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Lindeman Great Barrier Reef Resort
Baseline Water Quality Report and Revised Water Quality Monitoring Program

Well Smart Investment Holding (Bris) Pty Ltd

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1. INTRODUCTION

Well Smart Investment Holding (Bris) Pty Ltd (Well Smart) are redeveloping the Lindeman Great Barrier Reef Resort on Lindeman Island, Queensland. The proposed resort complex will comprise 325 suites and villas across three resort areas, including accommodation, bars and restaurants, power generation (solar with diesel backup), airstrip and golf course upgrades, and construction of a new jetty.

Catchment Solutions Pty Ltd was engaged by Well Smart to undertake water quality monitoring to establish water quality baseline conditions prior to redevelopment to satisfy Condition 5 of EPBC Approval EPBC 2015/7461 as follows:

> *The approval holder must implement the Water Quality Monitoring Program. The approval holder must not commence construction until 12 months of baseline data monitoring, as identified in the Water Quality Monitoring Program, has been completed and a revised Water Quality Monitoring Program has been submitted to the Department.*

The objective of the water monitoring program was to establish pre-development baseline water quality of marine waters surrounding Lindeman Island, and freshwaters on the island, for use in evaluating potential for water quality impacts during construction and operation of the resort. The monitoring program was completed largely in accordance with the approved Lindeman Great Barrier Reef Resort Water Quality Monitoring Program prepared by Wild Environmental Consultants in 2018 (WEC, 2018). Water quality data was collected over the period April 2024 to May 2025.

The waters surrounding Lindeman Island are considered high ecological value (HEV). For HEV waters, the generic ANZECC 2000 guideline is that there should be no change to existing condition. To establish baseline conditions, Catchment Solutions adopted the methodology defined in Qld DEHP (2013) *Queensland Water Quality Guidelines 2009* which recommends determination of 20th, 50th and 80th percentile ranges for appropriate water quality indicators, including toxicants and physical stressors. Qld DEHP (2013) considers that for most purposes, assessing change at all three percentiles is sufficient to address the no-change criterion.

2. SITE DESCRIPTION AND SETTING

2.1 Land Uses

The resort development site is described as Lot 2 on CP858366, Lease B, C, D on HR2029, Lot 3 CP858361 and located at Lindemann Island. The development area encompasses a total area of 137.84ha.

The majority of Lindeman Island is forested and protected under the Lindeman Island National Park. The development site is occupied by the former Club Med Lindeman Island Resort. At the time of the monitoring the resort was severely dilapidated with significant damage experienced from Cyclone Yasi (2011) and Cyclone Debbie (2017).

EPBC Approval for Lindemann Island Integrated Tourist Resort (EPBC 2015/7461) was issued on 8 November 2018 by Department of the Environment and Energy for the redevelopment of the existing resort and airstrip at Lindemann Island. The approval has effect until 30 July 2058. The transfer to the existing EPBC approval from White Horse Australia Lindeman Pty Ltd to Well Smart Investment Holding (Bris) Pty Ltd was approved on 25 January, 2024. The proposed development is presented on Figure 1 below:

Figure 1: Coordinator General approved Plan of Development

2.2 Climate and Rainfall

The climate is tropical with defined hot humid wet season from November to April and dry season from May to October.

- Daytime temperatures generally vary from the low 20s °C in winter to around 30 °C in summer.
- Rainfall is highly seasonal—over 300 mm in wet months, dropping to under 40 mm in the dry season
- Annual rainfall: ~1,691 mm, with roughly 106 rainy days.

Rainfall prior to and during the sampling program was highly variable with an extended period of below average rainfall prior to commencement, below average rainfall for the first six months of the sampling program from April 2024 to October 2024, followed by well above average wet season rainfall from November 2024 through April 2025.

Rainfall across the six months preceding the sampling program, including the 2024/24 wet season, was well below average, with rainfall deficit of 400 mm to 800 mm. Anecdotal information from the Lindeman Island caretaker, Mr Stuart Bieleiter, indicated the wet season was very poor, with less rainfall received than at nearby Hamilton Island. Six monthly rainfall anomalies for the Hamilton Island automatic weather station prior to commencement of the program is presented below (from www.bom.gov.au).

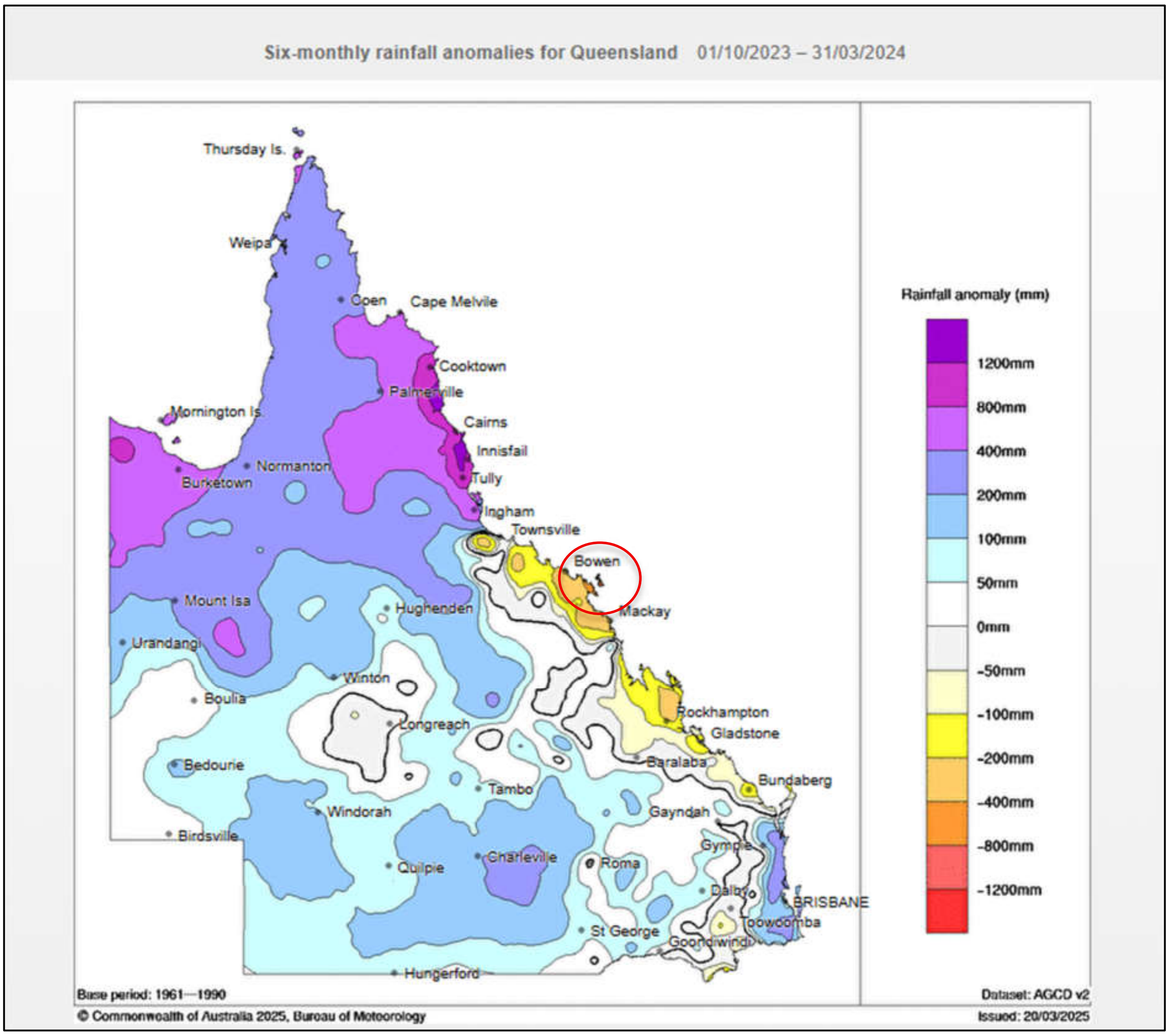


Figure 2: Six month rainfall anomaly, October 2023 – March 2024

Rainfall remained below average for the first half of the monitoring period from April 2024 to September 2024, with rainfall deficit of 200 mm – 400 mm over this period.

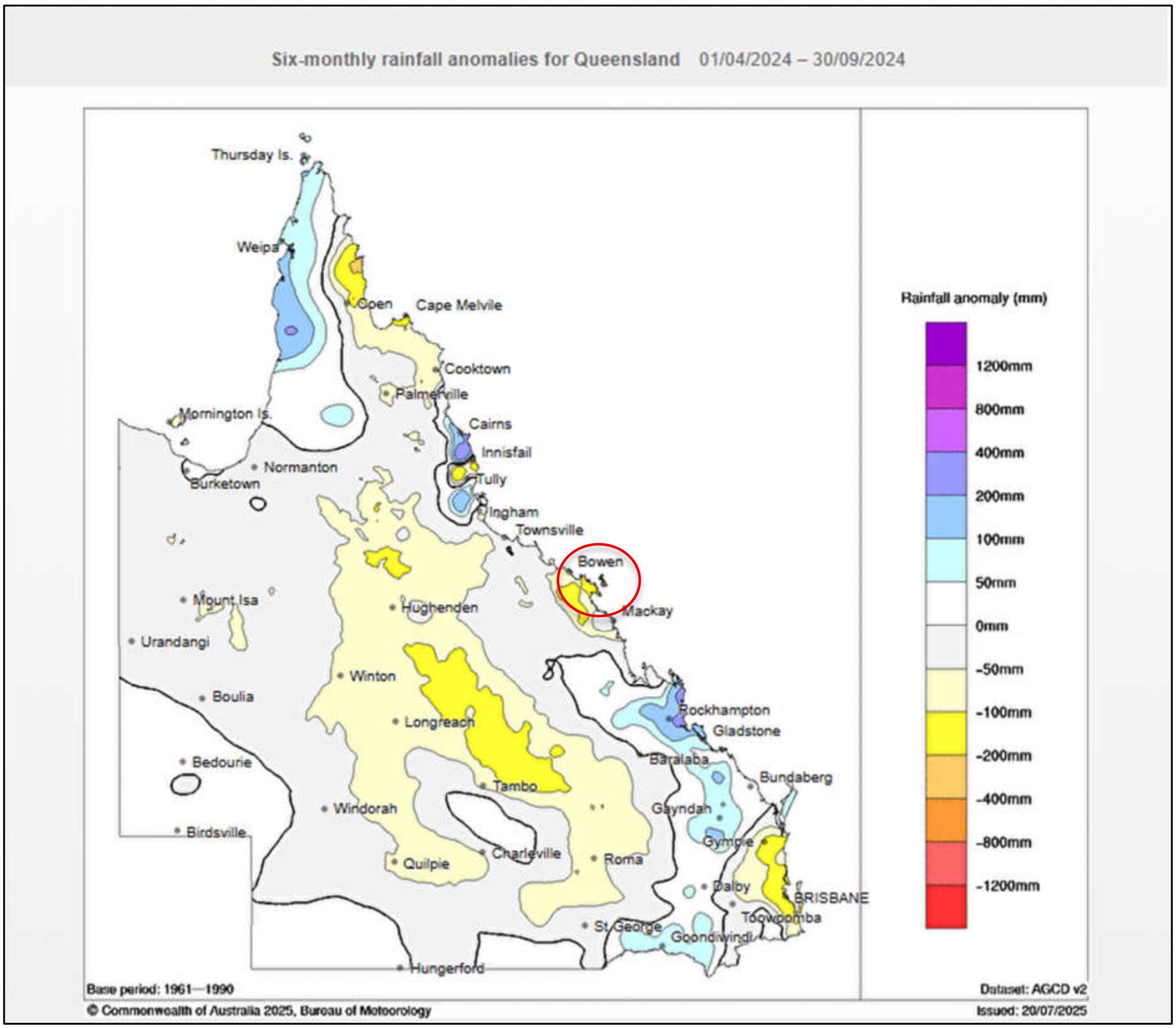


Figure 3: Six month rainfall anomaly, April 2024 – September 2024

From October 2024 through April 2025, rainfall recorded at Hamilton Island Airport was 150% to 200% above the average, with rainfall anomaly of 800 mm to 1200 mm. The 2024/25 wet season was characterised by consistent rainfall, with two major rain events occurring in late December 2024 and February 2025. Rainfall anomaly map for the 2024/25 wet season is presented on Figure 4 below.

