B	SP1-C	SP2	SP2-A	SP3	SP3-A	M3	E1	E2	C2	QA1	Comments			
	CHROMIUM IN MUDWHELKS (mg/kg wet weight)																			
FSANZ maximum level	N/G																"N/G" indicates no guidelines; "ND" indicates no data In 2012 Site C2 was established to replace site C1			
GEL 90th percentile	N/G																			
2006	0.29	0.25	0.22	ND	ND	0.28	ND	0.23	ND	ND	ND	0.26	0.28	0.24	ND	ND				
2007	0.35	0.31	0.3	ND	0.2	0.2	0.2	0.2	ND	ND	ND	0.11	0.21	0.32	ND	ND				
2008	2.32	1.6	0.21	ND	0.4	0.39	0.6	0.52	ND	ND	ND	1.68	1.19	1.61	ND	ND				
2009	0.20	0.20	0.20	ND	0.20	0.20	0.20	0.20	ND	ND	ND	0.20	0.20	0.20	ND	ND				
2010	0.20	0.20	0.38	ND	0.82	0.22	0.20	0.20	ND	ND	ND	0.20	0.20	0.20	ND	ND				
2011	0.20	0.20	0.20	ND	0.20	0.20	0.20	0.20	ND	ND	ND	0.20	0.20	0.20	ND	ND				
2012	0.20	2.20	0.20	ND	0.50	0.30	0.10	0.20	ND	ND	ND	0.60	1.10	1.10	1.20	ND				
2013	0.90	1.10	0.20	ND	0.30	0.40	1.00	0.40	ND	ND	ND	0.20	0.20	0.30	0.20	ND				
2014	0.42	0.34	0.32	ND	0.17	0.14	0.19	0.08	ND	ND	ND	0.17	0.47	0.48	0.12	ND				
2015	0.46	0.09	0.02	ND	0.14	0.02	0.08	0.03	ND	ND	ND	0.08	0.02	0.02	0.02	ND				
2016	0.11	0.34	0.20	ND	0.11	0.18	0.19	0.28	ND	ND	ND	0.08	0.20	0.15	0.13	ND				
2017	0.19	0.34	0.11	ND	0.09	0.25	0.28	0.31	ND	ND	ND	0.30	0.26	0.64	0.34	ND				
2018	0.04	0.54	0.09	0.34	0.13	0.81	0.11	0.09	ND	ND	ND	2.77	2.28	ND	1.84	1.66				
2019	0.61	<1	<1	<1	<1	<1	<1	<1	ND	ND	ND	<1	<1	ND	<1	1.00				
2020	<1	<1	<1	<1	<1	<1	<1	<1	ND	ND	<1	<1	<1	ND	<1	<1				
2021	0.63	0.49	0.51	0.24	0.41	0.38	0.10	0.44	ND	ND	0.52	0.56	0.39	ND	1.32	0.43				
2022	0.58	0.32	<0.1	<0.1	0.36	<0.1	0.28	0.70	ND	ND	0.4	1.30	1.02	ND	0.30	1.50				
2023	<0.25	<0.25	1.05	<0.25	<0.25	<0.25	0.21	0.38	ND	ND	6	<0.25	<0.25	ND	<0.25	<1				
2024	0.41	0.60	2.13	ND	0.42	0.56	0.42	0.84	ND	ND	0.75	1.34	2.75	ND	0.81	0.77				
	CHROMIUM IN MUDWHELKS (mg/kg dry weight)																			
2006	1.0	0.9	0.8	ND	ND	1.2	ND	0.9	ND	ND	ND	1.0	1.0	0.9	ND	ND				
2007	1.1	1.2	1.0	ND	0.6	<0.2	<0.2	<0.2	ND	ND	ND	0.4	1.2	1.4	ND	ND				
2008	6.10	4.0	0.5	ND	1.0	1.0	1.5	1.2	ND	ND	ND	4.1	3.3	5.2	ND	ND				
2009	0.2	0.2	<0.2	ND	0.2	0.2	0.3	0.2	ND	ND	ND	0.3	0.3	0.3	ND	ND				
2010	<0.2	0.3	1.5	ND	3.9	0.8	<0.2	<0.2	ND	ND	ND	<0.2	<0.2	0.2	ND	ND				
2011	0.2	<0.2	<0.2	ND	0.4	0.2	0.3	0.2	ND	ND	ND	0.2	0.3	0.4	ND	ND				
2012	0.5	4.7	0.4	ND	1.0	0.6	0.2	0.2	ND	ND	ND	1.3	2.7	2.8	2.9	ND				
2013	2.8	3.7	0.3	ND	1.0	1.4	3.6	1.0	ND	ND	ND	0.4	0.5	0.8	0.4	ND				
2014	1.5	1.3	1.0	ND	0.6	0.5	0.6	0.3	ND	ND	ND	0.6	1.7	1.7	0.5	ND				
2015	1.7	0.4	0.1	ND	0.6	0.1	0.3	0.1	ND	ND	ND	0.3	0.1	0.1	0.1	ND				
2016	0.4	1.2	0.8	ND	0.4	0.7	0.7	1.1	ND	ND	ND	0.3	0.7	0.5	0.4	ND				
2017	0.6	1.1	0.4	ND	0.3	0.8	1.1	0.9	ND	ND	ND	0.9	0.8	2.2	1.2	ND				
2018	0.2	1.8	0.4	1.7	0.6	4.3	0.4	0.4	ND	ND	ND	8.9	10	ND	7.4	7				
2019	2	1	1	1	1	1	1	1	ND	ND	ND	1	1	ND	1	1				
2020	1.00	1.00	1	1	1	1	1	1	ND	ND	1	1	1	ND	1	1				
2021	3.00	2.00	2	1	2	2	<1	2	ND	ND	2	3	2	ND	5	2				
2022	2.50	1.50	1	1	1.5	1.0	1.4	2.80	ND	ND	1.8	5.20	5.10	ND	2	2				
2023	<1	<1	4.2	<1	1	<1	1	1.50	ND	ND	25	<1	<1	ND	<1	<1				
2024	1.80	2.50	8.2	ND	2	3.10	2	3.50	ND	ND	3.4	5.60	11	ND	3.10	3.50				

Location	Wickham Pt											Control Site					
Site	LG1	LG2	LG3	SP1	SP1-A	SP1-B	SP1-C	SP2	SP2-A	SP3	SP3-A	M3	E1	E2	C2	QA1	Comments
	COPPER IN MUDWHELKS (mg/kg wet weight)																
FSANZ maximum level	N/G																"N/G" indicates no guidelines; "ND" indicates no data In 2012 Site C2 was established to replace site C1
GEL 90th percentile	30.00																
2006	44.00	34	31	ND	ND	21	ND	35	ND	ND	ND	18	22	21.00	ND	ND	
2007	0.35	29	30	ND	36	22	22	56	ND	ND	ND	16	10	20.00	ND	ND	
2008	27	24	23	ND	14	32	23	38	ND	ND	ND	31	13	5.30	ND	ND	
2009	12	11	8	ND	8	7	10	9	ND	ND	ND	3	4	2.00	ND	ND	
2010	21	13	7	ND	4	15	6	11	ND	ND	ND	5	4	2.00	ND	ND	
2011	10	3	4	ND	10	8	9	8	ND	ND	ND	13	0	1.00	ND	ND	
2012	37	32	24	ND	17	15	24	26	ND	ND	ND	18	6	5.00	20	ND	
2013	39	41	42	ND	40	22	31	26	ND	ND	ND	20	9	5.00	22	ND	
2014	30.0	34	31	ND	18	33	24	33	ND	ND	ND	31	7	6.00	27	ND	
2015	30.0	48	17	ND	12	18	21	30	ND	ND	ND	14	5	3.00	24	ND	
2016	5.00	9	5	ND	5	4	6	9	ND	ND	ND	5	3	4.00	10	ND	
2017	28.0	26	15	ND	16	14	13	15	ND	ND	ND	16	8	6.00	16	ND	
2018	45.0	30	27	15.52	45	18	17	51.00	ND	ND	ND	34	19	ND	32.40	30.80	
2019	42.98	29	37.05	44.64	20.57	24.75	26.66	33.84	ND	ND	ND	20.33	29.7	ND	33.80	38.08	
2020	53.39	43.84	32	23.95	17.17	18.74	40.68	35.23	ND	ND	42.67	32.76	26.89	ND	40.63	45.57	
2021	38.0	39.5	13.3	26.8	17.1	26.9	20	14.1	ND	ND	11.1	18.60	25.1	ND	29.04	25.92	
2022	6.9	16.59	7.5	5.75	11.28	2.72	5.2	8.91	ND	ND	28.8	7.5	4	ND	14.88	8.19	
2023	32.5	14.95	11.5	21	15.75	7.22	9.03	30	ND	ND	45.6	12.6	14.4	ND	22	52.20	
2024	18.4	23.76	28.6	ND	14.28	19.80	15.12	19.44	ND	ND	33.0	22.08	23.75	ND	20.54	22	
	COPPER IN MUDWHELKS (mg/kg dry weight)																
2006	150	120	110	ND	ND	93	ND	140	ND	ND	ND	68	80	83	ND	ND	
2007	110	110	100	ND	130	83	81	180	ND	ND	ND	60	46	88	ND	ND	
2008	71	60	55	ND	35	82	58	88	ND	ND	ND	76	36	17	ND	ND	
2009	30	31	20	ND	23	19	27	25	ND	ND	ND	11	14	8.5	ND	ND	
2010	65	53	29	ND	19	79	24	37	ND	ND	ND	19	14	7.0	ND	ND	
2011	39	12	11	ND	42	23	37	30	ND	ND	ND	55	<0.5	5.0	ND	ND	
2012	79	70	66	ND	34	28	64	61	ND	ND	ND	39	15	13	50	ND	
2013	120	140	130	ND	130	73	110	68	ND	ND	ND	59	30	16	73	ND	
2014	110	130	98	ND	64	120	76	130	ND	ND	ND	110	10	21	110	ND	
2015	110	190	78	ND	52	92	83	120	ND	ND	ND	64	20	12	110	ND	
2016	16	31	18	ND	19	16	23	37	ND	ND	ND	20	10	14	30	ND	
2017	89	86	55	ND	53	45	52	44	ND	ND	ND	50	26	20	55	ND	
2018	200	100	120	78	210	96	63	220	ND	ND	ND	110	85	ND	130	130	
2019	140	100	130	180	81	91	88	120	ND	ND	ND	84	110	ND	130	160	
2020	190	160	160	77	81	71	120	130	ND	ND	170	130	95	ND	170	210	
2021	180	160	52	110	84	140	95	64	ND	ND	43	100	130	ND	110	120	
2022	30	79	30	32	47	16	26	33	ND	ND	120	30	20	ND	62	39	
2023	130	65	46	100	75	38	43	120	ND	ND	190	60	60	ND	88	180	
2024	80	99	110	ND	68	110	72	81	ND	ND	150	92	95	ND	79	100	
	IRON IN MUDWHELKS (mg/kg wet weight)																
FSANZ maximum level	N/G																"N/G" indicates no guidelines; "ND" indicates no data In 2012 Site C2 was established to replace site C1
GEL 90th percentile	N/G																
2018	9	298	29	438	34	105	43	21	ND	ND	ND	1462	1322	ND	797	806	
2019	276	70	143	769	244	381	164	34	ND	ND	ND	189	254	ND	190	81	
2020	53	44	62	81	53	61	31	95	ND	ND	105	103	85	ND	67	30	
2021	55	62	51	51	75	35	27	26	ND	ND	26	63	52	ND	77	45	
2022	345	174	138	49	360	58	60	378	ND	ND	182	700	106	ND	175	149	
2023	40	154	1000	179	25	38	21	700	ND	ND	218	141	16	ND	33	957	
2024	202	223	1378	ND	109	1044	109	118	ND	ND	216	696	2150	ND	364	264	