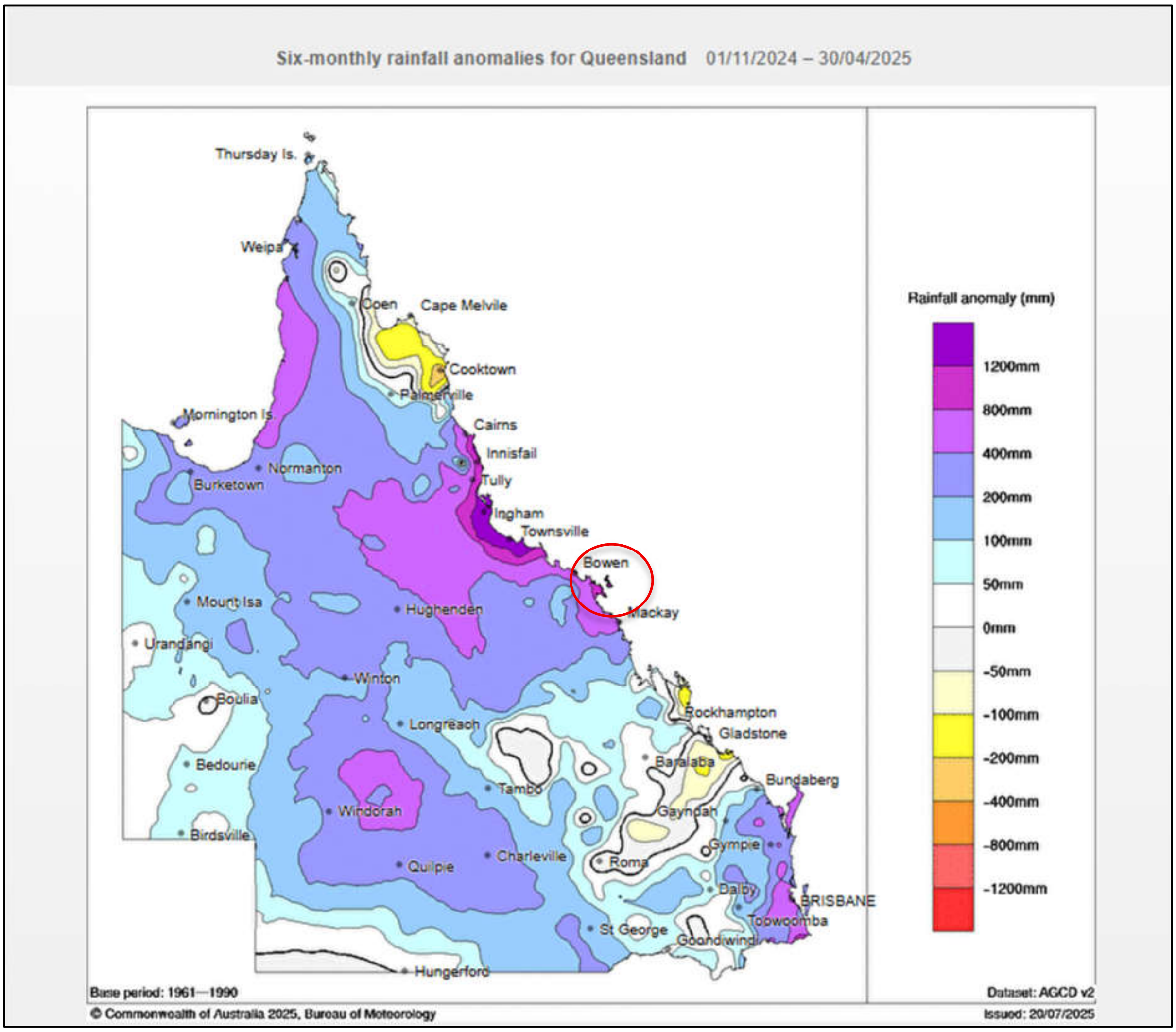


Figure 4: Six month rainfall anomaly, November 2024 – April 2025

The cumulative rainfall for 2024, demonstrating low rainfall across the 2023/24 wet season, and high rainfall in December 2024 is presented on Figure 5 below.

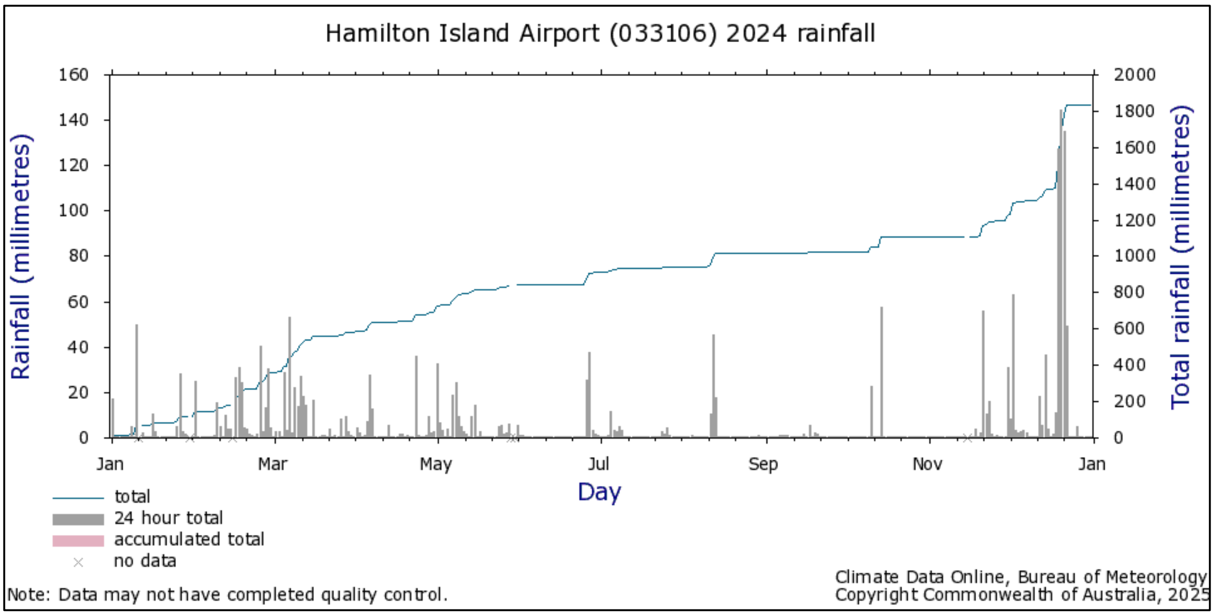


Figure 5: Daily and cumulative rainfall data for 2024 from Hamilton Island Station

Cumulative rainfall through to June 2025 demonstrating the very high rainfall in February 2025 is presented on Figure 6.

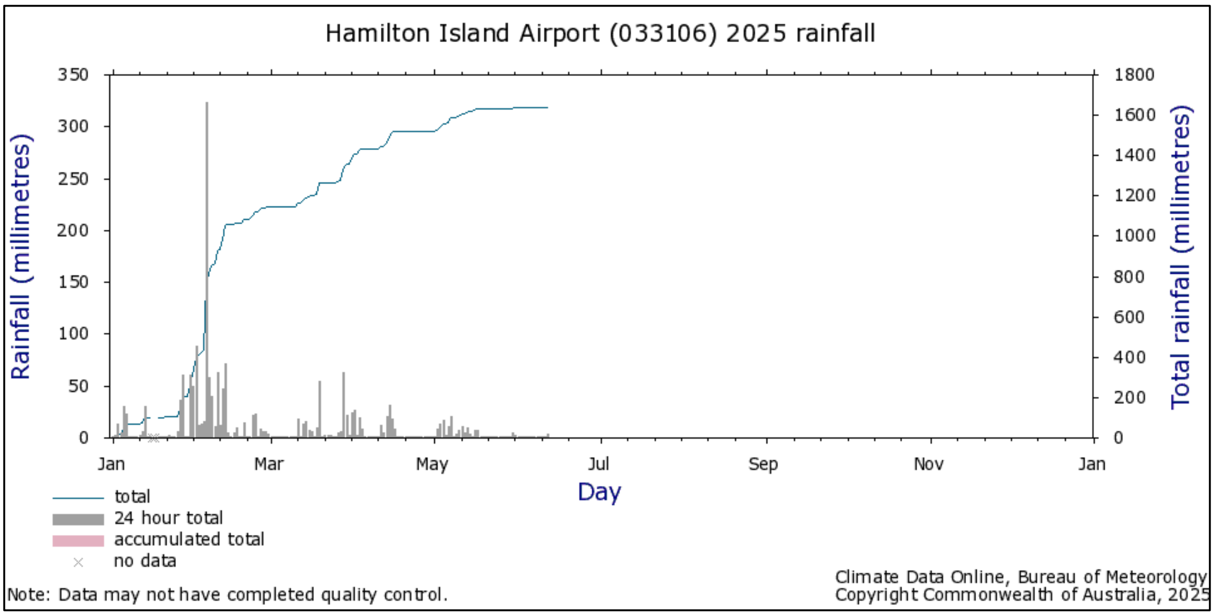


Figure 6: Daily and cumulative rainfall data to June 2025 from Hamilton Island Station

Daily rainfall across the monitoring program is presented on Figure 7. Monsoonal events can be seen in December 2024, February 2025 and March / April 2025.

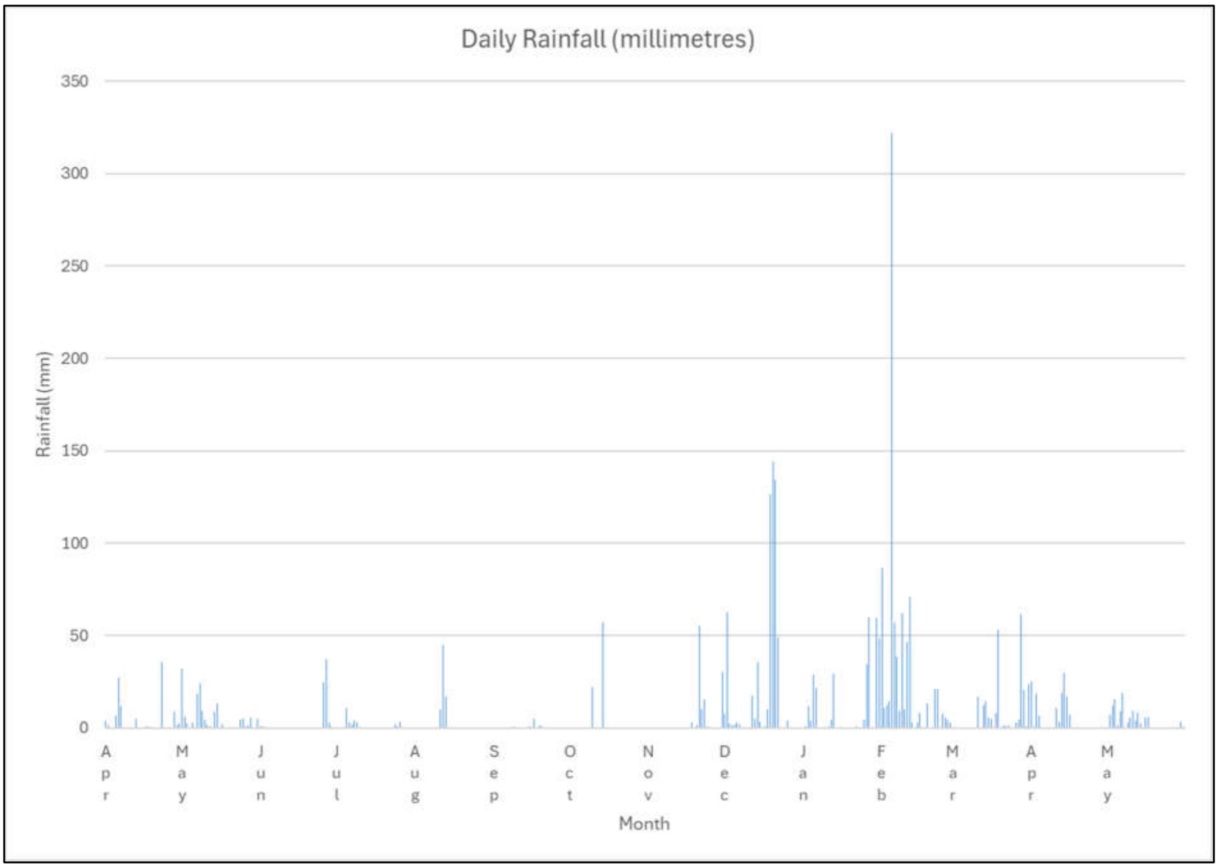


Figure 7: Daily rainfall data across the monitoring period from Hamilton Island Station

Total rainfall measured at the Hamilton Island weather station comprised the following:

- Annual total for 2024 = 1836.6 mm
- Annual total to January to May 2025 = 1635.4 mm

2.3 Topography

Lindeman Island's topography is characterised by steep cliffs and undulating hills. The island reaches a maximum elevation of approximately 200 m AHD at Mt Oldfield. Steep escarpments towards the sea can be found on the west, north and east of the Island. The topography of the development consists of undulated hills ranging from approximately 65 m AHD trending south to sea level.

2.4 Geology

Geology of Lindeman Island is mapped as Lower Cretaceous age Whitsunday Volcanics, characterised by rhyolitic to andesitic volcaniclastic rocks, including ignimbrite, minor flows, conglomerate and sandstone, and aged at around 110 million years. The geology is indicative of large volume explosive volcanism with significant water contribution.

3. SCOPE OF WORK

The sampling program comprised collection of marine water samples from five locations (WQ1 to WQ5) around and in close proximity to the island, and six locations (LIND01 to LIND06) within watercourses on the island itself. The program also included installation of a data logger in close proximity to the boathouse and barge landing ramp for the continuous monitoring of marine water temperature and salinity.