Location	Wickham Pt											Control Site						
Site	LG1	LG2	LG3	SP1	SP1-A	SP1-B	SP1-C	SP2	SP2-A	SP3	SP3-A	M3	E1	E2	C2	QA1	Comments	
	IRON IN MUDWHELKS (mg/kg wet weight)																	
2018	40	1000	130	2200	160	560	160	90	ND	ND	ND	4700	5800	ND	3200	3400	"N/G" indicates no guidelines; "ND" indicates no data In 2012 Site C2 was established to replace site C1	
2019	900	240	500	3100	960	1400	540	120	ND	ND	ND	780	940	ND	730	340		
2020	190	160	310	260	250	230	90	350	ND	ND	420	410	300	ND	280	140		
2021	260	250	200	210	370	180	130	120	ND	ND	100	340	270	ND	290	210		
2022	1500	830	550	270	1500	340	300	1400	ND	ND	760	2800	5300	ND	730	710		
2023	160	670	4000	850	120	200	98	2800	ND	ND	910	670	65	ND	130	3300		
2024	880	930	5300	ND	520	5800	520	490	ND	ND	980	2900	8600	ND	1400	1200		
	MANGANESE IN MUDWHELKS (mg/kg wet weight)																	
FSANZ maximum level	N/G																"N/G" indicates no guidelines; "ND" indicates no data In 2012 Site C2 was established to replace site C1	
GEL 90th percentile	N/G																	
2018	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
2019	37	44	131	129	762	299	152	82	ND	ND	ND	237	119	ND	65	14		
2020	65	12	46	44	254	45	7	54	ND	ND	25	141	18	ND	38	22		
2021	36	3	8	10	14	25	6	10	ND	ND	12	10	3	ND	9	5		
2022	101	149	163	38	226	7	28	49	ND	ND	384	25	72	ND	84	40		
2023	6	11	9	357	67	29	5	120	ND	ND	456	14	4	ND	3	133		
2024	483	360	65	ND	103	1422	50	72	ND	ND	68	240	70	ND	36	21		
	MANGANESE IN MUDWHELKS (mg/kg wet weight)																	
2018	75	1800	39	2400	250	7600	79	460	ND	ND	ND	88	210	ND	190	72		
2019	120	150	460	520	3000	1100	500	290	ND	ND	ND	980	440	ND	250	58		
2020	230	45	230	140	1200	170	22	200	ND	ND	100	560	63	ND	160	100		
2021	170	14	33	42	70	130	27	46	ND	ND	48	54	15	ND	33	25		
2022	440	710	650	210	940	39	140	180	ND	ND	1600	100	360	ND	350	190		
2023	23	48	36	1700	320	150	26	480	ND	ND	1900	65	16	ND	11	460		
2024	2100	1500	250	ND	490	7900	240	300	ND	ND	310	1000	280	ND	140	94		
	NICKEL IN MUDWHELKS (mg/kg wet weight)																	
FSANZ maximum level	N/G																"N/G" indicates no guidelines; "ND" indicates no data In 2012 Site C2 was established to replace site C1	
GEL 90th percentile	N/G																	
2006	1.39	0.84	0.98	ND	NC	0.85	NC	1.18	ND	ND	ND	0.55	1.51	1.05	ND	ND		
2007	0.22	0.23	0.1	ND	0.25	0.16	0.11	0.22	ND	ND	ND	0.11	0.11	0.25	ND	ND		
2008	1.22	0.8	0.1	ND	0.1	0.2	0.8	0.22	ND	ND	ND	0.49	0.5	0.71	ND	ND		
2009	0.1	0.1	0.1	ND	0.1	0.1	0.1	0.1	ND	ND	ND	0.1	0.1	0.1	ND	ND		
2010	0.1	0.2	0.1	ND	0.1	0.1	0.1	0.1	ND	ND	ND	0.1	0.1	0.1	ND	ND		
2011	0.80	0.05	0.05	ND	0.10	0.20	0.05	0.10	ND	ND	ND	0.05	0.05	0.10	ND	ND		
2012	0.50	1.20	0.05	ND	0.80	0.40	0.10	0.30	ND	ND	ND	0.30	1.10	1.00	0.80	ND		
2013	0.30	0.40	0.10	ND	0.20	0.20	0.30	0.40	ND	ND	ND	0.10	0.30	0.30	0.30	ND		
2014	0.17	0.19	0.16	ND	0.06	0.08	0.19	0.10	ND	ND	ND	0.11	0.19	0.23	0.07	ND		
2015	0.35	0.48	0.20	ND	0.09	0.39	0.12	0.43	ND	ND	ND	0.24	0.54	0.26	0.08	ND		
2016	0.09	0.31	0.13	ND	0.20	0.13	0.08	0.15	ND	ND	ND	0.11	0.11	0.21	0.13	ND		
2017	0.06	0.12	0.06	ND	0.15	0.09	0.08	0.21	ND	ND	ND	0.13	0.10	0.17	0.09	ND		
2018	0.20	3.58	0.16	0.62	0.15	0.81	0.24	0.49	ND	ND	ND	0.90	1.05	ND	0.77	0.48		
2019	0.61	0.58	1.14	0.50	0.76	1.09	0.91	0.56	ND	ND	ND	1.69	0.81	ND	0.78	0.48		
2020	<1	<1	0.40	<1	0.42	<1	<1	0.27	ND	ND	0.50	0.25	<1	ND	<1	<1		
2021	1.27	0.49	0.51	0.24	0.61	0.38	0.84	0.44	ND	ND	0.78	0.37	0.77	ND	0.26	0.86		
2022	0.76	2.10	1.58	0.25	0.62	0.65	0.36	0.95	ND	ND	2.30	0.88	1.58	ND	1.32	2.90		
2023	0.25	0.25	0.48	0.90	0.42	<0.25	0.36	1.55	ND	ND	4.80	0.92	<0.25	ND	0.70	3.20		
2024	1.82	3.84	1.56	ND	0.44	3.06	0.53	0.70	ND	ND	0.92	2.30	1.90	ND	1.01	0.68		

Location		Wickham Pt											Control Site						
Site		LG1	LG2	LG3	SP1	SP1-A	SP1-B	SP1-C	SP2	SP2-A	SP3	SP3-A	M3	E1	E2	C2	QA1	Comments	
		NICKEL IN MUDWHELKS (mg/kg dry weight)																	
2006		4.8	3.0	3.5	ND	ND	3.7		4.7	ND	ND	ND	2.1	5.4	4.2	ND	ND		
2007		0.7	0.9	<0.1	ND	0.9	0.6	0.4	0.7	ND	ND	ND	0.4	1.0	1.1	ND	ND		
2008		3.2	2.0	0.2	ND	<0.1	0.5	2.0	0.5	ND	ND	ND	1.2	1.4	2.3	ND	ND		
2009		<0.1	0.1	<0.1	ND	0.2	<0.1	<0.1	<0.1	ND	ND	ND	0.3	<0.1	<0.1	ND	ND		
2010		<0.1	0.5	0.2	ND	0.4	0.5	<0.1	<0.1	ND	ND	ND	<0.1	0.2	0.2	ND	ND		
2011		2.9	<0.1	<0.1	ND	0.1	0.6	<0.1	0.1	ND	ND	ND	<0.1	<0.1	0.5	ND	ND		
2012		1.1	2.6	<0.1	ND	1.7	0.8	0.3	0.8	ND	ND	ND	0.7	2.6	2.5	2.0	ND		
2013		0.9	1.3	0.3	ND	0.8	0.8	1.2	1.0	ND	ND	ND	0.2	1.0	0.9	0.9	ND		
2014		0.6	0.7	0.5	ND	0.2	0.3	0.6	0.4	ND	ND	ND	0.4	0.7	0.8	0.6	ND		
2015		1.3	1.9	0.9	ND	0.4	2	0.5	1.7	ND	ND	ND	1.1	2.3	1.1	0.4	ND		
2016		0.3	1.1	0.5	ND	0.7	0.5	0.3	0.6	ND	ND	ND	0.4	0.4	0.7	0.4	ND		
2017		0.2	0.4	0.2	ND	0.5	0.3	0.3	0.6	ND	ND	ND	0.4	0.3	0.6	0.3	ND		
2018		0.9	12	0.7	3.1	0.7	4.3	0.9	2.1	ND	ND	ND	2.9	4.6	ND	3.1	2		
2019		2.0	2.0	4.0	2.0	3.0	4.0	3.0	2.0	ND	ND	ND	7.0	3.0	ND	3.0	2.0		
2020		1	1	2	1	2	1	1	2	ND	ND	2	1	1	ND	1	1		
2021		6	2	2	1	3	2	4	2	ND	ND	3	2	4	ND	1	4		
2022		3.3	10	6.3	1.4	2.6	3.8	1.8	3.5	ND	ND	9.6	3.5	7.9	ND	5.5	2.9		
2023		1	1.1	1.9	4.3	2	<1	1.7	6.2	ND	ND	20	4.4	<1	ND	2.8	3.2		
2024		7.9	16	6	ND	2.1	17	2.5	2.9	ND	ND	4.2	9.6	7.6	ND	3.9	3.1		
		LEAD IN MUDWHELKS (mg/kg wet weight)																	
FSANZ maximum level		2.00																"N/G" indicates no guidelines; "ND" indicates no data In 2012 Site C2 was established to replace site C1	
GEL 90th percentile		N/G																	
2006		0.15	0.28	0.25	ND	ND	0.25	ND	0.25	ND	ND	ND	0.21	0.22	0.25	ND	ND		
2007		0.1	0.1	0.48	ND	0.39	0.16	0.14	0.28	ND	ND	ND	0.1	0.1	0.14	ND	ND		
2008		0.3	0.52	0.21	ND	0.2	0.2	0.2	0.1	ND	ND	ND	0.29	0.4	0.4	ND	ND		
2009		0.3	0.3	0.2	ND	0.2	0.2	0.3	0.2	ND	ND	ND	0.2	0.2	0.1	ND	ND		
2010		0.1	0.2	0.1	ND	0.1	1.6	0.1	0.1	ND	ND	ND	0.1	0.1	0.1	ND	ND		
2011		0.05	0.05	0.05	ND	0.30	0.10	0.05	0.05	ND	ND	ND	0.05	0.05	0.05	ND	ND		
2012		0.40	0.40	0.10	ND	0.20	0.10	0.10	0.10	ND	ND	ND	0.10	0.30	0.40	0.80	ND		
2013		0.50	0.60	0.20	ND	0.30	0.30	0.50	0.50	ND	ND	ND	0.10	0.10	0.30	0.20	ND		
2014		0.19	0.16	0.13	ND	0.14	0.08	0.10	0.05	ND	ND	ND	0.08	0.41	0.37	0.05	ND		
2015		0.12	0.03	0.02	ND	0.05	0.04	0.04	0.04	ND	ND	ND	0.05	0.05	0.03	0.01	ND		
2016		0.06	0.06	0.13	ND	0.03	0.13	0.08	0.15	ND	ND	ND	0.08	0.09	0.06	0.03	ND		
2017		0.10	0.15	0.06	ND	0.06	0.09	0.13	0.14	ND	ND	ND	0.10	0.13	0.32	0.11	ND		
2018		0.07	0.33	0.07	0.60	0.78	0.13	0.08	0.30	ND	ND	ND	1.03	0.91	ND	0.72	0.55		
2019		0.31	<1	<1	<1	0.51	<1	<1	<1	ND	ND	ND	0.726	<1	ND	<1	1		
2020		<1	<1	<1	<1	<1	<1	<1	<1	ND	ND	<1	<1	<1	ND	<1	<1		
2021		0.63	0.49	0.10	0.49	0.61	0.38	0.42	0.10	ND	ND	0.10	0.74	0.39	ND	0.79	0.86		
2022		0.94	0.84	0.75	0.49	1.25	0.73	0.84	2.38	ND	ND	0.36	0.98	0.42	ND	<1	<1		
2023		<0.25	0.53	0.50	<0.25	<0.25	<0.25	<0.25	0.30	ND	ND	<0.25	<0.25	<0.25	ND	<0.25	<1		
2024		0.23	0.24	0.70	ND	0.21	0.18	0.21	0.24	ND	ND	0.22	0.432	1.08	ND	0.26	0.22		

Location		Wickham Pt										Control Site							Comments
Site		LG1	LG2	LG3	SP1	SP1-A	SP1-B	SP1-C	SP2	SP2-A	SP3	SP3-A	M3	E1	E2	C2	QA1		
		LEAD IN MUDWHELKS (mg/kg dry weight)																	
2006		0.5	1.0	0.9	ND	ND	1.1	ND	1.0	ND	ND	ND	0.8	0.8	1.0	ND	ND		
2007		<0.1	<0.1	1.6	ND	1.4	0.6	0.5	0.9	ND	ND	ND	<0.1	0.4	0.6	ND	ND		
2008		0.8	1.3	0.5	ND	0.5	0.5	0.5	0.2	ND	ND	ND	0.7	1.1	1.3	ND	ND		
2009		0.8	0.8	0.5	ND	0.5	0.5	0.7	0.6	ND	ND	ND	0.7	0.5	0.5	ND	ND		
2010		0.1	0.6	0.2	ND	0.3	6	<0.1	0.1	ND	ND	ND	<0.1	<0.1	<0.1	ND	ND		
2011		0.1	<0.1	<0.1	ND	1.1	0.2	<0.1	<0.1	ND	ND	ND	<0.1	<0.1	1.9	ND	ND		
2012		0.8	0.8	0.1	ND	0.4	0.2	0.3	0.1	ND	ND	ND	0.3	0.8	1.1	0.8	ND		
2013		1.4	1.9	0.6	ND	0.9	1.1	1.9	1.3	ND	ND	ND	0.4	0.5	1.0	0.5	ND		
2014		0.7	0.6	0.4	ND	0.5	0.3	0.3	0.2	ND	ND	ND	0.3	1.5	1.3	0.2	ND		
2015		0.5	0.1	0.1	ND	0.2	0.2	0.1	0.1	ND	ND	ND	0.2	0.2	0.2	0.1	ND		
2016		0.2	0.2	0.5	ND	0.1	0.5	0.3	0.6	ND	ND	ND	0.3	0.3	0.2	0.1	ND		
2017		0.3	0.5	0.2	ND	0.2	0.3	0.5	0.4	ND	ND	ND	0.3	0.4	1.1	0.4	ND		
2018		0.3	1.1	0.3	3	3.7	0.7	0.3	1.3	ND	ND	ND	3.3	4	ND	2.9	2.3		
2019		1	1	1	1	2	1	1	1	ND	ND	ND	3	1	ND	1.0	1.0		
2020		1	1	1	1	1	1	1	1	1	1	1	1	1	ND	1	1		
2021		3	2	<1	2	3	2	2	<1	ND	ND	<1	4	2	ND	3	4		
2022		4.1	3	3	2.7	5.2	4.3	4.2	8.8	ND	ND	1.5	3.9	2.1	ND	1.7	2		
2023		<1	2.3	2	<1	<1	<1	<1	1.2	ND	ND	<1	<1	<1	ND	<1	<1		
2024		<1	<1	2.7	ND	<1	<1	<1	<1	ND	ND	<1	1.8	4.3	ND	<1	<1		
		ZINC IN MUDWHELKS (mg/kg wet weight)																	
FSANZ maximum level		N/G																"N/G" indicates no guidelines; "ND" indicates no data In 2012 Site C2 was established to replace site C1	
GEL 90th percentile		290																	
2006		73	190	90	ND	ND	76	ND	153	ND	ND	ND	47	106	75	ND	ND		
2007		12	12	15	ND	15	10	14	19	ND	ND	ND	10	8	10	ND	ND		
2008		14	8	6	ND	7	13	48	15	ND	ND	ND	11	9	8	ND	ND		
2009		7	5	5	ND	5	5	7	7	ND	ND	ND	17	4	3	ND	ND		
2010		8	6	4	ND	4	10	3	5	ND	ND	ND	3	3	2	ND	ND		
2011		4	0.7	1	ND	3.1	2	3	4	ND	ND	ND	2	4	3	ND	ND		
2012		31	15	11	ND	318	109	12	19	ND	ND	ND	9	11	16	12	ND		
2013		13	13	13	ND	70	19	39	60	ND	ND	ND	12	17	33	21	ND		
2014		11.9	11.9	8.2	ND	13.7	14.1	12.8	11.7	ND	ND	ND	10.9	12.1	9.1	10.6	ND		
2015		18.4	20.3	12.5	ND	77.9	72.5	15.3	32.5	ND	ND	ND	13.8	16.9	23.2	11.8	ND		
2016		4.0	8.2	4.5	ND	44.8	5.0	5.5	8.8	ND	ND	ND	3.5	5.7	5.2	4.8	ND		
2017		6.0	9.5	6.4	ND	15.1	8.3	7.9	20.9	ND	ND	ND	8.2	4.9	5.5	6.0	ND		
2018		16	143	22	149	34	414	19	81	ND	ND	ND	12	21	ND	25	9		
2019		20	21	68	57	229	98	242	65	ND	ND	ND	119	149	ND	26	16		
2020		48	18	24	37	165	42	17	35	ND	ND	23	71	28	ND	22	24		
2021		25	17	13	17	25	16	12	14	ND	ND	11	13	15	ND	11	13		
2022		25	20	40	9	84	6	7	27	ND	ND	161	22	22	ND	38	72		
2023		12	12	7	252	25	13	12	28	ND	ND	106	14	5	ND	9	150		
2024		127	55	22	ND	40	270	29	36	ND	ND	37	74	19	ND	15	13		

Location		Wickham Pt										Control Site							
Site		LG1	LG2	LG3	SP1	SP1-A	SP1-B	SP1-C	SP2	SP2-A	SP3	SP3-A	M3	E1	E2	C2	QA1	Comments	
		ZINC IN MUDWHELKS (mg/kg dry weight)																	
2006		250	680	320	ND	ND	330	ND	610	ND	ND	ND	180	380	300	ND	ND		
2007		38	47	51	ND	54	36	52	60	ND	ND	ND	39	39	45	ND	ND		
2008		37	20	14	ND	18	33	120	35	ND	ND	ND	27	24	26	ND	ND		
2009		16	14	12	ND	14	14	18	20	ND	ND	ND	60	13	13	ND	ND		
2010		25	19	15	ND	20	38	13	16	ND	ND	ND	11	9.7	8.4	ND	ND		
2011		14	2.6	3.7	ND	13	5	12	17	ND	ND	ND	10	12	13	ND	ND		
2012		65	33	30	ND	650	210	32	45	ND	ND	ND	20	27	41	31	ND		
2013		40	46	40	ND	260	63	140	160	ND	ND	ND	34	59	100	68	ND		
2014		43	45	26	ND	48	51	40	46	ND	ND	ND	39	44	32	44	ND		
2015		68	80	57	ND	340	370	61	130	ND	ND	ND	62	72	100	54	ND		
2016		14	29	18	ND	160	19	20	35	ND	ND	ND	13	20	17	15	ND		
2017		19	31	23	ND	50	27	31	61	ND	ND	ND	25	15	19	21	ND		
2018		72	480	100	750	160	2,200	69	350	ND	ND	ND	37	90	ND	100	36		
2019		65	71	240	230	900	360	800	230	ND	ND	ND	490	550	ND	100	67		
2020		170	64	120	120	780	160	49	130	ND	ND	92	280	100	ND	93	110		
2021		120	68	50	68	120	84	57	63	ND	ND	42	69	79	ND	40	58		
2022		110	96	160	48	350	36	36	100	ND	ND	670	89	110	ND	160	72		
2023		47	54	26	1200	120	70	59	110	ND	ND	440	65	21	ND	35	45		
2024		550	230	83	ND	190	1500	140	150	ND	ND	170	310	76	ND	59	61		
		TPH IN MUDWHELKS (mg/kg wet weight)																	
FSANZ maximum level		N/G																	
GEL 90th percentile		N/G																	
2006		<0.04	<0.04	<0.04	ND	ND	<0.04	ND	<0.04	ND	ND	ND	<0.04	2.1	ND	ND	ND		
2007		<0.04	1.1	1.9	ND	<0.04	1.2	<0.04	<0.04	ND	ND	ND	<0.04	<0.04	ND	ND	ND		
2008		<0.04	<0.04	<0.04	ND	<0.04	<0.04	<0.04	<0.04	ND	ND	ND	<0.04	<0.04	ND	ND	ND		
2009		<0.04	<0.04	<0.04	ND	<0.04	<0.04	<0.04	<0.04	ND	ND	ND	<0.04	<0.04	ND	ND	ND		
2010		<0.04	<0.04	<0.04	ND	<0.04	<0.04	<0.04	<0.04	ND	ND	ND	<0.04	<0.04	ND	ND	ND		
2011		<0.04	<0.04	<0.04	ND	<0.04	<0.04	<0.04	<0.04	ND	ND	ND	<0.04	<0.04	ND	ND	ND		
2012		<0.04	<0.04	<0.04	ND	<0.04	<0.04	<0.04	<0.04	ND	ND	ND	<0.04	<0.04	ND	<0.04	ND		
2013		<0.04	<0.04	<0.04	ND	<0.04	<0.04	<0.04	<0.04	ND	ND	ND	<0.04	<0.04	ND	<0.04	ND		
2014		<0.04	<0.04	<0.04	ND	<0.04	<0.04	<0.04	<0.04	ND	ND	ND	<0.04	<0.04	ND	<0.04	ND		
2015		<0.04	<0.04	<0.04	ND	<0.04	<0.04	<0.04	<0.04	ND	ND	ND	<0.04	<0.04	ND	<0.04	ND		
2016		<0.04	<0.04	<0.04	ND	<0.04	<0.04	<0.04	<0.04	ND	ND	ND	<0.04	<0.04	ND	<0.04	ND		
2017		<0.04	<0.04	<0.04	ND	<0.04	<0.04	<0.04	<0.04	ND	ND	ND	<0.04	<0.04	ND	<0.04	ND		
2018		<0.04	<0.04	<0.04	ND	<0.04	<0.04	<0.04	<0.04	ND	ND	ND	<0.04	<0.04	ND	<0.04	ND		
2019		<0.04	<0.04	<0.04	ND	<0.04	<0.04	<0.04	<0.04	ND	ND	ND	<0.04	<0.04	ND	<0.04	ND		
2020		<0.04	<0.04	<0.04	ND	<0.04	<0.04	<0.04	<0.04	ND	ND	<0.04	<0.04	<0.04	ND	<0.04	ND		
2021		<0.04	<0.04	<0.04	ND	<0.04	<0.04	<0.04	<0.04	ND	ND	<0.04	<0.04	<0.04	ND	<0.04	ND		
2022		<0.04	<0.04	<0.04	ND	<0.04	<0.04	<0.04	<0.04	ND	ND	<0.04	<0.04	<0.04	ND	<0.04	ND		
2023		<0.04	<0.04	<0.04	ND	<0.04	<0.04	<0.04	<0.04	ND	ND	<0.04	<0.04	<0.04	ND	<0.04	ND		
2024		<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	ND	<0.04	ND		

Attachment C – Stack Emission Data

*Note: No data available for 2024

Compressor Turbines

NOX g/s		Unit						EPL217
Year	Month	U1411	U1421	U1511	U1521	U1611	U1621	Max Emission Rate (g/s)
2016	2	6.5	5.5	5.2	7.2	5.4	5.6	25
	4	7	6.1	5.8	7.4	6.7	5.6	25
	9	5.9	5.2	4.6	7.2	6.7	5.8	25
	11	6	6.3	4.7	5.7	5.6	4.8	25
2017	3	6.6	6	6.6	6	6.7	6.2	25
	5	9.1	9.6	9	9	7.9	7.5	25
	8	6.7	6.9	6.6	6.3	7.6	7.1	25
	10	6.1	6.1	5.8	5.5	6.9	6.5	25
2018	4	5.1	5.7	8	6.6	6.4	6.7	25
	10	7.3	7.2	7	7.3	5.6	5.8	25
2019	3	5.8	5.9	7	7	4.6	5.4	25
	11	10	8.4	6.7	7.5	7.1	7.5	25
2020	8	12	10	10	11	8.2	10	25
	11	9.2	9.6	10	9.9	11	8.2	25
2021	6	11	11	9.8	9.3	12	11	25
	12	9.5	8.9	9.3	8	6.8	7.4	25
2022	4	8.6		7.3		8.5		25
	6		11		6.9		8.7	25
	10	8.5		6.9		7.4		25
2023	4		9.6		7.2		8.8	25