Sample Locations are presented on Figure 8 below:

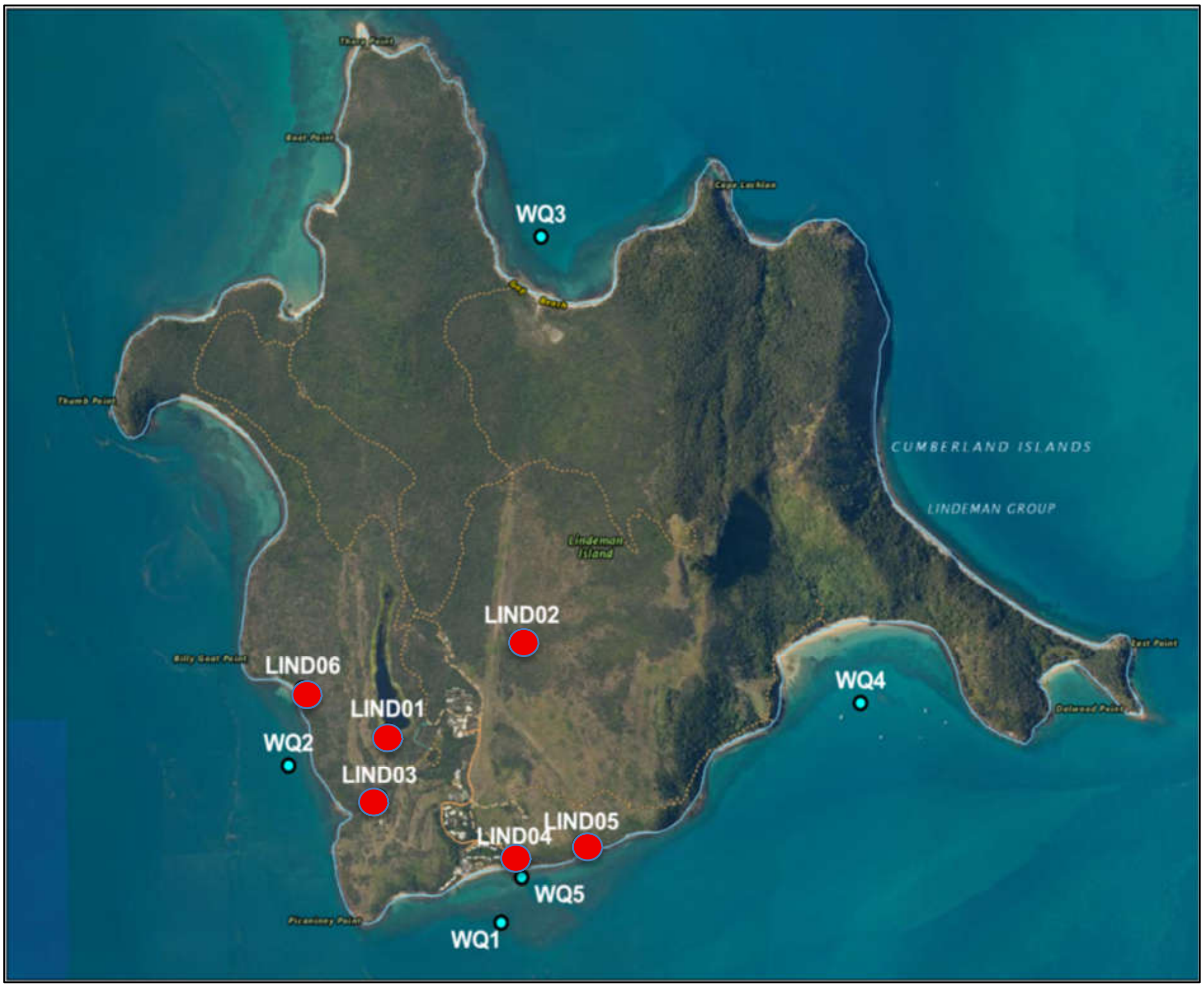


Figure 8: Marine and Terrestrial Sampling Locations

The sampling regime as specified in the WQMP is presented on Table 1 below:

Table 1: Water Sample Regime.

Parameter		Analysis	Sampling Interval
Physical	Temperature	In-situ / Automatic	WQ1 – WQ5 and LIND01 Monthly 2 x Rainfall Events Post Cyclonic Event LIND02 to LIND06 When Possible
	pH		
	Total Suspended Solids		
	Dissolved Oxygen		
	Electrical Conductivity / salinity		
	Turbidity	In-situ	
	Secchi depth		
Chemical	Total Dissolved Solids	Laboratory	
	Total Nitrogen		

Parameter		Analysis	Sampling Interval
	Ammonia		
	Oxidised Nitrogen		
	Total Phosphorus		
	Reactive Phosphorus		
	Organophosphorus Pesticides		WQ1 – WQ5 and LIND01 Quarterly 2 x Rainfall Event Post Cyclonic Event LIND02 to LIND06 When Possible
Biological	Faecal Coliforms	Laboratory	
	Heterotrophic Plate Count		
	Total Coliforms		
	E. coli		

Water quality sampling was conducted on a monthly basis through the period April 2024 to April 2025 and following two rainfall events in February 2025 and April 2025.

Due to the ephemeral nature of the streams, the full cohort of terrestrial surface water samples could only be collected from the two rainfall sampling events (10 February 2025, 3 April 2025) and the 25 March 2025 sampling event.

No cyclone events occurred in the 12 month sampling period.

Sample date, locations and analytes tested are presented in Table 2 below:

Table 2: Sampling dates, type and analytes for WQM on Lindeman Island.

Sample Date	Sample Type	Sample Locations	Analytes
24 April 2024	Quarterly	WQ1-WQ5, LIND01	pH, EC, DO, Temp, Turbidity, OPP, TDS, TSS, TN, NO2, NO3, NH3, TP, RP, Faecal Coliforms, Total Coliforms, HPC, E. coli.
28 May 2024	Monthly	WQ1-WQ5, LIND01	pH, EC, DO, Temp, Turbidity, TDS, TSS, TN, NO2, NO3, NH3, TP, RP
20 June 2024	Monthly	WQ1-WQ5, LIND01	pH, EC, DO, Temp, Turbidity, TDS, TSS, TN, NO2, NO3, NH3, TP, RP
30 July 2024	Quarterly	WQ1-WQ5, LIND01	pH, EC, DO, Temp, Turbidity, OPP, TDS, TSS, TN, NO2, NO3, NH3, TP, RP, Faecal Coliforms, Total Coliforms, HPC, E. coli.
20 August 2024	Monthly	WQ1-WQ5, LIND01	pH, EC, DO, Temp, Turbidity, TDS, TSS, TN, NO2, NO3, NH3, TP, RP
24 September 2024	Monthly	WQ1-WQ5, LIND01	pH, EC, DO, Temp, Turbidity, TDS, TSS, TN, NO2, NO3, NH3, TP, RP
22 October 2024	Quarterly	WQ1-WQ5, LIND01	pH, EC, DO, Temp, Turbidity, OPP, TDS, TSS, TN, NO2, NO3, NH3, TP, RP, Faecal Coliforms, Total Coliforms, HPC, E. coli.
29 November 2024	Monthly	WQ1-WQ5, LIND01	pH, EC, DO, Temp, Turbidity, TDS, TSS, TN, NO2, NO3, NH3, TP, RP
12 December 2024	Monthly	WQ1-WQ5, LIND01, LIND03, LIND05	pH, EC, DO, Temp, Turbidity, TDS, TSS, TN, NO2, NO3, NH3, TP, RP
28 January 2025	Quarterly	WQ1-WQ5, LIND01, LIND02, LIND03, LIND05	pH, EC, DO, Temp, Turbidity, OPP, TDS, TSS, TN, NO2, NO3, NH3, TP, RP, Faecal Coliforms, Total Coliforms, HPC, E. coli.

Sample Date	Sample Type	Sample Locations	Analytes
10 February 2025	Rainfall Event	WQ1-WQ5, LIND01 – LIND06	pH, EC, DO, Temp, Turbidity, OPP, TDS, TSS, TN, NO2, NO3, NH3, TP, RP, Faecal Coliforms, Total Coliforms, HPC, E. coli.
11 March 2025	Monthly	WQ1-WQ5, LIND01, LIND03, LIND05	pH, EC, DO, Temp, Turbidity, TDS, TSS, TN, NO2, NO3, NH3, TP, RP
25 March 2025	Monthly	WQ1-WQ5, LIND01 – LIND06	pH, EC, DO, Temp, Turbidity, TDS, TSS, TN, NO2, NO3, NH3, TP, RP
3 April 2025	Rainfall Event	WQ1-WQ5, LIND01 – LIND06	pH, EC, DO, Temp, Turbidity, OPP, TDS, TSS, TN, NO2, NO3, NH3, TP, RP, Faecal Coliforms, Total Coliforms, HPC, E. coli.

EC = Electrical Conductivity
DO = Dissolved Oxygen
Temp = Temperature
OPP = Organophosphate Pesticides
TDS = Total Dissolved Solids
TSS = Total Suspended Solids
TN = Total Nitrogen
NO2 = Nitrite
NO3 = Nitrate
NH3 = Ammonia
TP = Total Phosphorus
RP = Reactive Phosphorus
HPC = Heterotrophic Plate Count

4. METHODOLOGY

4.1 Project Preliminaries

The following permits and approvals were obtained prior to commencement of the monitoring program:

- Permission from Queensland Parks and Wildlife Service to undertake water sample collection within the National Park under s144 of the Nature Conservation (Protected Areas Management) Regulation 2017.

- A Research Permit (G24/50072.1) was obtained from the Great Barrier Reef Marine Park Authority for collection of marine water samples.

- Consent was granted by Maritime Safety Queensland to install the Sonde on the navigation beacon.

4.2 Surface Water Quality Monitoring

Water sampling was undertaken in accordance with the methods specified in the Australian Standard for water quality sampling – AS/NZS 5667.1:1998 and the Department of Environment, Science, Technology and Innovation's Environmental Protection (Water) Policy 2009 - Monitoring and Sampling Manual.

4.3 Marine Water Quality Sampling

Surface water samples were collected from five locations (WQ1 to WQ5) from marine waters surrounding Lindemand Island. Samples were collected monthly across a 12 month period and from two rainfall events.

Samples were collected across all weather conditions to limit sample bias. Shallow waters necessitated sample collection to be the last half of the flood tide or first half of the ebb tide. Samples were collected during both flow regimes to limit sample bias and ensure representative water quality.

Table 3: Marine sample locations for the WQM program on Lindeman Island

Location	Coordinates	Sample Location Description
WQ1	-20.460800 S 149.040717 E	Located offshore over the shallow reef and near the reef edge. Exposed to prevailing southeast trade winds and strong flood and ebb tidal currents.
WQ2	-20.455917 S 149.031700 E	This sample location was located on the western side of the island. It may receive inputs from the LIND03 and LIND06 ephemeral streams. This location may be subject to strong currents.
WQ3	-20.437400 S 149.041967 E	Located within a sheltered bay on the northern side of the island. Subject to northerly winds in the summer months but otherwise well protected. Little to no tidal current. The sample location was located directly seaward of the discharge location of a freshwater creek that drains the northern portion of the island.
WQ4	-20.453133 S 149.055100 E	Generally protected from prevailing trade winds but subject to strong tidal currents.
WQ5	-20.459717 S 149.041450 E	This site is located adjacent to the proposed jetty and former resort. The location is significantly impacted by strong southeast trade winds.

In-situ monitoring was conducted using a YSI hand-held multiparameter probe, calibrated prior to every sampling event. The following parameters were recorded on field data sheets:

- Temperature.
- pH.
- Dissolved oxygen.
- Electrical conductivity
- Turbidity.
- Total Dissolved Solids.

Manual grab samples for laboratory analysis were collected using a telescopic sample pole from a boat, using a suitable, sterilised container. The samples were collected up current of the boat engine to avoid potential contamination. The bottle was extended into the water and submerged to a depth of at least 0.3m, with the mouth pointing down. Once the bottle was filled, it was removed from the water, the lid replaced and shaken to rinse the entire container. The liquid was discarded and the bottle was rinsed a total of three times with seawater.

Following rinsing, the container was used to fill the laboratory prepared sample containers and placed on ice in and esky for transport under chain of custody to NATA accredited laboratory. The samples were delivered within laboratory holding times where possible. Samples were analysed by accredited laboratory as per their analysis methodologies.

4.4 Sonde Installation and Measurement

The WQMP originally specified that the in-situ monitoring station be located on a jetty, which was decommissioned before the program commenced. Instead, a YSI Exo 3 sonde with a central wiper and wiped conductivity probe was installed on the most inshore starboard navigation marker within the jetty channel directly in front of the proposed resort area at the edge of the channel, closest to Lindeman Island (Figure 9). Permission from MSQ was granted for the installation. The sonde was mounted at the approximate elevation of Lowest Astronomical Tide (LAT) to ensure it remained submerged and was encased in a protective PN12.5 SDR 13.6 PE100 110mm sotted polyethylene pipe sleeve.

The data logger recorded conductivity (EC) and temperature at 1-hour intervals commencing 27 May 2024; the Sonde was removed late November 2024 for maintenance and replaced in December 2024.

During each sampling event the sonde was removed from the navigation marker, cleaned thoroughly and checked to ensure functionality, battery charge and the data was downloaded. The conductivity probe in the sonde was calibrated in the field every three months with 58,000 µS/cm calibration solution using the KOR YSI software.

Figure 9: Location of Sonde installation

4.5 Terrestrial Water Quality Sampling

The terrestrial sampling locations included an established dam (LIND01) and ephemeral, freshwater streams (LIND02-LIND06). The sampling locations are based on the catchments identified in the Lindeman Island EIS (2017) which discharge into the ocean. A description of the locations is provided in Table 3.

Table 4: Terrestrial sample locations for the WQM program on Lindeman Island

LIND01 Sampling location is within a permanent dam, located on the western side of the island.  
LIND02 Located upgradient of the airstrip and the resort area with intact and uncleared catchment area. Low gradient ephemeral stream with sand and gravel bed and defined banks. This site was almost permanently dry, with the ephemeral stream only existing during heavy rain events. Flow ceased almost immediately following rain events.  

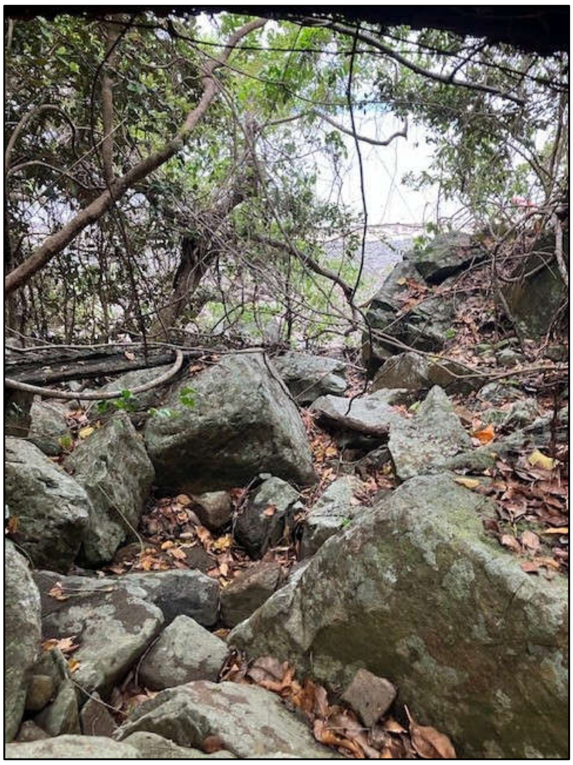
LIND03
Bedrock confined, high gradient, high energy, boulder field creek. Evidence of baseflow from groundwater discharge during the dry season not representative of runoff. Runoff only occurring following large rainfall events. A golf course is within the catchment.


LIND04
Located within a drain adjacent to a sealed access road within the resort. There was little to no flow in this drain outside of rainfall events.

LIND05
High gradient boulder dominated drainage line with low volume baseflow from groundwater discharge that historically appears to have been utilised as a drinking water source by mariners. Ephemeral with small catchment area that includes the cross runway (not used). Flow only observed immediately following large rainfall events.
A pitfall sampler was installed in the creek but was washed out to sea by a storm event.


LIND06

Very steep boulder dominated drainage line. This creek was primarily dry during the sampling program. There was flow during large events, which would cease almost immediately following the cessation of rainfall.

In-situ water quality was analysed using the YSI handheld multiparameter probe and the following parameters were recorded on field data sheets:

- Temperature.
- pH.
- Dissolved oxygen.
- Electrical conductivity.
- Turbidity.
- Total Dissolved Solids.

The manual grab samples were collected directly from the running stream to ensure that no stagnant water was collected. The sample was collected using laboratory prepared sample containers and placed on ice in and esky for transport under chain of custody to NATA accredited laboratory. The samples were delivered within laboratory holding times where possible.

4.6 Field QA/QC

During the monitoring of surface water, field quality control, and quality assurance (QA/QC) procedures and methods were observed in consideration of the below:

- DES. 2018. Monitoring and Sampling Manual: Environmental Protection (Water) Policy.

Brisbane: Department of Environment and Science Government.

Quality Assurance / Quality Control (QA/QC sampling was undertaken in general accordance with specifications outlined in AS4482.1 Guide to sampling and investigating potentially contaminated soil and Qld DES (2018) Monitoring and Sampling Manual: Field QC samples were collected and included the following:

Sample Identification	Sample Type	Sample Matrix	Rate of Collection
Duplicate	Field duplicate of LIND01	Water	1 per event,
Triplicate	Field triplicate of LIND01	Water	1 per event,

Note – Rate of QC sample collection specified as 1 in 20 samples in AS4482.1
The laboratory internal QC procedures are consistent with NEPM policy on laboratory analysis of contaminated soils and waters.

4.7 Laboratory Analysis

The analytical laboratory, Australia Laboratory Services (ALS) was engaged to undertake analyses and is accredited by the National Association of Testing Authorities (NATA) for the requested analyses. Samples submitted to the analytical laboratory were accompanied by the appropriate Chain of Custody form which is completed to include the required analyses and reporting information.

NATA-accredited laboratories (ALS) undertook laboratory quality control procedures including surrogates, blanks, method blanks, and spikes. The quality control results were reviewed by the recipient before acceptance of the groundwater laboratory results from the laboratory.

5. TERRESTRIAL FRESH WATERS RESULTS

To establish baseline water quality, the 20th, 50th and 80th percentile for each analyte was calculated. The 20th and 80th percentiles remove outlier data but still represent natural variability. Half the reporting limit was substituted where an analyte was not detected at concentrations above the laboratory limits of reporting.

Surface water analytical results were compared to the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 Proserpine River, Whitsunday Island and O'Connell River Basins Environmental Values and Water Quality Objectives for Island fresh waters – Whitsundays for relative comparison.

Permanent water exists in the dam at sample location LIND01 and a full data set was obtained for this location. The remaining sample locations (LIN02 to LIND06) were located on ephemeral streams with an incomplete dataset. Due to the nature of the sampling locations, results for LIND01 (perennial) were calculated separately to the aggregated result for ephemeral sites LIND02, LIND03, LIND04, LIND05, LIND06.

To ensure all results are displayed clearly and completely, charts used in the section are a combination of line and scatter formats. Line plots are provided for data collected over three or more successively monitoring events and scatter plots used to display other results. Monthly, quarterly and event triggered data is considered jointly and reference made to the sampling event type where relevant to discussions.

Field sheets and calibration records are included in Attachment A. Summary tables of analytical results are presented in Attachment B and Laboratory Analytical Reports are included in Attachment C.

5.1 Electrical Conductivity

Electrical conductivity (EC) at LIND01 (Dam) was consistent through the dry season and variable across the wet season.

EC within the ephemeral streams was highly variable and likely dependent on flow conditions at the time of sampling.

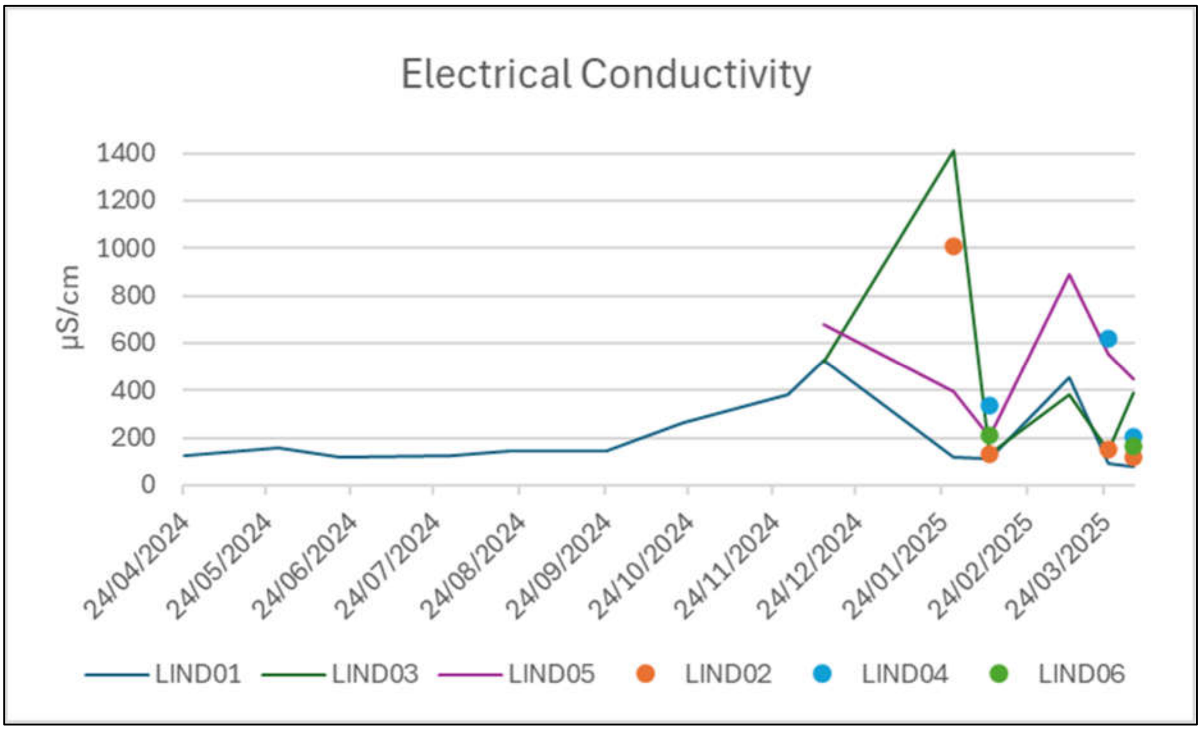


Figure 10: Electrical Conductivity results from Inland Fresh Waters on Lindeman Island, 2024 - 2025

EC at LIND01 was within the water quality objectives. The 20th and 80th percentiles of EC in the ephemeral streams was within the WQOs with the 50th percentile above the WQOs.

The 20th, 50th and 80th percentile values for all terrestrial EC samples combined fall below Water Quality Objective values.

Table 5: Percentile calculations for Electrical Conductivity (units: µS/cm) for Inland Fresh Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
Water Quality Objective	180	260	780
LIND01	114	133	380
Ephemeral Stream sites (LIND02, LIND03, LIND04, LIND05, LIND06)	148	384	653
All Sites (LIND01, LIND02, LIND03, LIND04, LIND05, LIND06)	125	203	528

5.2 pH

Water pH displayed marked variability in both the dam (LIND01) and the ephemeral streams.

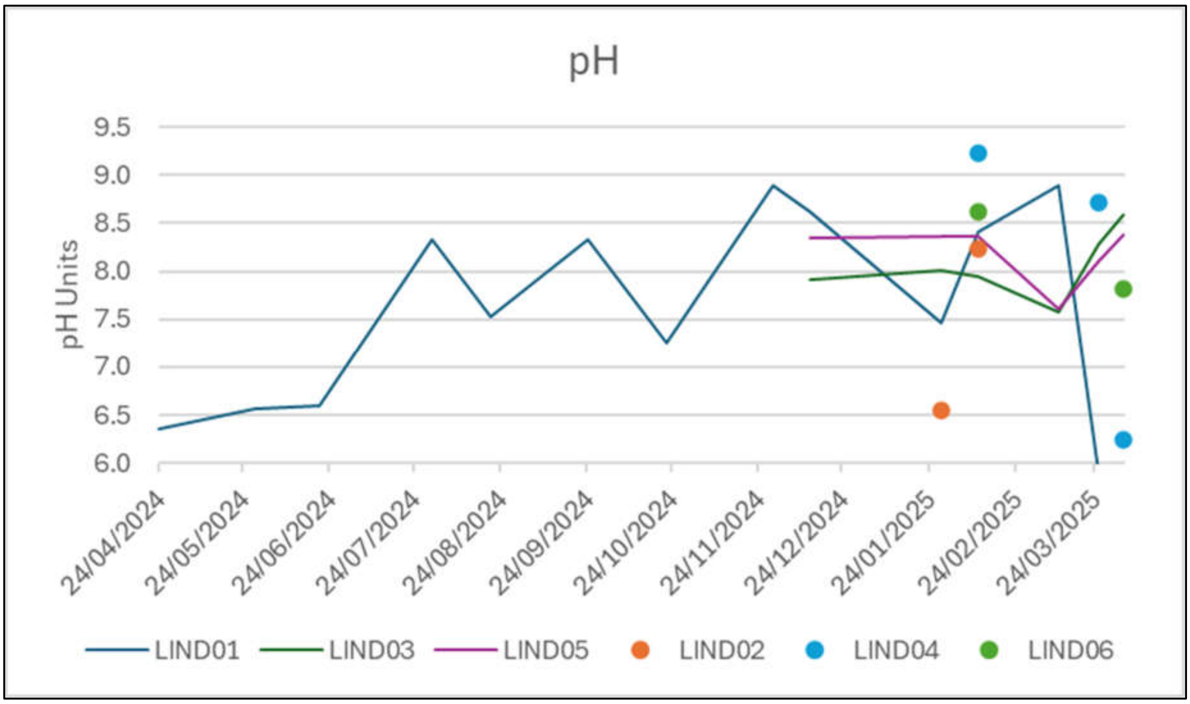


Figure 11: pH results from Inland Fresh Waters on Lindeman Island, 2024 - 2025

The 20th percentile pH value at LIND01 was lower than the Water Quality Objective, with both 50th and 80th percentiles exceeding WQOs. Results for LIND02, LIND03, LIND04, LIND05 and LIND06 were also outside the WQOs.

In combination (LIND01, LIND02, LIND03, LIND04, LIND05, LIND06), the 20th percentile value is less than the Water Quality Objective value, while the 50th and 80th percentile values exceed the Water Quality Objective values., This indicates a high degree of variability in water quality in terms of pH.

Table 6: Percentile calculations for pH (units: pH units) for Inland Fresh Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
Water Quality Objective	7.2	7.3	7.6
LIND01	6.4	7.5	8.6
Ephemeral Stream sites (LIND02, LIND03, LIND04, LIND05, LIND06)	7.0	8.1	8.5
All Sites (LIND01, LIND02, LIND03, LIND04, LIND05, LIND06)	6.6	8.0	8.5

5.3 Dissolved Oxygen

Dissolved oxygen (DO) at LIND01 was consistent throughout the dry season and displayed variability across the wet season.

DO in the ephemeral streams displayed variability with a general decrease across the wet season observed.