CO g/s		Unit						EPL217
Year	Month	U1411	U1421	U1511	U1521	U1611	U1621	Max Emission Rate (g/s)
2016	2	0.7	0.95	0.69	0.55	1.5	0.92	5
	4	0.59	1.5	0.7	1.5	1.8	0.99	5
	9	0.71	1.1	0.96	1.2	1.3	1.4	5
	11	0.67	1.2	0.99	0.65	1.1	0.54	5
2017	3	0.7	0.71	0.43	0.66	0.85	0.38	5
	5	1.7	1.6	1.2	1.6	2.4	0.96	5
	8	0.89	0.8	0.52	0.68	1.1	0.64	5
	10	0.96	1.1	0.5	0.74	0.59	0.61	5
2018	4	0.59	0.83	0.62	0.74	0.72	0.51	5
	10	0.44	0.7	0.58	0.58	0.9	0.87	5
2019	3	0.52	0.68	0.67	0.66	0.98	0.78	5
	11	0.61	0.67	0.8	0.42	0.32	0.6	5
2020	8	0.68	0.71	1.1	0.39	0.47	0.28	5
	11	0.62	0.48	0.45	0.42	0.56	0.42	5
2021	6	0.52	0.58	0.49	0.5	0.48	0.59	5
	12	0.57	0.4	0.5	0.43	0.42	0.44	5
2022	4	0.57		0.45		0.3		5
	6		0.48		0.52		0.74	5
	10	0.47		0.41		0.22		5
2023	4		0.38		0.59		0.59	5

SO2 g/s		Unit						EPL217
Year	Month	U1411	U1421	U1511	U1521	U1611	U1621	Max Emission Rate (g/s)
2016	2	0.18	0.18	0.17	0.18	0.19	0.18	4.7
	4	0.19	0.19	0.18	0.18	0.19	0.19	4.7
	9	0.17	0.18	0.17	0.17	0.19	0.19	4.7
	11	0.17	0.18	0.17	0.16	0.17	0.17	4.7
2017	3	0.17	0.19	0.17	0.19	0.17	0.18	4.7
	5	0.50	0.50	0.50	0.50	0.40	0.40	4.7
	8	0.40	0.40	0.48	0.54	0.36	0.37	4.7
	10	0.40	0.30	0.40	0.30	0.40	0.30	4.7
2018	4	0.30	0.40	0.40	0.30	0.30	0.30	4.7
	10	0.40	0.40	0.30	0.30	0.30	0.30	4.7
2019	3	0.30	0.30	0.30	0.30	0.30	0.30	4.7
	11	0.40	0.30	0.30	0.30	0.30	0.30	4.7
2020	8	2.20	0.90	2.50	2.10	2.10	2.20	4.7
	11	0.85	0.30	2.00	0.40	0.40	1.10	4.7
2021	6	0.30	0.30	0.44	0.49	0.40	0.59	4.7
	12	0.30	0.40	0.30	0.30	0.30	0.39	4.7
2022	4	0.89		0.86		0.2		4.7
	6		0.3		0.2		0.2	4.7
	10	0.3		0.3		0.3		4.7
2023	4		0.3		0.3		0.3	4.7

NOX mg/Nm ³		Unit						EPL217
Year	Month	U1411	U1421	U1511	U1521	U1611	U1621	Concentration Limit (mg/Nm ³)
2016	2	91	75	75	105	73	79	212
	4	95	83	84	108	88	77	212
	9	82	73	66	106	88	78	212
	11	83	88	72	91	77	66	212
2017	3	92	84	105	98	103	96	212
	5	99	98	103	104	92	89	212
	8	92	92	101	98	99	93	212
	10	86	86	96	93	96	90	212
2018	4	72	78	113	95	102	102	212
	10	100	100	108	110	80	82	212
2019	3	81	91	100	101	71	80	212
	11	147	120	108	123	115	123	212
2020	8	172	144	150	162	148	174	212
	11	138	144	152	149	161	118	212
2021	6	170	170	140	130	160	150	212
	12	150	130	150	130	120	140	212
2022	4	140		130		130		212
	6		160		120		140	212
	10	140		120		130		212
2023	4		160		130		150	212

CO mg/Nm ³		Unit						EPL217
Year	Month	U1411	U1421	U1511	U1521	U1611	U1621	Concentration Limit (mg/Nm ³)
2016	2	9.7	13	10	8.1	20	13	70
	4	8	20	10	21	24	14	70
	9	10	15	14	17	17	19	70
	11	9	17	15	10	15	7	70
2017	3	10	10	7	11	13	6	70
	5	19	17	14	19	28	11	70
	8	12	11	8	11	15	8.3	70
	10	14	16	8.2	13	8.2	8.5	70
2018	4	8.2	11	8.7	11	11	7.8	70
	10	6	9.6	8.8	8.8	13	12	70
2019	3	7.3	10	9.6	9.6	15	12	70
	11	8.9	9.6	13	6.8	5.2	9.9	70
2020	8	9.9	11	16	5.7	8.5	4.8	70
	11	9.3	7.2	6.6	6.3	7.9	6.1	70
2021	6	7.7	8.7	6.9	7.1	6.4	7.7	70
	12	8.8	5	7.8	7.3	7.3	8.3	70
2022	4	9.1		7.9		5		70
	6		7		9.1		12	70
	10	7.7		7.2		3.9		70
2023	4		6.2		11		9.8	70

SO2 mg/Nm ³		Unit						EPL217
Year	Month	U1411	U1421	U1511	U1521	U1611	U1621	Concentration Limit (mg/Nm ³)
2016	2	2.6	2.5	2.5	2.7	2.5	2.6	65
	4	2.6	2.5	2.6	2.6	2.4	2.6	65
	9	2.4	2.5	2.4	2.4	2.5	2.5	65
	11	2.3	2.5	2.6	2.6	2.4	2.4	65
2017	3	2.4	2.6	2.6	3.2	2.6	2.9	65
	6	5	5	5	5	5	5	65
	9	5	5	7.4	8.5	4.8	4.8	65
	10	5	5	6	6	5	5	65
2018	4	4	5	5	5	5	5	65
	10	5	5	5	5	5	5	65
2019	3	5	5	5	5	5	5	65
	11	5	5	5	5	5	5	65
2020	8	33	14	37	30	37	38	65
	11	13	5	30	5	5	16	65
2021	6	5	5	6.1	7	5	5	65
	12	5	5	5	5	6	7.2	65
2022	4	14		7.9		4		65
	6		4		5		4	65
	10	5		6		6		65
2023	4		5		5		5	65

Power Generation Turbines

NOX g/s		Unit					EPL217
Year	Month	U3101	U3102	U3103	U3104	U3105	Max Emission Rate (g/s)
2016	2	0.24	0.2		0.17	0.23	1
	4	0.36	0.3	0.14	0.044		1
	8	0.27	0.18	0.12	0.19		1
	11	0.25	0.23	0.17	0.13	0.26	1
2017	3	0.2	0.32	0.08	0.14	0.22	1
	6	0.34	0.37	0.15	0.19	0.37	1
	8	0.28	0.38	0.096	0.16	0.34	1
	10	0.25	0.3	0.076	0.12	0.23	1
2018	4	0.17	0.17	0.036	0.074	0.15	1
	10	0.37	0.31	0.12	0.15	0.26	1
2019	3	0.28	0.41	0.091	0.014	0.043	1
	11	0.3	0.3	0.11	0.041	0.12	1
2020	8	0.34	0.11	0.08	0.15	0.09	1
	11	0.24	0.24	0.079	0.17	0.27	1
2021	6	0.22	0.34	0.03	0.16	0.20	1
	12	0.16	0.17	0.05	0.16	0.29	1
2022	4	0.22	0.16	0.03		0.16	1
	10	0.19	0.13			0.12	1
2023	4		0.24	0.04		0.11	1

CO g/s		Unit					EPL217
Year	Month	U3101	U3102	U3103	U3104	U3105	Max Emission Rate (g/s)
2016	2	0.012	0.048		0.012	0.047	0.4
	4	0.014	0.042	0.01	0.014		0.4
	8	0.012	0.053	0.012	0.04		0.4
	11	0.013	0.013	0.013	0.013	0.013	0.4
2017	3	0.012	0.013	0.012	0.012	0.015	0.4
	6	0.032	0.022	0.016	0.01	0.015	0.4
	8	0.012	0.015	0.013	0.012	0.012	0.4
	10	0.012	0.013	0.014	0.01	0.012	0.4
2018	4	0.012	0.011	0.015	0.011	0.024	0.4
	10	0.012	0.013	0.01	0.011	0.01	0.4
2019	3	0.011	0.013	0.013	0.012	0.012	0.4
	11	0.012	0.013	0.013	0.013	0.026	0.4
2020	8	0.012	0.014	0.012	0.013	0.01	0.4
	11	0.011	0.013	0.013	0.01	0.01	0.4
2021	6	0.011	0.012	0.01	0.01	0.012	0.4
	12	0.07	0.06	0.07	0.07	0.07	0.4
2022	4	0.07	0.06	0.06		0.07	0.4
	10	0.01	0.01			0.01	0.4
2023	4		0.01	0.01		0.01	0.4

SO2 g/s		Unit					EPL217
Year	Month	U3101	U3102	U3103	U3104	U3105	Max Emission Rate (g/s)
2016	2	0.028	0.027		0.029	0.027	0.2
	4	0.031	0.03	0.023	0.032		0.2
	8	0.029	0.029	0.029	0.03		0.2
	11	0.03	0.029	0.03	0.031	0.029	0.2
2017	3	0.027	0.03	0.027	0.028	0.027	0.2
	6	0.06	0.06	0.06	0.06	0.07	0.2
	8	0.06	0.06	0.06	0.06	0.06	0.2
	10	0.06	0.06	0.06	0.05	0.06	0.2
2018	4	0.06	0.05	0.07	0.05	0.06	0.2
	10	0.06	0.06	0.06	0.05	0.06	0.2
2019	3	0.05	0.05	0.06	0.05	0.06	0.2
	11	0.06	0.06	0.06	0.06	0.06	0.2
2020	8	0.06	0.06	0.06	0.06	0.06	0.2
	11	0.05	0.06	0.06	0.06	0.06	0.2
2021	6	0.05	0.06	0.06	0.05	0.06	0.2
	12	0.06	0.06	0.07	0.06	0.07	0.2
2022	4	0.07	0.06	0.05		0.06	0.2
	10	0.05				0.05	0.2
2023	4		0.05	0.06		0.05	0.2

NOX mg/Nm³		Unit					EPL217
Year	Month	U3101	U3102	U3103	U3104	U3105	Concentration Limit (mg/Nm³)
2016	2	29	24		20	27	70
	4	37	32	15	5		70
	8	30	19	13	20	21	70
	11	26	24	17	13	27	70
2017	3	22	34	9	15	24	70
	6	35	37	14	19	33	70
	9	31	40	10	19	36	70
	10	28	32	8.2	15	25	70
2018	4	19	18	3.9	9.1	16	70
	10	41	32	13	18	28	70
2019	3	33	46	9.6	1.6	4.6	70
	11	32	32	11	4.4	13	70
2020	8	37	12	8	16	9.6	70
	11	27	25	8.3	18	29	70
2021	6	25	36	3	20	22	70
	12	16	18	5	16	27	70
2022	4	21	14	3		14	70
	10	22	14			13	70
2023	4		27.00	5.00		13.00	70