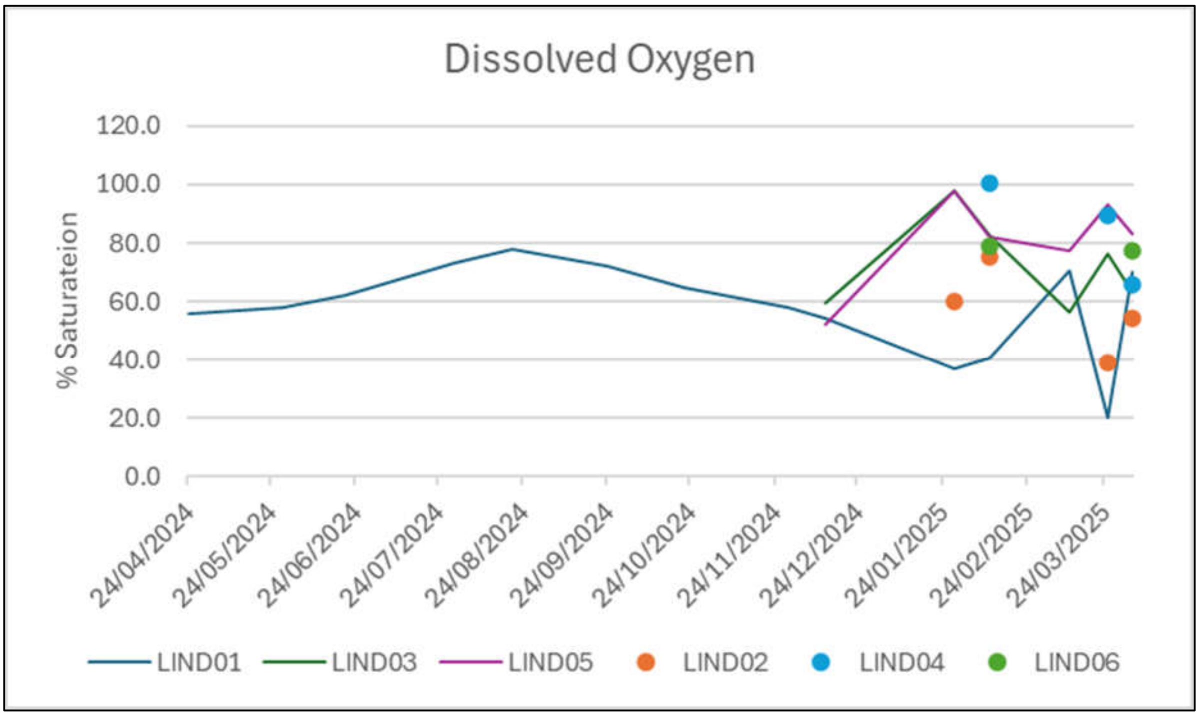


Figure 12: Dissolved Oxygen results from Inland Fresh Waters on Lindeman Island, 2024 - 2025

DO percentiles are presented in Table 7 below. DO at LIND01 and the ephemeral streams was generally below the WQOs but in the expected range.

Table 7: Percentile calculations for Dissolved Oxygen (units: % Saturation) for Inland Fresh Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
Water Quality Objective – No Flow	50		120
Water Quality Objective – Flow	90		105
LIND01 – No Flow	40.6	60.0	72.1
Ephemeral Stream sites (LIND02, LIND03, LIND04, LIND05, LIND06) - Flow	57.6	77.2	91.5
All Sites (LIND01, LIND02, LIND03, LIND04, LIND05, LIND06)	54.5	70.1	82.4

5.4 Turbidity

Turbidity at LIND01 was consistent and low throughout the end of the 2024 wet season the dry season, with an increase in measured in the 2024/25 wet season. This may reflect the poor wet season experienced in 2024 compared to that of 2025 and the varying impact of surface runoff over these periods.

Turbidity of the ephemeral streams was highly variable and increased across the wet season. Turbidity was also likely to be subject to the flow stage at the time of sampling.

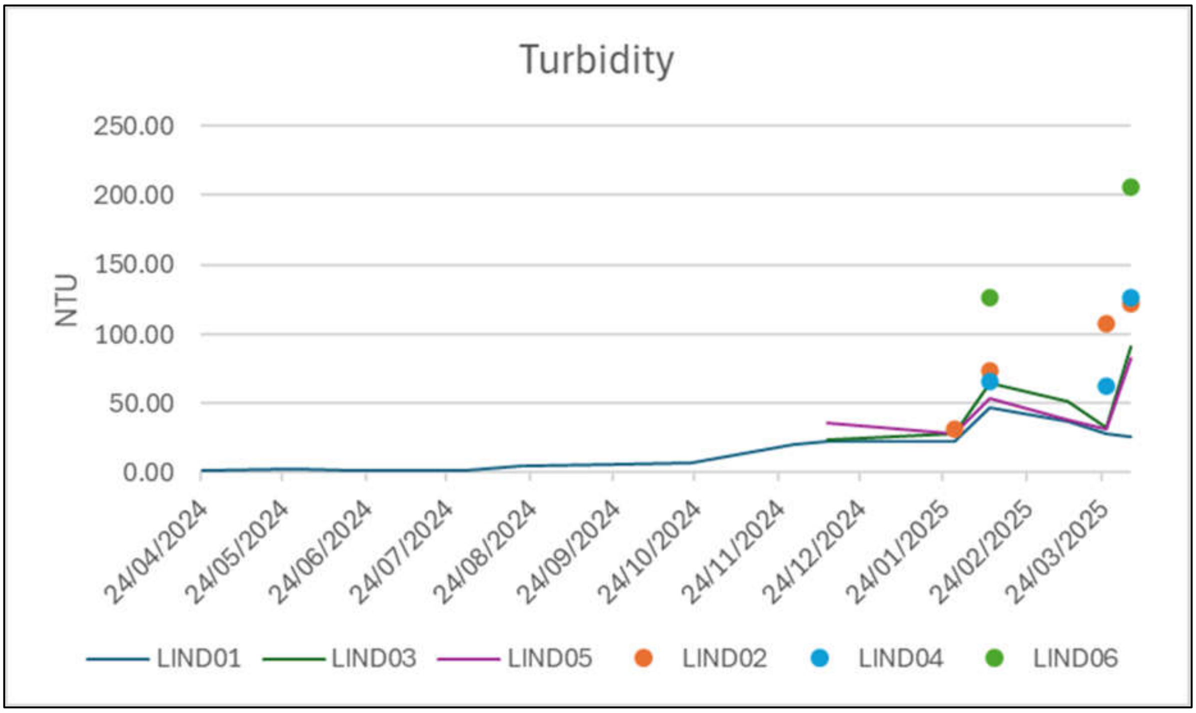


Figure 13: Turbidity results from Inland Fresh Waters on Lindeman Island, 2024 - 2025

Turbidity percentiles are presented in Table 8 below.

Table 8: Percentile calculations for Turbidity (units: NTU) for Inland Fresh Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
LIND01	2.1	14.0	27.8
Ephemeral Stream sites (LIND02, LIND03, LIND04, LIND05, LIND06)	31.4	62.9	116.4
All Sites (LIND01, LIND02, LIND03, LIND04, LIND05, LIND06)	10.2	31.5	80.3

5.5 Total Dissolved Solids

Total Dissolved Solids (TDS) at LIND01 were consistent across the monitoring program, with the exception of a one-off peak TDS of 516 mg/L in May 2024. The peak does not correlate with any significant or sustained period of rainfall or other weather event, and does not correlate with EC. Other than this peak, TDS at LIND01 ranged from 72mg/L (June 2024) to 161 mg/L (rainfall event sampling March 2025).

TDS in the samples collected from ephemeral streams were higher than the dam water at LIND01 with no particular pattern observed.

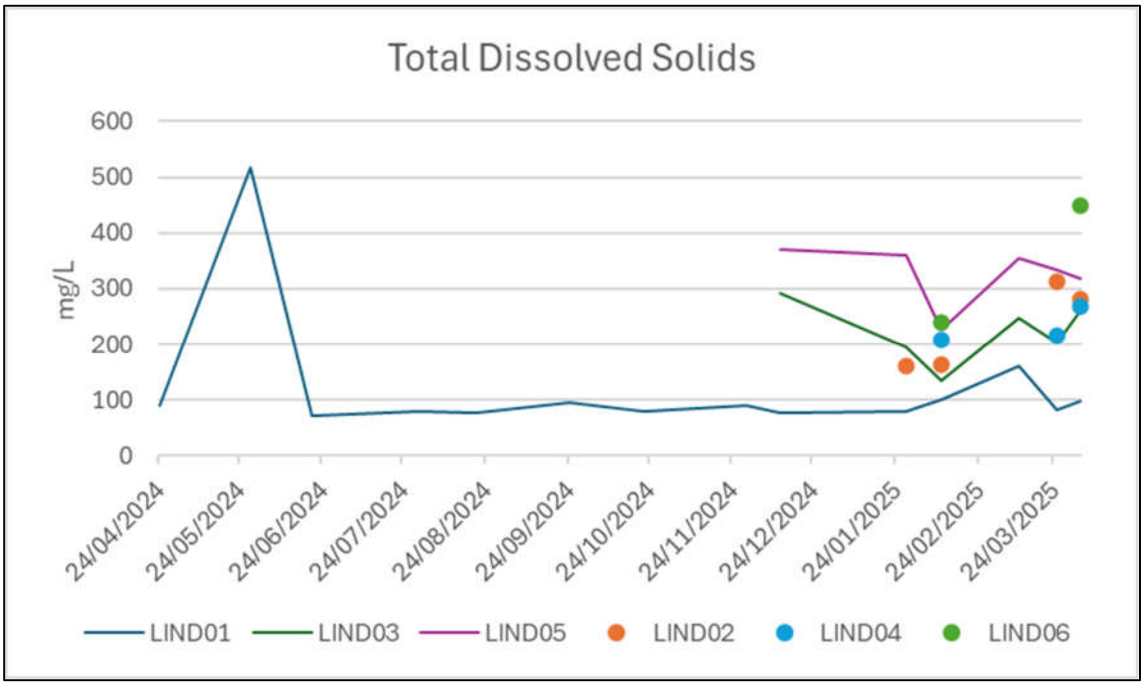


Figure 14: Total Dissolved Solids results from Inland Fresh Waters on Lindeman Island, 2024 - 2025

TDS percentiles are presented in Table 9 below.

Table 9: Percentile calculations for Total Dissolved Solids (units: mg/L) for Inland Fresh Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
LIND01	78	87	101
Ephemeral Stream sites (LIND02, LIND03, LIND04, LIND05, LIND06)	198	261	346
All Sites (LIND01, LIND02, LIND03, LIND04, LIND05, LIND06)	84	203	318

5.6 Total Suspended Solids

Total Suspended Solids (TSS) at LIND01 were low or below detection limits across the majority of the sampling program. A peak of 33 mg/L was detected in March 2025 following an extended period of rainfall.

A spike in TSS concentration was detected at LIND04 in early March 2025 following a landslide event in the catchment of the creek.

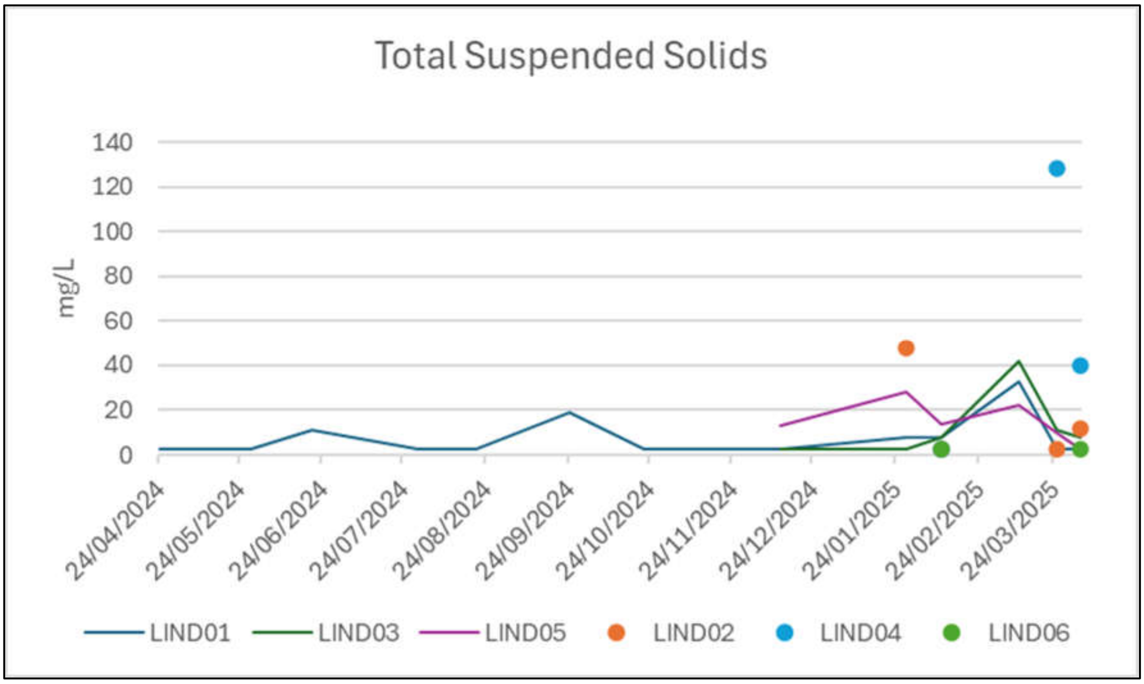


Figure 15: Total Suspended Solids results from Inland Fresh Waters on Lindeman Island, 2024 - 2025

Table 10: Percentile calculations for Total Suspended Solids (units: mg/L) for Inland Fresh Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
Water Quality Objective	1	2	3
LIND01	<5	<5	11
Ephemeral Stream sites (LIND02, LIND03, LIND04, LIND05, LIND06)	<5	10	35.2
All Sites (LIND01, LIND02, LIND03, LIND04, LIND05, LIND06)	<5	5.5	21.4

5.7 Ammonia

Ammonia levels at LIND01 ranged from undetected (less than Level of Reporting) to a peak of 0.75 mg/L in May 2024. Ammonia concentrations were highest in the first two sampling events (April and May 2024).