CO mg/Nm³		Unit					EPL217
Year	Month	U3101	U3102	U3103	U3104	U3105	Concentration Limit (mg/Nm³)
2016	2	1.5	5.7		1.5	5.6	32
	4	1.4	4.4	1	1.5		32
	8	1.3	5.7	1.3	4.3	7.4	32
	11	1.3	1.3	1.4	1.4	1.3	32
2017	3	1.2	1.4	1.2	1.3	1.7	32
	6	3.3	2.2	1.6	1	1.4	32
	8	1.4	1.6	1.4	1.4	1.3	32
	10	1.3	1.4	1.5	1	1.3	32
2018	4	1.3	1.2	1.6	1.4	2.6	32
	10	1.3	1.3	1	1.4	1	32
2019	3	1.3	1.5	1.3	1.4	1.3	32
	11	1.3	1.4	1.4	1.4	2.7	32
2020	8	1.3	1.5	1.3	1.4	1	32
	11	1.2	1.4	1.4	1	1	32
2021	6	1.3	1.3	1	1	1.3	32
	12	6	6	7	7	7	32
2022	4	7	5	6		6	32
	10	1	1			1	32
2023	4		1.00	1.00		1.00	32.0

SO2 mg/Nm³		Unit					EPL217
Year	Month	U3101	U3102	U3103	U3104	U3105	Concentration Limit (mg/Nm³)
2016	2	3.4	3.2		3.4	3.2	23
	4	3.2	3.1	2.4	3.4		23
	8	3.1	3.2	3.1	3.2	3.2	23
	11	3.1	3.1	3.2	3.2	3.1	23
2017	3	2.9	3.2	2.9	3	2.9	23
	6	6	6	6	6	6	23
	8	7	7	7	7	7	23
	10	6	6	7	6	6	23
2018	4	6	5	7	6	6	23
	10	6	6	6	6	6	23
2019	3	6	6	6	6	6	23
	11	6	6	6	6	6	23
2020	8	6	6	6	6	6	23
	11	6	6	6	7	6	23
2021	6	6	6	6	6	6	23
	12	6	6	6	6	6	23
2022	4	6	5	5		5	23
	10	6	6			6	23
2023	4		6	6		6	23.0

Acid Gas Incinerator

NOX g/s		EPL217	
Year	Month	K-1904	Max Emission Rate (g/s)
2016	2	0.67	1.5
	4	1	1.5
	9	0.88	1.5
	11	1.2	1.5
2017	3	0.94855525	1.5
	6	0.7	1.5
	8	0.8	1.5
	11	0.77	1.5
2018	2	0.75	1.5
	4	0.66	1.5
	12	0.42	1.5
2019	1	0.65	1.5
	4	0.37	1.5
	8	0.47	1.5
	11	0.21	1.5
2020	2	0.36	1.5
	8	0.51	1.5
	11	0.32	1.5
2021	3	0.21	1.5
	6	0.37	1.5
	9	0.43	1.5
	12	0.19	1.5
2022	2	0.27	1.5
	4	0.47	1.5
	8	0.31	1.5
	10	0.27	1.5
2023	2	0.3	1.5
	4	0.29	1.5

SO2 g/s		EPL217	
Year	Month	K-1904	Max Emission Rate (g/s)
2016	2	1.6	4.6
	4	2.5	4.6
	9	2.7	4.6
	11	3.5	4.6
2017	3	2.9	4.6
	6	2	4.6
	8	2.4	4.6
	11	2.5	4.6
2018	2	1.9	4.6
	4	2.1	4.6
	12	2.2	4.6
2019	1	2.2	4.6
	4	1.4	4.6
	8	1.6	4.6
	11	1.8	4.6
2020	2	2.1	4.6
	8	2.4	4.6
	11	1.4	4.6
2021	3	1.8	4.6
	6	1.4	4.6
	9	2.2	4.6
	12	3.4	4.6
2022	2	1.8	4.6
	4	0.88	4.6
	8	0.62	4.6
	10	0.68	4.6
2023	2	0.37	4.6
	4	0.42	4.6

NOX mg/Nm³		Unit	EPL217
Year	Month	K-1904	Concentration Limit (mg/Nm³)
2016	2	30	64
	4	44	64
	9	34	64
	11	38	64
2017	3	30	64
	6	34	64
	8	40	64
	11	38	64
2018	2	37	64
	4	31	64
	12	22	64
2019	1	32	64
	4	30	64
	8	23	64
	11	13	64
2020	2	20	64
	8	26	64
	11	19	64
2021	3	12.0	64
	6	18.0	64
	9	22.0	64
	12	11.0	64
2022	2	16	64
	4	71	64
	8	59	64
	10	46	64
2023	2	71.0	64
	4	70.0	64

SO2 mg/Nm³		Unit	EPL217
Year	Month	K-1904	Concentration Limit (mg/Nm³)
2016	2	74	194
	4	112	194
	9	103	194
	11	106	194
2017	3	90	194
	6	98	194
	9	122	194
	11	126	194
2018	2	92	194
	4	95	194
	12	117	194
2019	1	112	194
	4	110	194
	8	76	194
	11	109	194
2020	2	119	194
	8	121	194
	11	81	194
2021	3	97	194
	6	22	194
	9	120	194
	12	190	194
2022	2	110	194
	4	130	194
	8	120	194
	10	120	194
2023	2	89	194
	4	100	194

CO g/s		Unit	EPL217
Year	Month	K-1904	Max Emission Rate (g/s)
2016	2	1.7	3
	4	0.65	3
	9	1.8	3
	11	0.99	3
2017	3	2.8	3
	6	1.3	3
	9	0.74	3
	11	0.69	3
2018	2	1.2	3
	4	1	3
	12	0.67	3
2019	1	1	3
	4	0.23	3
	8	2.7	3
	11	1.2	3
2020	2	0.68	3
	8	0.72	3
	11	0.53	3
2021	3	0.61	3
	6	0.44	3
	9	0.64	3
	12	0.46	3
2022	2	0.57	3
	4	0.1	3
	8	0.058	3
	10	0.043	3
2023	2	0.065	3
	4	0.044	3

H2S g/s		EPL217		EPL217	
Year	Month	K1904	H2S Concentration Limit (mg/Nm³)	K1904	Maximum mass emission rate H2S (g/s)
2017	11	0.8	5	0.02	0.1
2018	2	0.8	5	0.02	0.1
	4	0.8	5	0.02	0.1
	12	0.6	5	0.01	0.1
2019	1	0.6	5	0.01	0.1
	4	0.6	5	0.008	0.1
	8	0.4	5	0.009	0.1
	11	0.4	5	0.007	0.1
2020	2	0.4	5	0.007	0.1
	8	0.4	5	0.008	0.1
	11	0.7	5	0.012	0.1
2021	3	0.4	5	0.008	0.1
	6	0.3	5	0.006	0.1
	9	0.4	5	0.008	0.1
	12	0.4	5	0.008	0.1
2022	2	0.2	5	0.004	0.1
	4	0.5	5	0.004	0.1
	8	0.4	5	0.002	0.1
	10	0.9	5	0.005	0.1
2023	2	0.5	5	0.002	0.1
	4	0.5	5	0.002	0.1

CO mg/Nm³		Unit	EPL217
Year	Month	K-1904	Concentration Limit (mg/Nm³)
2016	2	79	339
	4	29	339
	9	69	339
	11	31	339
2017	3	87	339
	6	61	339
	9	37	339
	11	34	339
2018	2	59	339
	4	46	339
	12	36	339
2019	1	52	339
	4	18	339
	8	130	339
	11	71	339
2020	2	38	339
	8	37	339
	11	32	339
2021	3	33	339
	6	22	339
	9	33	339
	12	26	339
2022	2	35	339
	4	15	339
	8	11	339
	10	7	339
2023	2	16	339
	4	11	339

Boiler

NOx g/s			EPL217
Year	Month	B-3801	Max Emission Rate (g/s)
2016	2	0.26	0.70
	4	0.21	0.70
	9	0.20	0.70
	11	0.14	0.70
2017	3	0.22	0.70
	6	0.45	0.70
	8	0.49	0.70
	10	0.25	0.70
2018	4	0.18	0.70
	11	0.20	0.70
2019	3	0.16	0.70
	11	0.15	0.70
	11	0.17	0.70
2020	8	0.19	0.70
	11	0.17	0.70
2021	6	0.20	0.70
	12	0.24	0.70
2022	4	0.27	0.7

NOx mg/Nm³			EPL217
Year	Month	B-3801	Concentration Limit (mg/Nm³)
2016	2	124.0	190
	4	114.0	190
	9	114.0	190
	11	111.0	190
2017	3	105.0	190
	6	139.0	190
	9	139.0	190
	10	100.0	190
2018	4	101.0	190
	11	103.0	190
2019	3	103.00	190
	11	134.00	190
	11	121.00	190
2020	8	128.00	190
	11	110.00	190
2021	6	150.00	190
	12	120.00	190
2022	4	130	190

CO g/s			EPL217
Year	Month	B-3801	Max Emission Rate (g/s)
2016	2	0.003	0.2
	4	0.01	0.2
	9	0.06	0.2
	11	0.002	0.2
2017	3	0.004	0.2
	6	0.006	0.2
	9	0.006	0.2
	10	0.005	0.2
2018	4	0.004	0.2
	11	0.037	0.2
2019	3	0.021	0.2
	11	0.120	0.2
	11	0.0042	0.2
2020	8	0.0030	0.2
	11	0.0030	0.2
2021	6	0.0046	0.2
	12	0.0200	0.2
2022	4	0.02	0.2

CO mg/Nm³			EPL217
Year	Month	B-3801	Concentration Limit (mg/Nm³)
2016	2	1.4	42
	4	3.2	42
	9	36	42
	11	1.9	42
2017	3	1.9	42
	6	2	42
	9	2	42
	10	2	42
2018	4	2	42
	11	19	42
2019	3	13	42
	11	107	42
	11	3	42
2020	8	2	42
	11	2	42
2021	6	3.5	42
	12	9	42
2022	4	8	42

SO2 g/s			EPL217
Year	Month	B-3801	Max Emission Rate (g/s)
2016	2	0.007	0.25
	4	0.006	0.25
	9	0.007	0.25
	11	0.005	0.25
2017	3	0.009	0.25
	6	0.030	0.25
	9	0.020	0.25
	10	0.020	0.25
2018	4	0.020	0.25
	11	0.020	0.25
2019	3	0.020	0.25
	11	0.010	0.25
	11	0.010	0.25
2020	8	0.010	0.25
	11	0.010	0.25
2021	6	0.010	0.25
	12	0.020	0.25
2022	4	0.02	0.25

SO2 mg/Nm³			EPL217
Year	Month	B-3801	Concentration Limit (mg/Nm³)
2016	2	3.20	65
	4	3.10	65
	9	4.20	65
	11	4.30	65
2017	3	4.30	65
	6	9.00	65
	9	6.00	65
	10	9.00	65
2018	4	9.00	65
	11	10.00	65
2019	3	10.00	65
	11	10.00	65
	11	9.00	65
2020	8	9.00	65
	11	9.00	65
2021	6	9.00	65
	12	9.00	65
2022	4	8	65

Solvent Regenerator Reflux Drum (Acid Gas Removal Vent)

H2S					
Year	Month	V1206	H2S Concentration Limit (mg/Nm³)	V1206	Maximum mass emission rate H2S (g/s)
2017	10	86.00	136	0.82	1.5
2018	2	44.00	136	0.54	1.5
	4	31.00	136	0.36	1.5
	7	95.00	136	1.10	1.5
	10	142.00	136	1.40	1.5
2019	1	67.00	136	0.66	1.5
	4	60.00	136	0.54	1.5
	8	68.00	136	0.70	1.5
	11	107	136	1.0	1.5
2020	2	82.00	136	0.78	1.5
	8	44.00	136	0.38	1.5
	11	51.00	136	0.53	1.5
2021	3	88.00	136	0.76	1.5
	6	5.00	136	0.06	1.5
	9	85.00	136	0.87	1.5
	12	5.00	136	0.02	1.5
2022	1	6	136	0.04	1.5
	2	6	136	0.04	1.5
	4	4	136	0.01	1.5
	8	49	136	0.16	1.5
	10	23	136	0.07	1.5
2023	2	4	136	0.006	1.5
	4	3	136	0.006	1.5