Results for LIND02 ranged from 0.02 mg/L in February 2025 to a peak value of 0.48 mg/L in January 2025.

Results for LIND03, LIND04, LIND05 and LIND06 ranged from less than Level of Reporting to 0.1 mg/L (LIND03 monthly sampling March 2025) over the monitored period (December 2024 to April 2025).

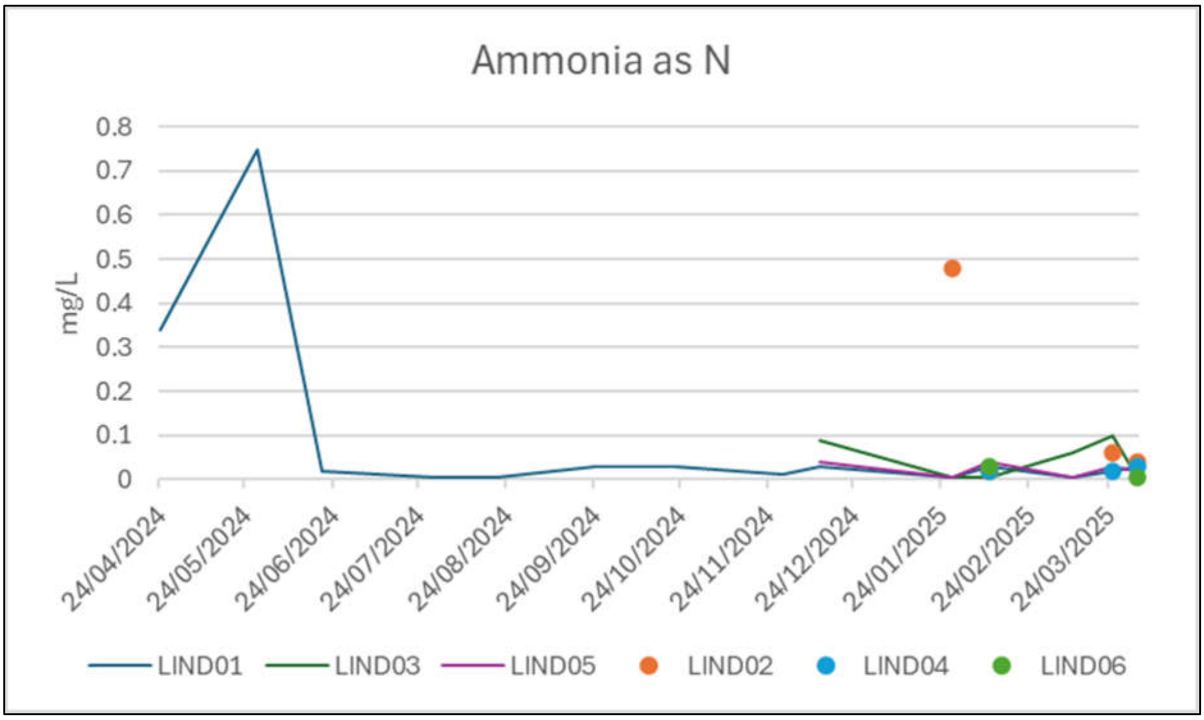


Figure 16: Ammonia results from Inland Fresh Waters on Lindeman Island, 2024 - 2025

Ammonia percentiles are presented in Table 11 below.

Table 11: Percentile calculations for Ammonia as N (units: mg/L) for Inland Fresh Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
LIND01	<0.01	0.025	0.030
Ephemeral Stream sites (LIND02, LIND03, LIND04, LIND05, LIND06)	<0.01	0.030	0.060
All Sites (LIND01, LIND02, LIND03, LIND04, LIND05, LIND06)	<0.01	0.022	0.056

5.8 Nitrite + Nitrate

The sum of Nitrite and Nitrate at LIND01 remained below Limit of Reporting levels except in June 2024 (0.03mg/L) and August 2024 (0.08mg/L).

A spike in Nitrite and Nitrate concentration was measured at LIND04 in March 2025 following a landslide event in the catchment of the creek. The peak corresponds with elevated TSS.

Nitrite and Nitrate concentrations in the remainder of the ephemeral stream samples were low.

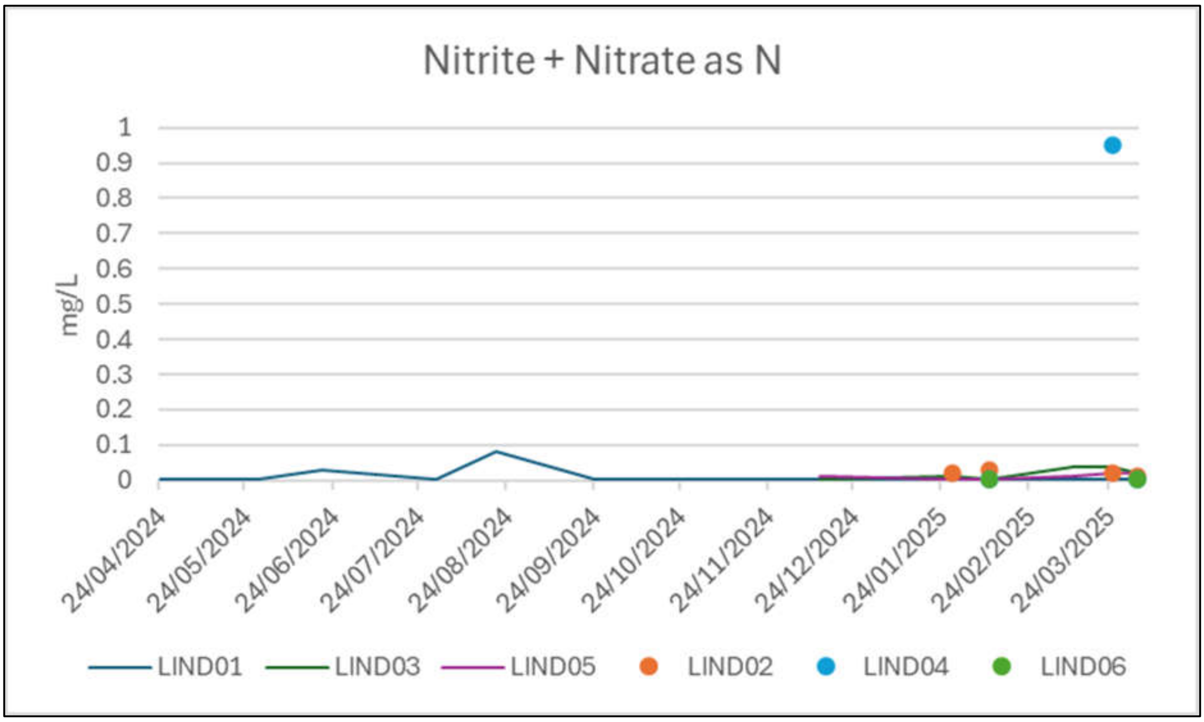


Figure 17: Total Nitrite + Nitrate as N results from Inland Fresh Waters on Lindeman Island, 2024 - 2025

Nitrite and Nitrate percentiles are presented in Table 12 below.

Table 12: Percentile calculations for Total Nitrite + Nitrate as N (units: mg/L) for Inland Fresh Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
LIND01	<0.01	<0.01	<0.01
Ephemeral Stream sites (LIND02, LIND03, LIND04, LIND05, LIND06)	<0.01	0.01	0.026
All Sites (LIND01, LIND02, LIND03, LIND04, LIND05, LIND06)	<0.01	<0.01	0.020

5.9 Total Nitrogen

Total Nitrogen (TN) at LIND01 was relatively consistent across the monitoring period.

A distinct TN peak was detected in the first sample collected from LIND05. The TN concentration was consistent with other stream samples in the samples from subsequent flow events.

Similarly, elevated TN was detected in the first sampling event from LIND02, which then reduced in follow up events.

TN spikes were not detected in the first flow event samples from the other ephemeral streams.

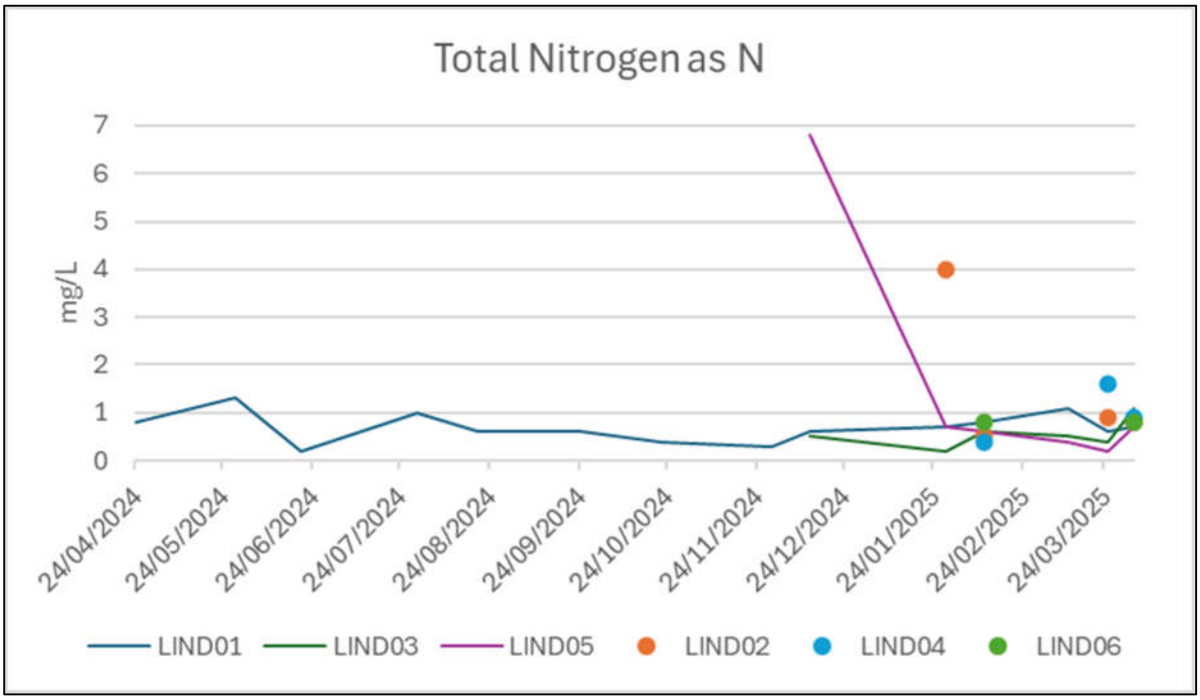


Figure 18: Total Nitrogen as N results from Inland Fresh Waters on Lindeman Island, 2024 - 2025

TN percentiles are presented in Table 13 below.

Table 13: Percentile calculations for Total Nitrogen (units: mg/L) for Inland Fresh Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
LIND01	0.40	0.65	1.00
Ephemeral Stream sites (LIND02, LIND03, LIND04, LIND05, LIND06)	0.40	0.70	1.02
All Sites (LIND01, LIND02, LIND03, LIND04, LIND05, LIND06)	0.40	0.07	0.98

5.10 Total Phosphorus

Total Phosphorus (Total P) in dam water at LIND01 was relatively consistent across the monitoring period, with no distinct concentration spikes observed.

Total P in ephemeral stream samples LIND02 and LIND05 were elevated in the first flow event sample and reduced in subsequent events, consistent with Total N.

A spike in Total P concentration was detected in sample LIND04 following the landslide event in the creeks catchment area. Total P in the remaining ephemeral stream samples was otherwise consistent.

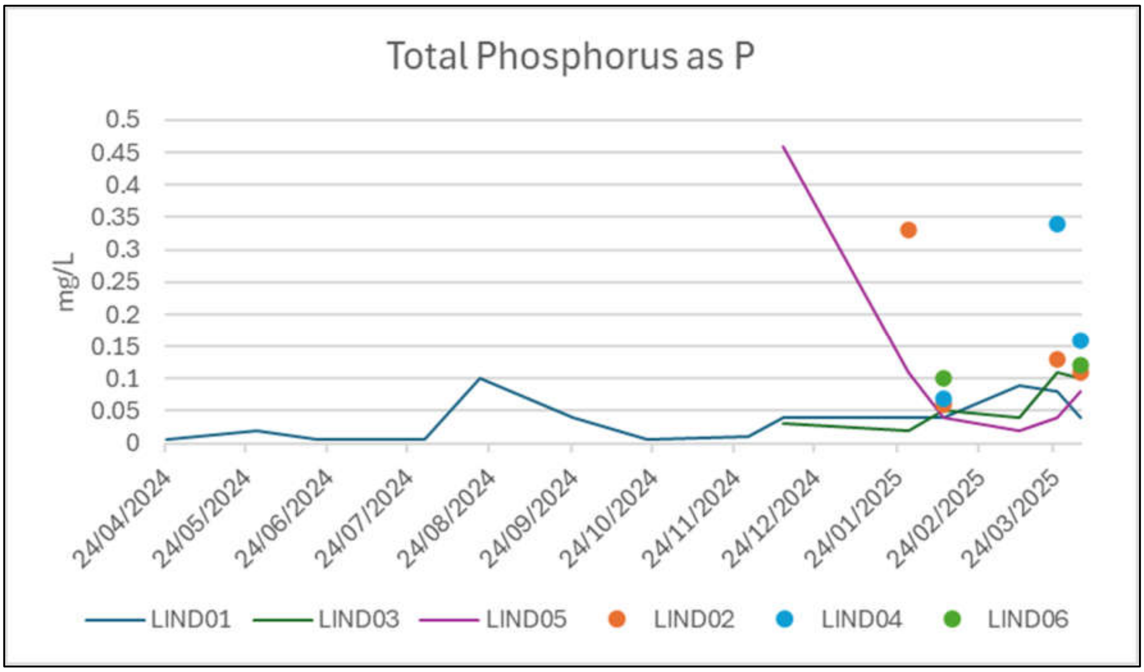


Figure 19: Total Phosphorus as P results from Inland Fresh Waters on Lindeman Island, 2024 - 2025

Total P percentiles are presented in Table 14 below.