Benzene					
Year	Month	V1206	Benzene Concentration Limit (mg/Nm³)	V1206	Maximum mass emission rate Benzene (g/s)
2017	10	6.20	16	0.059	0.18
2018	2	5.60	16	0.068	0.18
	4	2.70	16	0.031	0.18
	7	1.20	16	0.014	0.18
	10	6.10	16	0.061	0.18
2019	1	9.70	16	0.096	0.18
	4	34.00	16	0.30	0.18
	8	8.80	16	0.09	0.18
	11	16.00	16	0.15	0.18
2020	2	14.00	16	0.13	0.18
	8	13.00	16	0.11	0.18
	11	5.80	16	0.06	0.18
2021	3	13.00	16	0.11	0.18
	6	7.30	16	0.08	0.18
	9	9.30	16	0.10	0.18
	12	24.00	16	0.10	0.18
2022	1	24	16	0.18	0.18
	2	24	16	0.18	0.18
	4	42	16	0.13	0.18
	8	24	16	0.08	0.18
	10	44	16	0.13	0.18
2023	2	150.00	16	0.27	0.18
	4	130	16	0.23	0.18

Attachment D – Groundwater Data

GROUNDWATER

Sample	Date Sampled	PHYSICAL PROPERTIES							NUTRIENTS										MAJOR IONS													Dissolved Cr/VI	
		pH	Electrical Conductivity (EC)	Dissolved Oxygen	Dissolved Oxygen (Field %)	Total Dissolved Solids (g/L)	Total Suspended Solids	Biological Oxygen Demand	Total Nitrogen	Ammonia as N	Nitrite + Nitrate as N	Nitrate as N	Nitrite as N	Kjeldahl Nitrogen Total	Dissolved Reactive Phosphorus as P	Total Phosphorus	Calcium - Dissolved	Potassium - Dissolved	Magnesium - Dissolved	Sodium - Dissolved	Bicarbonate HCO3 as CaCO3	Carbonate CO32- as CaCO3	Hydroxide OH- as CaCO3	Total Alkalinity as CaCO3	Chloride	Sulphate	Fluoride	Aluminium-Dissolved	Arsenic-Dissolved	Cadmium-Dissolved	Chromium-Dissolved		
Biannual Testing Frequency		pH Units	µS/cm	mg/L	% Sat	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR		0.1	1	0.1		1	1	2	0.1	0.01	0.01	0.01	0.01	0.1	0.01	0.01	1	1	1	1	1	1	1	1	1	1	1	0.1	0.01	0.001	0.0001	0.001	0.001
BH1																																	
BH1	16/03/2015	5.78	2,110	8.6		1,070	531		0.6	0.04		0.18	<0.01		<0.01	0.18	27	8	40	286	5	<1	<1	5	615	113	<0.1	0.02	<0.001	<0.001	<0.01	<0.01	<0.01
BH1	25/08/2015	5.39	91,100	7.0		50,400	9,480		2	0.37		0.35	<0.01		<0.1	3.14	865	360	2,300	16,700	32	<1	<1	32	24,200	4,140	0.3	0.44	<0.01	0.0032	<0.01	<0.01	<0.01
BH1	27/04/2016	5.4	14,000	9.3		9,300	430		1	0.01		0.44	0.006			0.02	170	60	400	3,000	10	<5	<5	10	4,800	590	1.3	0.05	0.002	0.0006	<0.001	<0.005	<0.005
BH1	10/08/2016	4.9	69,000			50,000	7,600		2.2	0.51		0.83	<0.005			0.13	770	310	2,000	15,000	9	<5	<5	9	28,000	3,400	<5	1.6	0.006	0.0035	<0.002	<0.005	<0.1
BH1	27/04/2017	5.53	5,030	8.7		2,720	439		1	0.13		0.18	<0.01	0.8	<0.01	0.78	46	18	98	759	3	<1	<1	3	1,350	247	<0.1	0.25	0.001	0.0006	<0.001	<0.01	<0.01
BH1	22/08/2017	5.14	91,800	7.1		78,700	2,240		<2	0.6	0.19	<0.01	0.19	<2.0	0.02	0.9	1,100	442	2,940	20,800	2	<1	<1	2	34,400	4,340	0.1	1.46	<0.010	0.0029	<0.010	<0.001	<0.01
BH1	11/04/2018	5.7	4,400	9.1		3,300	280		0.4	0.03	0.14	0.14	<0.02	0.3	<0.05	0.14	63	23	130	1,000	<20	<10	<20	<20	1,500	260	<0.5	0.11	0.001	<0.0002	<0.001	<0.001	<0.001
BH1	9/08/2018	4.2	76,000	7.6		8	56,000		<0.5	0.70	0.26	0.59	0.59	<0.02	<0.2	0.12	910	430	2,300	19,000	<20	<10	<20	<20	27,000	3,300	720		<0.01	0.0026	<0.01	<0.01	<0.001
BH1	2/04/2019	5.2	9,850	7.7		5,550	735		1.1	0.38	0.63	0.63	<0.01	0.5	<0.01	0.08	89	32	190	1,430	<1	<1	<1	<1	3,020	304	<0.1		<0.001	0.0004	<0.001	<0.01	<0.01
BH1	14/08/2019	5.0	72,800	7.7		57,600	3,520		<2	0.80	0.36	0.36	<0.01	<2	0.01	0.84	898	357	2,220	16,400	2	<1	<1	2	29,400	4,100	0.2		<0.01	0.0031	<0.01	<0.01	<0.01
BH1	8/04/2020	4.7	17,400	6.7		9,950	3,430		0.8	0.1	0.15	0.15	<0.01	0.6	<0.01	0.41	220	75	555	3,790	<1	<1	<1	<1	5,620	733	<0.1	0.84	0.004	0.0008	0.001	<0.10	0.014
BH1	5/08/2020	5.3	48,700	8.5		43,400	1,030		0.7	0.1	0.34	0.34	<0.002	0.4	0.026	0.06	612	233	1,550	11,200	6	<1	<1	6	18,100	3,050	0.4	2.07	0.0045	0.0031	0.0008	<0.01	<0.001
BH1	7/04/2021	5.9	2,160	4.7		1,250	776		0.3	0.38	0.032	0.03	<0.002	0.25	0.0004	0.21	25	14	42	302	7	<1	<1	7	567	113	<0.1	0.026	<0.0002	0.00006	0.0032	0.002	<0.001
BH1	10/08/2021	4.2	64,100	10.6		45,100	183		0.5	0.0	0.36	0.35	<0.002	0.2	<0.01	0.12	721	237	1,630	12,000	<1	<1	<1	<1	21,700	3,080	0.1	1.56	0.0049	0.0024	<0.0005	<0.010	<0.010
BH1	4/27/2022	5.2	20,100			12,500	131		<0.5	0.07	0.03	0.03	<0.01	<0.5		<0.5	211	57	447	2,890	8			8	6,600	868	0.1	0.52	0.001	0.0007	0.002		
BH1	8/09/2022	4.2	35,700	63.9		24,300	38		0.8	0.2	0.19	0.19	<0.01	0.6		0.08	297	104															
BH1	4/12/2023	4.97	47,180	108.5		6,460	43		0.22	0.035	0.046	0.046	<0.002	0.17	<0.001	<0.005	87	27	202	1400	2	<1	<1	2	2,950	390	<0.1	0.529	0.0015	0.00085	0.0006		
BH1	8/02/2024	4.39	14,396	51.8		29,400	60		0.39	0.062	0.27	0.27	<0.002	0.12	<0.001	<0.005	470	181	1,270	8650	2	<1	<1	2	14,000	1850	0.2	1.48	0.0031	0.0017	0.0008		
BH1	30/04/2024	4.69	20,230	13100	79.9	6,050	151	3	0.44	0.037	0.183	0.183	<0.002	0.26	0.016	0.002	108	38	222	1630	4	<1	<1	4	3,000	377	0.1	0.257	0.0006	0.00036	<0.001	<0.0001	<0.0001
BH1	13/08/2024	4.35	61,000		77.7	48,900	294	<2	0.78	0.306	0.381	0.381	<0.002	0.40	0.046	0.122	744	285	1,890	13600	5	5	<1	5	26,200	2980	0.1	2.16	0.0052	0.0027	<0.01	<0.010	<0.01
BH2																																	
BH2	18/03/2015	7.08	82,800	6.4		63,000	2,500		2.3	2.02		0.02	<0.01		<0.01	1.1	1,310	653	2,350	18,200	645	<1	<1	645	32,500	4,230	0.2	<0.1	0.032	<0.001	<0.01	<0.01	<0.01
BH2	26/08/2015	7.4	74,700	7.1		48,200	2,890		28.4	27.3		0.04	<0.01		<0.1	0.77	776	472	1,500	14,300	629	<1	<1	629	21,800	1,750	0.5	<0.1	0.016	<0.001	<0.01	<0.01	<0.01
BH2	27/04/2016	6.2	55,000			38,000	1,200		66	39		1.61	<0.05			<0.01	530	250	1,300	13,000	510	<5	<5	510	24,000	120	<5	0.02	0.12	<0.001	<0.001	<0.005	<0.005
BH2	10/08/2016	6.7	75,000			54,000	7,100		26	15		<0.01	<0.05			0.12	980	510	2,000	17,000	800	<5	<5	800	30,000	2,800	<5	<0.02	0.05	&			