Table 14: Percentile calculations for Total Phosphorus (units: mg/L) for Inland Fresh Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
LIND01	<0.01	0.040	0.080
Ephemeral Stream sites (LIND02, LIND03, LIND04, LIND05, LIND06)	0.040	0.100	0.148
All Sites (LIND01, LIND02, LIND03, LIND04, LIND05, LIND06)	0.020	0.050	0.110

5.11 Total Coliforms

Total coliforms in dam sample LIND01 demonstrated a gradual increase across the sampling period.

Tota coliforms in the ephemeral stream samples were elevated, with concentrations detected at the maximum detection limit of 24,196 MPN/100 mL in various samples from LIND02, LIND03, LIND05 and LIND06.

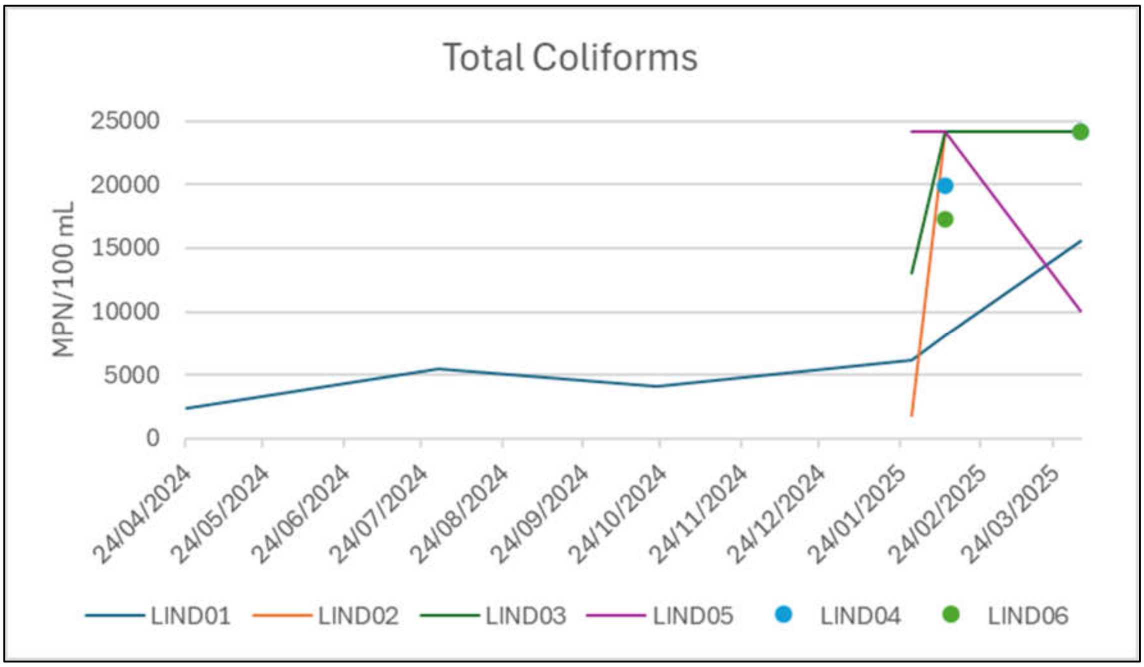


Figure 20: Total Coliforms results from Inland Fresh Waters on Lindeman Island, 2024 - 2025

Total Coliform percentiles are presented in Table 15 below.

Table 15: Percentile calculations for Total Coliforms (units: MPN/100ml) for Inland Fresh Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
LIND01	3094	5803	12584
Other sites (LIND02, LIND03, LIND04, LIND05, LIND06)	12420	24196	24196
All Sites (LIND01, LIND02, LIND03, LIND04, LIND05, LIND06)	5475	17329	24196

5.12 *E. coli*

E. coli levels at LIND01 ranged between 9 MPN/100 mL in April 2024 and 75 MPN/100 mL in October 2024, with the exception of 770 MPN/100 ml recorded in July 2024.

A distinct and unexplained E. coli spike was measured in LIND04 in the April 2025 rainfall event sampling round.

E. coli concentrations were consistent and followed the same concentration pattern in the remainder of the ephemeral stream samples.

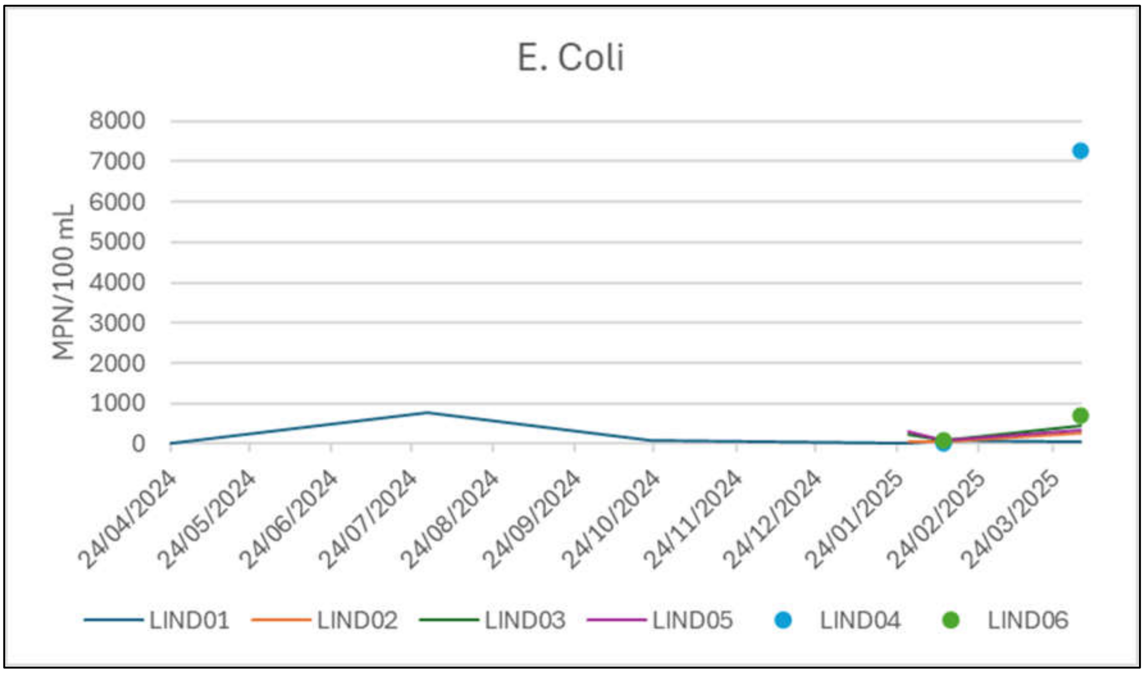


Figure 21: E. coli results from Inland Fresh Waters on Lindeman Island, 2024 - 2025

E. coli percentiles are presented in Table 16 below.

Table 16: Percentile calculations for E. coli (units: MPN/100ml) for Inland Fresh Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
LIND01	13	58	492
Other sites (LIND02, LIND03, LIND04, LIND05, LIND06)	50	243	499
All Sites (LIND01, LIND02, LIND03, LIND04, LIND05, LIND06)	41	75	450

5.13 Thermotolerant Coliforms

The pattern of Thermotolerant coliform results is generally consistent with *E. coli* however with a greater magnitude. A significant spike was recorded in LIND04 in the April 2025 rainfall event round.

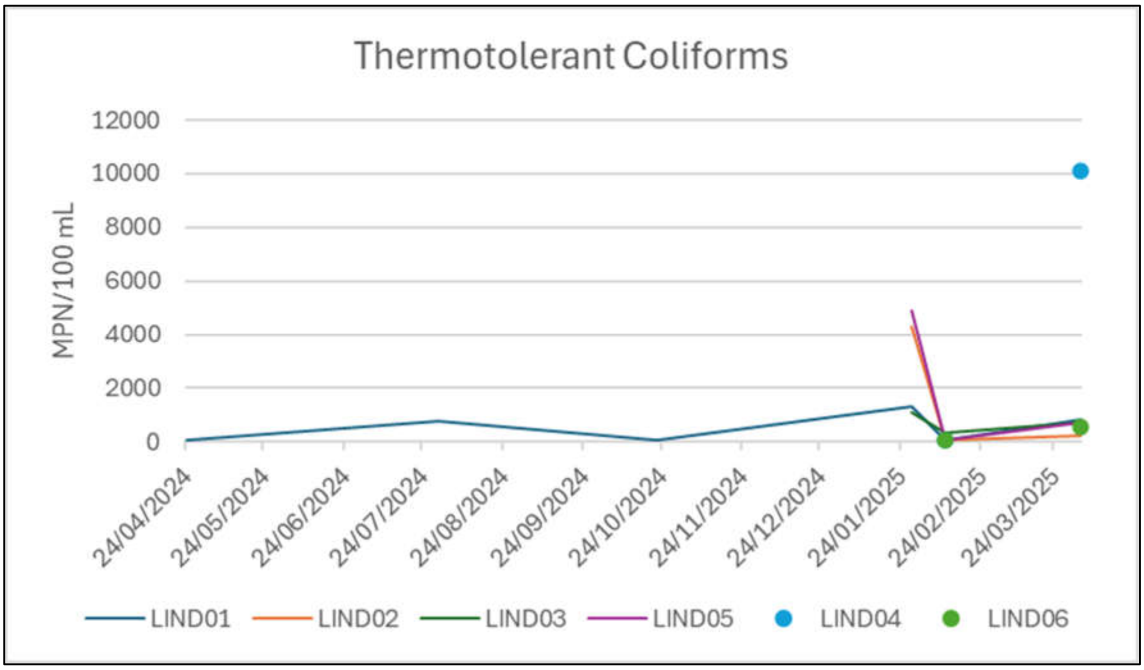


Figure 22: Thermotolerant Coliforms results from Inland Fresh Waters on Lindeman Island, 2024 - 2025

Thermotolerant coliforms percentiles are presented in Table 17 below.

Table 17: Percentile calculations for Thermotolerant Coliforms (units: MPN/100ml) for Inland Fresh Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
LIND01	68	432	1117
Ephemeral Stream sites (LIND02, LIND03, LIND04, LIND05, LIND06)	73	576	4402
All Sites (LIND01, LIND02, LIND03, LIND04, LIND05, LIND06)	75	576	1320

5.14 Heterotrophic Plate Count

Heterotrophic Plate Count (HPC) levels at LIND01 ranged between 20 cfu/1 ml in April 2024 and 1,380 cfu/1 ml in February 2025.

LIND04 recorded a peak Heterotrophic Plate Count greater than the Limit of Reporting (20,000 cfu/1 ml) in April 2025 (rainfall event sampling), consistent with elevated *E. coli* and Thermotolerant coliforms.

A Heterotrophic Plate Count level of 6200 cfu/1 ml was recoded at LIND02 in April 2025 (rainfall event sampling). Results for all other samples, including those for LIND03, LIND05 and LIND06 ranged between 20 cfu/1 ml and 2,070 cfu/1 ml in the period sampled (January 2025 to April 2025).

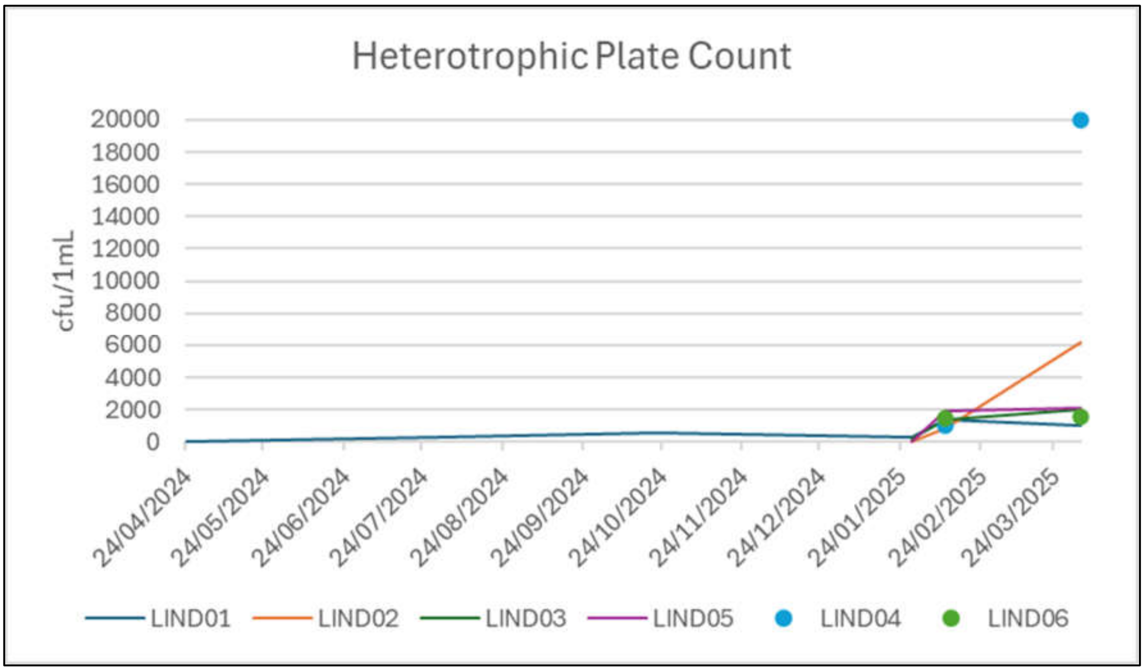


Figure 23: Heterotrophic Plate Count results from Inland Fresh Waters on Lindeman Island, 2024 - 2025

Heterotrophic Plate Count percentiles are presented in Table 18 below.