		PHYSICAL PROPERTIES							NUTRIENTS							MAJOR IONS																		
Sample	Date Sampled	pH	Electrical Conductivity (EC)	Dissolved Oxygen	Dissolved Oxygen (Field %)	Total Dissolved Solids (grav)	Total Suspended Solids	Biological Oxygen Demand	Total Nitrogen	Ammonia as N	Nitrite + Nitrate as N	Nitrate as N	Nitrite as N	Kjeldahl Nitrogen Total	Dissolved Reactive Phosphorus as P	Total Phosphorus	Calcium - Dissolved	Potassium - Dissolved	Magnesium - Dissolved	Sodium - Dissolved	Bicarbonate HCO3 as CaCO3	Carbonate CO32- as CaCO3	Hydroxide OH- as CaCO3	Total Alkalinity as CaCO3	Chloride	Sulphate	Fluoride	Aluminium-Dissolved	Arsenic-Dissolved	Cadmium-Dissolved	Chromium-Dissolved	Dissolved CrIII	Dissolved CrVI	
Biannual Testing Frequency		pH Units	µS/cm	mg/L	% Sat	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR		0.1	1	0.1		1	1	2	0.1	0.01	0.01	0.01	0.01	0.1	0.01	0.01	1	1	1	1	1	1	1	1	1	1	1	0.1	0.01	0.001	0.001	0.001	0.001	0.001
BH5	6/04/2021	5.5	1,770	6.7		978	434		3.4	0.01	2.830	2.83	<0.002	0.60	0.018	0.09	28	2	25	250	2	<1	<1	2	518	82	0.1	0.26	0.0009	0.00042	0.06914	0.085	<0.001	
BH5	11/08/2021	4.6	1,420	7.9		782	245		1.5	0.0	1.61	1.61	<0.002	0.3	<0.01	0.08	16	4	20	213	<1	<1	<1	<1	389	75	0.1	0.0224	0.0008	0.00028	0.001	<0.0010	<0.0010	
BH5	4/27/2022	5.7	1,600			1,060	1,590		0.7	<0.01		0.4	<0.01	0.3		0.13	25	5	24	242	13			13	489	79	0.2	0.05	1	0.0001	<0.001			
BH5	8/09/2022	5.7	1,260	110.2		784	774		0.6	0	0.03	0.03	<0.01	0.6		0.17	18	2																
BH5	4/11/2023	5.07	151	54.2		949	1470		1.6	0.093	1.04	1.04	<0.002	0.56	<0.001	0.43	24	1	19	225	4	<1	<1	4	442	97	0.2	0.193	0.0007	0.0004	<0.0002			
BH5	8/02/2023	5.66	1,392	106.3		902	123		0.21	0.022	0.415	0.412	0.003	<0.02	0.002	0.11	18	2	17	208	13	<1	<1	13	391	71	0.1	0.051	0.0007	0.0003	0.0004			
BH5	30/04/2024	5.69	681		105.6	1650	39100	2	5.68	0.182	1.47	1.47	<0.002	4.21	0.018	1.967	29	4	21	224	31	<1	<1	31	494	69	<0.1	0.058	0.0057	0.0007	<0.00001	<0.00001	<0.0001	
BH5	12/08/2024	5.59	1,050		72	766	856	<2	1.05	0.075	0.403	0.403	<0.002	0.65	0.007	0.618	20	3	18	199	6	<1	<1	6	355	74	0.1	0.0036	0.0007	0.00026	<0.00001	<0.00001	<0.0001	
BH6																																		
BH6	18/03/2015	5.9	2,220	6.4		1,040	6,580		1.1	0.67		0.02	<0.01		<0.01	0.48	20	9	42	339	33	<1	<1	33	561	188	<0.1	0.01	0.002	<0.0001	<0.001	<0.01	<0.01*	
BH6	25/08/2015	5.96	21,400	5.7		12,500	9,400		0.7	0.46		0.07	<0.01		<0.1	0.09	230	54	550	3,410	44	<1	<1	44	5,220	951	0.2	<0.01	0.004	0.0011	<0.001	<0.01	<0.01*	
BH6	27/04/2016	6	36,000			25,000	3,100		0.8	0.007		0.01	<0.005			0.03	480	100	1,200	7,100	52	<5	<5	52	14,000	1,700	<2	0.01	0.003	0.0012	<0.001	<0.005	<0.05	
BH6	10/08/2016	5.3	11,000			7,000	740		1.1	0.35		0.017	<0.005			<0.01	85	38	250	1,900	12	<5	<5	12	3,500	550	<1	0.08	0.003	0.0011	<0.001	<0.005	<0.005	
BH6	27/04/2017	6.01	1,510	6.4		762	605		1	0.7		0.09	<0.01	1	<0.01	0.1	13	8	30	206	23	<1	<1	23	390	158	<0.1	<0.01	<0.001	<0.001	<0.01	<0.01		
BH6	21/08/2017	5.68	8,340	6.8		4,850	708		600	0.38	0.05	<0.01	0.05	0.5	<0.01	0.05	61	29	166	1,320	5	<1	<1	5	2,450	419	<0.1	0.03	0.002	0.0007	<0.001	<0.001	<0.01	
BH6	10/04/2018	6.1	3,700	8.4		2,500	240		0.6	0.58	<0.05	<0.02	<0.02	0.6	<0.05	<0.05	49	21	120	890	21	<10	<20	21	1,200	250	<0.5	0.13	0.001	<0.0002	<0.001	<0.001	<0.001	
BH6	8/08/2018	6.1	6,100	8.9		3,600	460		0.3	0.07	<0.05	0.02	<0.02	0.3	<0.05	0.10	140	46	370	2,400	< 20	<10	<20	<20	1,700	310	<0.5		<0.001	0.0003	<0.001	<0.001	<0.001	
BH6	3/04/2019	6.5	1,110	6.3		564	112		0.6	0.30	0.02	0.02	<0.01	0.6	<0.01	0.01	8	6	20	148	20	<1	<1	20	279	128	<0.1		<0.001	<0.0001	<0.001	<0.01	<0.01	
BH6	14/08/2019	5.9	6,750	6.7		3,430	956		0.7	0.38	0.03	0.03	<0.01	0.7	<0.01	0.04	27	15	70	578	11	<1	<1	11	1,780	384	<0.1		<0.001	0.0001	<0.001	<0.01	<0.01	
BH6	7/04/2020	5.9	1,090	5.4		568	196		0.5	0.3	<0.01	<0.01	<0.01	0.5	<0.01	<0.01	10	6	22	159	26	<1	<1	26	253	146	<0.1	0.06	0.001	<0.0001	<0.001	<0.01	0.002	
BH6	5/08/2020	5.7	3,230	7.6		1,810	444		0.4	0.3	0.02	0.02	<0.002	0.4	0.002	<0.005	28	16	78	622	12	<1	<1	12	885	222	<0.1	0.016	0.0013	0.00022	<0.0002	<0.01	<0.01	
BH6	6/04/2021	5.9	1,100	5.9		632	1,960		0.8	0.41	0.008	0.01	<0.002	0.80	0.003	0.16	11	7	22	143	14	<1	<1	14	276	121	<0.1	0.013	0.00005	0.00005	0.002	0.002	<0.001	
BH6	11/08/2021	5.6	2,680	6.4		1,490	290		0.2	0.4	<0.01	<0.01	<0.002	0.2	<0.01	0.11	23	14	57	479	17	<1	<1	17	688	195	<0.1	0.012	0.0014	0.00012	<0.0002	<0.0010	<0.0010	
BH6	4/27/2022	5.8	19,100			13,600	69		0.2	0.2		<0.01	<0.01	0.2		<0.02	237	47	518	2,920	10			10	6,290	877	<0.1	0.05	0.006	0.0006	<0.001			
BH6	8/09/2022	5.1	2,300	29.8		1,320	<5		0.5	0.3	0.02	0.02	<0.01	0.5		0.03	18	12																
BH6	4/11/2023	5.67	1,578	44.2		809	13		0.13	0.237	<0.002	<0.002	<0.002	0.13	<0.001	0.029	12	6	25	192	13	<1	<1	13	375	125	<0.1	<0.005	0.0012	0.00006	<0.0002			
BH6	8/02/2023	5.68	18,130	107.3		7,660	24		0.04	0.307	<0.020	<0.020	0.004	0.04	0.017	0.013	161	45	431	2390	16	<1	<1	16	3950	560	<0.1	0.012	0.0042	0.00076	<0.0002			
BH6	22/04/2024	5.59	1,444		52.7	652	208	<2	0.4	0.322	<0.02	<0.02	<0.02	0.4	0.002	0.074	12	7	27	180	11	<1	<1	11	289	119	<0.1	<0.005	0.0012	0.00036	<0.00001	<0.00001	<0.0001	
BH6	12/08/2024	5.38	3,509		68.7	1420	303	2	0.31	0.24	<0.02	<0.02	<0.002	0.31	0.001	0.069	29	16	70	547	8	<1	<1	8	642	175	<0.1	0.002	0.0008	0.00022	<0.00001	<0.00001	<0.0001	
BH7																																		
BH7	16/03/2015	6.44	3,500	4.5		1,750	3,500			3.08		0.04	<0.01		<0.01	0.39	28	23	76	516	69	<1	<1	69	936	267	0.3	<0.01	0.001	<0.0001	<0.001	<0.01	<0.01*	
BH7	26/08/2015	6.42	13,500	4.8		7,680	35,400			3.5		<0.05	<0.05		<0.1	1.21	84	88	210	1,670	58	<1	<1	58										

GROUNDWATER

		DISSOLVED METALS									ORGANICS																	MICROBIOLOGICAL					
Sample	Date Sampled	Copper-Dissolved	Iron-Dissolved	Lead-Dissolved	Manganese-Dissolved	Mercury-Dissolved	Nickel-Dissolved	Zinc-Dissolved	Silver-Dissolved	Benzene	Toluene	Ethylbenzene	m+p-xylene	o-xylene	Total Xylene	Total BTEX	Naphthalene	TRH C6 - C9	TRH C10 - C14	TRH C15 - C28	TRH C29 - C36	C10 - C36 Fraction (sum)	TRH C6 - C10	TRH C6-C10 less BTEX (F1)	TRH >C10 - C16	TRH >C10-C16 less N (F2)	TRH >C16 - C34	TRH >C34 - C40	C10 - C40 Fraction (sum)	E. Coli	Enterococci		
Biannual Testing Frequency LOR		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	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	cfu/100 ml	org/100ml	
BH1		0.01	0.01	0.001	0.01	0.0001	0.001	0.001	0.001	1	1	1	2	1	2	1	5	20	50	50	50	50	20	20	50	50	100	100	100	100	2	2	
BH1	16/03/2015	<0.001	<0.05	<0.001	1.89	<0.0001	0.01	0.047		<1	<2	<2	<2	<2			<5	<20	<50	<100	<50		<20	<20	<100	<100	<100	<100					
BH1	25/08/2015	0.013	0.15	<0.01	15.3	<0.0001	0.276	1.47		<1	<2	<2	<2	<2			<5	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100					
BH1	27/04/2016	0.002	1.1	<0.001	5.6	<0.00005	0.06	1.6		<1	<1	<1	<2	<1			<1	<10	<50	<100	<100	<250	<10	<10	<50	<50	<100	<100					
BH1	10/08/2016	0.047	0.44	0.014	18	<0.00005	0.29	1.9		<1	<1	<1	<2	<1			<1	<10	<50	<100	<100	<250	<10	<10	<50	<50	<100	<100					
BH1	27/04/2017	0.005	1.02	<0.001	5.57	<0.0001	0.052	0.318																									
BH1	22/08/2017	0.059	<0.10	<0.010	11.4	<0.0001	0.211	1.28																									
BH1	11/04/2018	0.003	1	<0.001	4.4	<0.0001	0.021	0.088		<1	<1	<1	<2	<1			<10	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<100					
BH1	9/08/2018	0.076	1	<0.01	15.0	<0.001	0.270	1.600		<1	<1	<1	<2	<2			<10	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<100					
BH1	2/04/2019	0.008	<0.05	<0.001	3.9	<0.0001	0.035	0.172	<0.001	<1	<2	<2	<2	<2			<5	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<100			<2	2	
BH1	14/08/2019	0.082	1	<0.01	15.0	<0.0001	0.289	1.630	<0.01	<1	<2	<2	<2	<2			<5	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<100			<10	<10	
BH1	8/04/2020	<0.10	0.2	0.001	4.71	<0.0001	0.074	0.388	0.001	<1	<2	<2	<2	<2	<2		<5	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100	<100	<100	<2	<2
BH1	5/08/2020	0.089	2.32	0.0028	16.3	<0.00004	0.346	1.530	0.0028	<1	<2	<2	<2	<2	<2		<5	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100	<100	ND	ND	
BH1	7/04/2021	0.005	0.10	0.0002	1.7	<0.00004	0.008	0.040	<0.0001	<1	<2	<2	<2	<2	<2		<5	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100	<100	<10	<10	
BH1	10/08/2021	0.071	0.41	0.0021	13.0	<0.00004	0.227	1.050	0.0012	<1	<2	<2	<2	<2	<2		<5	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100	<100	<10	<10	
BH1	4/27/2022	0.032	0.75		3.9		0.074	0.358		<1	<2	<2	<2	<2	<2		<5						<20	<20	<100	<100	<100	<100	<100	<100	<10	<10	
BH1	8/09/2022																															30	
BH1	4/12/2023	0.0158	0.22	0.0011	4.18	<0.00004	0.0644	0.333	0.003	<1	<2	<2	<2	<2	<2		<5	<20	<50	<100	<100	<50	<20	<20	<100	<100	<100	<100	<100	<100	<10	<10	
BH1	8/02/2024	0.052	0.368	0.0024	9.11	<0.00004	0.158	0.892	0.0011	<1	<2	<2	<2	<2	<2		<5	<20	<50	<100	<50	<50	<50	<20	<20	<100	<100	<100	<100	<100	<10	<10	
BH1	30/04/2024	0.0099	0.0034	0.0023	2.36	<0.00004	0.0364	0.182	0.0002	<1	<2	<2	<2	<2	<2		<5	<20	<50	<100	<100	<100	<20	<20	<100	<100	<100	<100	<100	<100	<10	<10	
BH1	13/08/2024	0.064	0.888	0.0017	14.8	<0.0001	0.263	1.36	0.0015	<1	<2	<2	<2	<2	<2		<5	<20	<50	<100	<50	<50	<50	<20	<20	<100	<100	<100	<100	<100	<10	<10	
BH2																																	
BH2	18/03/2015	<0.01	1.66	<0.01	5.72	<0.0001	<0.01	<0.05		<1	<2	<2	<2	<2			<5	<20	<50	<100	<50		<20	<20	<100	<100	<100	<100					
BH2	26/08/2015	<0.01	2.35	<0.01	21.4	<0.0001	<0.01	<0.05		<1	<2	<2	<2	<2			<5	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100					
BH2	27/04/2016	0.003	280	<0.001	95	<0.00005	0.018	1.9		<1	<1	<1	<2	<1			<1	<10	170	880	150	1200	<10	<10	290	290	880	100					
BH2	10/08/2016	<0.002	20	<0.002	27	<0.00005	0.006	0.03		<1	<1	<1	<2	<1			<1	<10	<50	<100	<100	<265	<10	<10	58	58	190	<100					
BH2	26/04/2017	<0.010	<0.10	<0.010	97.3	<0.0001	0.034	0.058																									
BH2	22/08/2017	<0.010	<0.10	<0.010	36.4	<0.0001	0.017	<0.050																									
BH2	11/04/2018	0.010	1.5	0.006	22	<0.0001	0.008	0.035		<1	<1	<1	<2	<1			<10	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<100					
BH2	8/08/2018	<0.01	<0.5	<0.01	42.0	<0.001	0.017	<0.05		<1	<1	<1	<2	<1			<10	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<100					
BH2	2/04/2019	0.025	<0.1	<0.01	31.7	<0.0001	0.025	<0.05	<0.01	<1	<2	<2	<2	<2			<5	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<100			<2	<2	
BH2	13/08/2019	<0.01	3	<0.01	39.5	<0.0001	0.016	<0.05	<0.01	<1	<2	<2	<2	<2			5	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<100			<2	<2	
BH2	7/04/2020	<0.01	45.7	0.032	35.0	<0.0001	0.018	<0.050	<0.010	<1	<2	<2	<2	<2	<2		<5	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100	<100	<100	<2	<2
BH2	6/08/2020	<0.001	0.2	0.0008	29.50	<0.00004	0.007	<0.005	0.000	<1	<2	<2	<2	<2	<2		<5	<20	<50	<100	<100	<100	<20	<20	<100	<100	120	<100	120	<100	<2	<2	
BH2	7/04/2021	<0.001	7.1	0.0004	84.60	<0.00004	0.013	0.007	<0.0001	<1	<2	<2	<2	<2	<2		<5	<20	<50	140	<50	140	<20	<20	<100	<100	120	<100	120	<100	<10	<10	
BH2	11/08/2021	<0.001	4.7	0.0007	27.00	<0.00004	0.008	<0.005	<0.0001	<1	<2	<2	<2	<2	<2		<5	<20	<50	140	<50	140	<20	<20	<100	<100	120	<100	120	<100	<10	<10	
BH2	4/26/2022	<0.010	63	<0.01	34.3		0.017	<0.050															<20	<20	<100	<100	<100	<100	<100	<100	<50	<10	
BH2	8/09/2022																															594	
BH2	4/12/2023	0.0007	110	<0.0002	145	<0.00004	0.0466	0.025	<0.0002	<1	<2	<2	<2	<2	<2		<5	<20	70	290	<50	360	<20	<20	110	110	290	<100	390	<100	<10	<10	
BH2	8/01/2024	<0.0001	82.4	<0.0002	40.5	<0.00004	0.0026	0.009	<0.0001	<1	<2	<2	<2	<2	<2		<5	<20	<50	250	<50	250	<20	<20	<100	<100	250	<100	250	<100	<10	<10	
BH2	23/04/2024	<0.0005	31.7	0.0002	49.4	<0.00005	0.01	0.005	<0.0001	<1	<2	<2	<2	<2	<2		<5	<20	<50	<100	<100	<100	<20	<20	<100	<100	<100	<100	<100	<100	<10	<10	
BH2	13/08/2024	0.002	0.245	0.0008	15.7	<0.0001	0.0775	0.043	<0.0001	<1	<2	<2	<2	<2	<2		<5	<20	<50	<100	<100	<100	<20	<20	<100	<100	<100	<100	<100	<100	<10	<10	
BH3																																	
BH3	18/03/2015	0.003	1.98	<0.001	0.129	<0.0001	0.011	0.034		<1	<2	<2</																					

		DISSOLVED METALS								ORGANICS																	MICROBIOLOGICAL					
Sample	Date Sampled	Copper-Dissolved	Iron-Dissolved	Lead-Dissolved	Manganese-Dissolved	Mercury-Dissolved	Nickel-Dissolved	Zinc-Dissolved	Silver-Dissolved	Benzene	Toluene	Ethylbenzene	m+p-xylene	o-xylene	Total Xylene	Total BTEX	Naphthalene	TRH C6 - C9	TRH C10 - C14	TRH C15 - C28	TRH C29 - C36	C10 - C36 Fraction (sum)	TRH C6 - C10	TRH C6- C10 less BTEX (F1)	TRH >C10 - C16	TRH >C10- C16 less N (F2)	TRH >C16 - C34	TRH >C34 - C40	C10 - C40 Fraction (sum)	E. Coli	Enterococci	
Biannual Testing Frequency		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	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	cfu/100 ml	org/100ml	
LOR		0.01	0.01	0.001	0.01	<0.0001	0.001	0.001	0.001	1	1	1	2	1	2	1	5	20	50	100	50	50	20	20	50	50	100	100	100	2	2	
BH5	6/04/2021	0.0094	0.6	0.0004	14.50	<0.00004	0.254	0.187	<0.0001	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	140	<50	140	<20	<20	<100	<100	120	<100	120	<10	<10	
BH5	11/08/2021	0.0076	<0.002	0.0002	8.48	<0.00004	0.104	0.154	<0.0001	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50				<20	<20	<100	<100	<100	<100	<100	<10	<10	
BH5	4/27/2022	0.005	<0.05	1	6.1		0.066	0.071																							880	
BH5	8/09/2022																															
BH5	4/11/2023	0.0148	0.012	0.0003	14.6	<0.00004	0.101	0.154	<0.0001	<1	<2	<2	<2	<2	<2	<1	<5	<20	50	<100	<50	50	<20	<20	<100	<100	<100	<100	<100	<10	109	
BH5	8/02/2023	0.0076	0.03	0.0002	10.4	<0.00004	0.0861	0.13	<0.0001	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100	<10	20	
BH5	30/04/2024	0.0012	1.92	0.00005	6.1	<0.00004	0.0494	0.055	<0.0001	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	<100	<100	<100	<20	<20	<100	<100	<100	<100	<100	<10	4352	
BH5	12/08/2024	0.0017	0.172	0.0004	5.17	<0.00005	0.063	0.103	<0.0001	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	<100	<100	<100	<20	<20	<100	<100	<100	<100	<100	<10	201	
BH6																																
BH6	18/03/2015	<0.001	15	<0.001	7.38	<0.0001	0.004	0.019		<1	<2	<2	<2	<2			<5	<20	<50	<100	<50		<20	<20	<100	<100	<100	<100				
BH6	25/08/2015	0.001	3.4	0.002	3.09	<0.0001	0.008	0.021		<1	<2	<2	<2	<2			<5	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100				
BH6	27/04/2016	0.002	1.2	0.004	4.4	<0.00005	0.009	2.1		<1	<1	<1	<2	<1			<1	<10	<50	<100	<100	<250	<10	<10	<50	<50	<100	<100				
BH6	10/08/2016	0.005	8.9	0.003	5	<0.00005	0.017	0.039		<1	<1	<1	<2	<1			<1	<10	<50	<100	<100	<250	<10	<10	<50	<50	<100	<100				
BH6	27/04/2017	<0.001	14.9	<0.001	10.2	<0.0001	0.004	0.008																								
BH6	21/08/2017	0.003	9.97	<0.001	4.7	<0.0001	0.013	0.027																								
BH6	10/04/2018	0.003	10.0	<0.001	7.5	<0.0001	0.006	<0.005		<1	<1	<1	<2	<1			<10	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<100				
BH6	8/08/2018	0.002	14	<0.001	7.2	<0.0001	0.012	0.028		<1	<1	<1	<2	<1			<10	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<100				
BH6	3/04/2019	<0.001	6	<0.001	6.9	<0.0001	0.003	<0.001	0.006	<1	<2	<2	<2	<2			<5	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<100		<2	<2	
BH6	14/08/2019	0.001	14	<0.001	6	<0.0001	0.008	0.016	<0.001	<1	<2	<2	<2	<2			<5	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<100		<10	<10	
BH6	7/04/2020	<0.01	10.6	<0.001	7.14	<0.0001	0.003	0.007	<0.001	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100	<2	<2	
BH6	5/08/2020	0.0049	7.7	0.0007	3.72	<0.00004	0.008	0.038	<0.0001	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100	ND	ND	
BH6	6/04/2021	<0.0005	4.8	0.0003	10.20	<0.00004	0.004	0.010	<0.0001	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	140	<50	140	<20	<20	<100	<100	120	<100	120	<10	<10	
BH6	11/08/2021	0.001	8.0	0.0003	4.18	<0.00004	0.007	0.014	<0.0001	<1	<2	<2	<2	<2	<2	<1	<5					<20	<20	<100	<100	<100	<100	<100	<100	<10	<10	
BH6	4/27/2022	0.011	3.61	0.002	2.69		0.015	0.028																							<10	<10
BH6	8/09/2022																															
BH6	4/11/2023	0.0007	5.87	<0.0001	8.32	<0.00004	0.0054	0.009	<0.001	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100	<10	<10	
BH6	8/02/2023	0.005	6.36	0.0004	4.27	<0.00004	0.0106	0.019	0.0001	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100	<10	<10	
BH6	22/04/2024	0.0009	5.79	0.0003	7.81	<0.00004	0.0037	0.009	<0.0001	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	<100	<100	<100	<20	<20	<100	<100	<100	<100	<100	<10	<10	
BH6	12/08/2024	0.002	7.14	0.0005	5.46	<0.00005	0.009	0.026	<0.0001	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	<100	<100	<100	<20	<20	<100	<100	<100	<100	<100	<10	<10	
BH7																																
BH7	16/03/2015	<0.001	65.9	<0.001	68.7	<0.0001	0.004	0.008		<1	<2	<2	<2	<2			<5	<20	<50	<100	<50		<20	<20	<100	<100	<100	<100				
BH7	26/08/2015	0.002	36.3	<0.001	76.3	<0.0001	0.011	0.024		<1	<2	<2	<2	<2			<5	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100				
BH7	27/04/2016	<0.001	69	<0.001	58	<0.00005	0.006	0.79		<1	<1	<1	<2	<1			<1	<10	<50	<100	<100	<250	<10	<10	<50	<50	<100	<100				
BH7	10/08/2016	<0.001	47	<0.001	65	<0.00005	0.007	0.013		<1	<1	<1	<2	<1			<1	<10	<50	<100	<100	<250	<10	<10	<50	<50	<100	<100				
BH7	27/04/2017	<0.001	16.8	<0.001	39.2	<0.0001	0.002	<0.005																								
BH7	21/08/2017	<0.001	9.97	<0.001	57.9	<0.0001	0.006	0.014																								
BH7	10/04/2018	0.003	17	<0.001	39	<0.0001	0.002	<0.005		<1	<1	<1	<2	<1			<10	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<100				
BH7	8/08/2018	<0.001	7.9	<0.001	62	<0.0001	0.007	0.010		<1	<1	<1	<2	<1			<10	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<100				
BH7	3/04/2019	<0.001	5.8	<0.001	32	<0.0001	0.002	<0.001	<0.005	<1	<2	<2	<2	<2			<5	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<100		<2	<2	
BH7	13/08/2019	<0.001	6.1	<0.001	50	<0.0001	0.010	0.010	<0.001	<1	<2	<2	<2	<2			<5	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<100	<100	<100	<2	<2
BH7	8/04/2020	<0.01	12.2	<0.001	29.8	<0.0001	0.002	<0.005	<0.001	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100	<100	<2	<2
BH7	6/08/2020	<0.0005	19.3	<0.0001	36.10	<0.00004	0.005	0.005	<0.0001	<1	<2	<2	<2	<2	<2	<1	<5	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100	<100	<2	<2
BH7	6/04/2021	<0.0005	22.9	<0.0001	30.20	<0.00004	0.001	0.002	<0.0001	<1	<																					