Table 18: Percentile calculations for Heterotrophic Plate Count (units: cfu/1 ml) for Inland Fresh Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
LIND01	136	465	1228
Ephemeral Stream sites (LIND02, LIND03, LIND04, LIND05, LIND06)	222	1,500	2,896
All Sites (LIND01, LIND02, LIND03, LIND04, LIND05, LIND06)	259	1,070	2,030

5.15 Organophosphorus Pesticides

No Organophosphorus Pesticide (OPP) was detected at concentrations above the laboratory reporting limits in any sample during any sampling event.

6. MARINE WATER QUALITY RESULTS

As noted in Wild Environmental Consultants' Water Quality Monitoring Program document, sampling locations for the baseline pre-development (ambient) water quality monitoring and the construction/operation phase monitoring have been selected to capture water quality within the most sensitive receiving environment (fringing reef).

Where possible, water quality is compared to the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 Proserpine River, Whitsunday Island and O'Connell River Basins Environmental Values and Water Quality Objectives for Coastal/marine waters (North-South) HEV2381 open coastal waters (Whitsundays - south to Thomas Island) seaward of Plume line shown in WQ1222 (s3, s4) for point of comparison.

Secchi depth measurements could not be obtained due to strong currents and risk of entanglement of the rope with the boat motors. Secchi results are not considered reliable for reporting or assessment and are not included in the monitoring results dataset. TSS and Turbidity results are considered more representative than Secchi depth for water quality assessment.

6.1 Electrical Conductivity

EC followed the same pattern between all sample locations across all sample events.

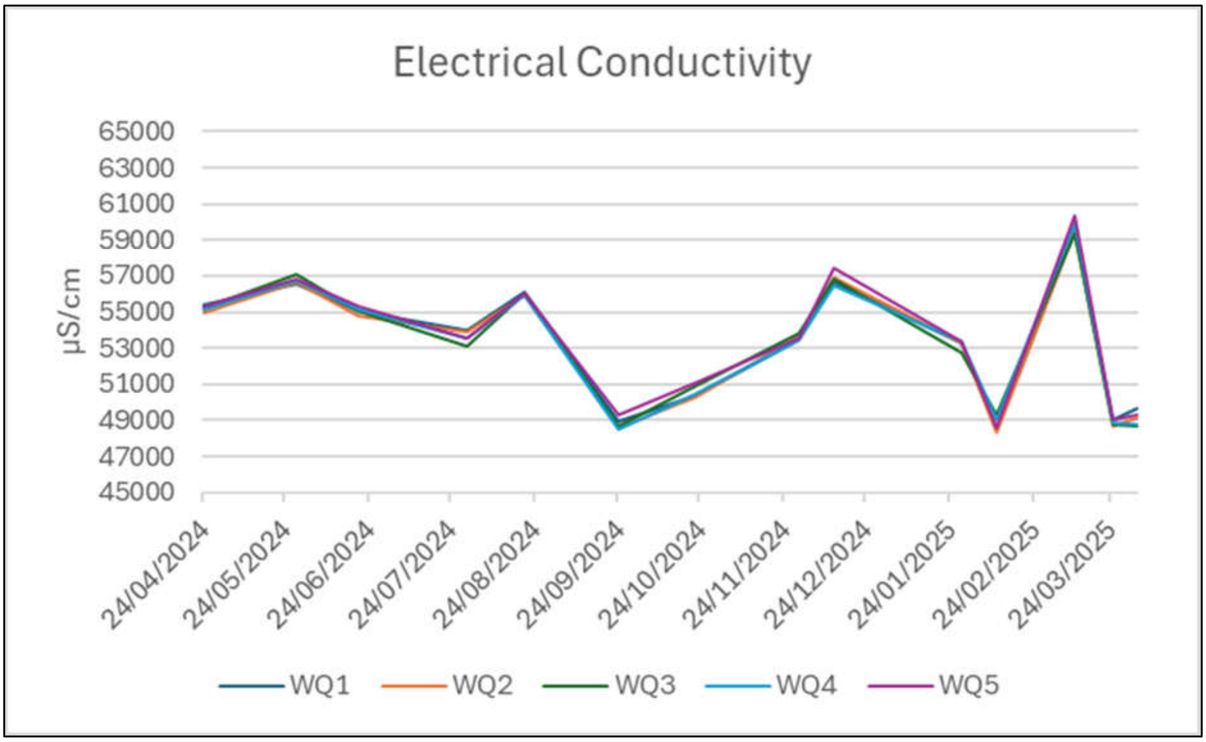


Figure 24: Electrical Conductivity results from Coastal Waters

Electrical Conductivity shows a high degree of correlation across all open coastal water sampling locations and sampling events. Corresponding to this, little variation in 20th, 50th and 80th percentile of the Electrical Conductivity reading between impact sites and control sites was measured.

Electrical conductivity of sea water is directly influenced by water temperature and represented by the general decrease in EC from April 2024 through to September 2024, followed by an increase to December 2024. Significant rainfall occurred from December 2024 through to March 2025, resulting in a decrease in EC due to freshwater additions from runoff.

Table 19: Percentile calculations for Electrical Conductivity (units: µS/cm) for Open Coastal Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
Control Sites (WQ3, WQ4)	48830	53495	56526
Impact Sites (WQ1, WQ2, WQ5)	49120	53594	56595
All Sites (WQ1, WQ2, WQ3, WQ4, WQ5)	49048	53552	56560

6.2 pH

pH generally followed the same pattern between all sample locations and across all sample events.

A consistent and marked decrease in pH was recorded in the 22 October 2024 sampling event. No rainfall or abnormally high winds were recorded in the 7 days prior to 22 October 2024 sampling. Field records confirm the meter calibration was correct. It is unclear what led to lower pH levels observed at all coastal water sites at the time.

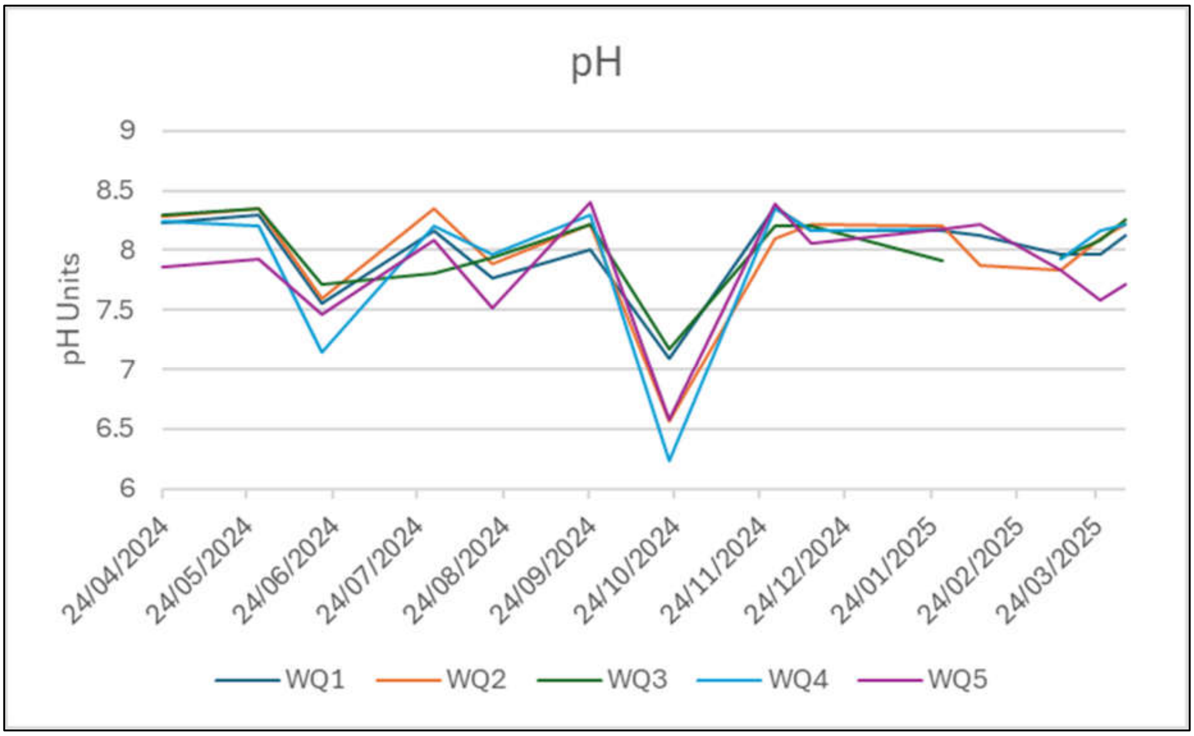


Figure 25: pH results from Coastal Waters

In comparison to the Water Quality Objectives, results are less than the lower and upper limits for coastal waters.

Table 20: Percentile calculations pH (units: pH units) for Open Coastal Waters on Lindeman Island

	Lower Limit	Upper Limit	20th Percentile	50th Percentile	80th Percentile
Water Quality Objective	8.1	8.4			
Control Sites (WQ3, WQ4)	6.2	8.4	7.9	8.2	8.2
Impact Sites (WQ1, WQ2, WQ5)	6.6	8.4	7.7	8.1	8.2
All Sites (WQ1, WQ2, WQ3, WQ4, WQ5)	6.2	8.4	7.8	8.1	8.2

6.3 Dissolved Oxygen

DO generally followed the same pattern between all sample locations across all sample events.

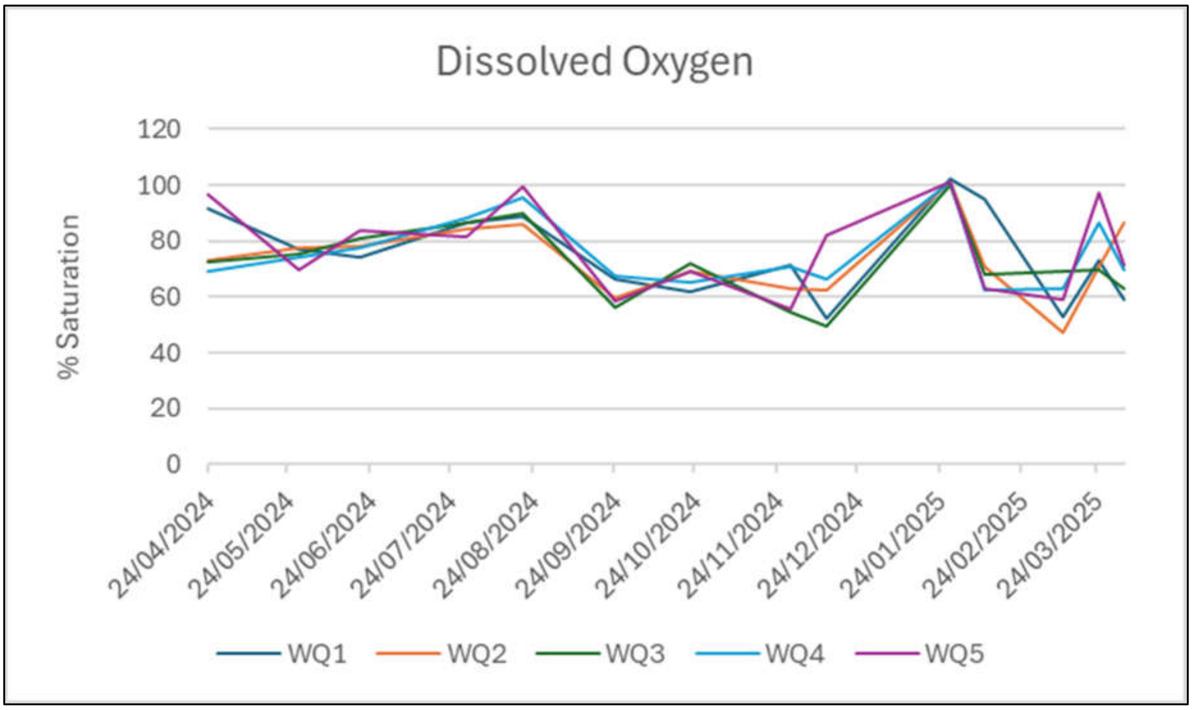


Figure 26: Dissolved Oxygen results from Coastal Waters

In comparison to the Water Quality Objectives results are within limits. DO percentiles are presented in the table below:

Table 21: Percentile calculations for Dissolved Oxygen (units: %) for Open Coastal Waters on Lindeman Island

	Lower Limit	Upper Limit	20th Percentile	50th Percentile	80th Percentile
Water Quality Objective	95	105			
Control Sites (WQ3, WQ4)	49	101	63	71	87
Impact Sites (WQ1, WQ2, WQ5)	47	102	61	73	90
All Sites (WQ1, WQ2, WQ3, WQ4, WQ5)	47	102	63	72	88

6.4 Turbidity

Turbidity was generally low and consistent between sample location from April 2024 through October 2024. A marked increase in turbidity was observed across all sample locations in November 2024. Coral spawning for the Whitsunday region on the Great Barrier Reef was expected to occur 19-22 November 2024, which may have impacted water clarity and increased turbidity at the time.

Turbidity showed little consistency between sampling locations following the onset of the wet season.

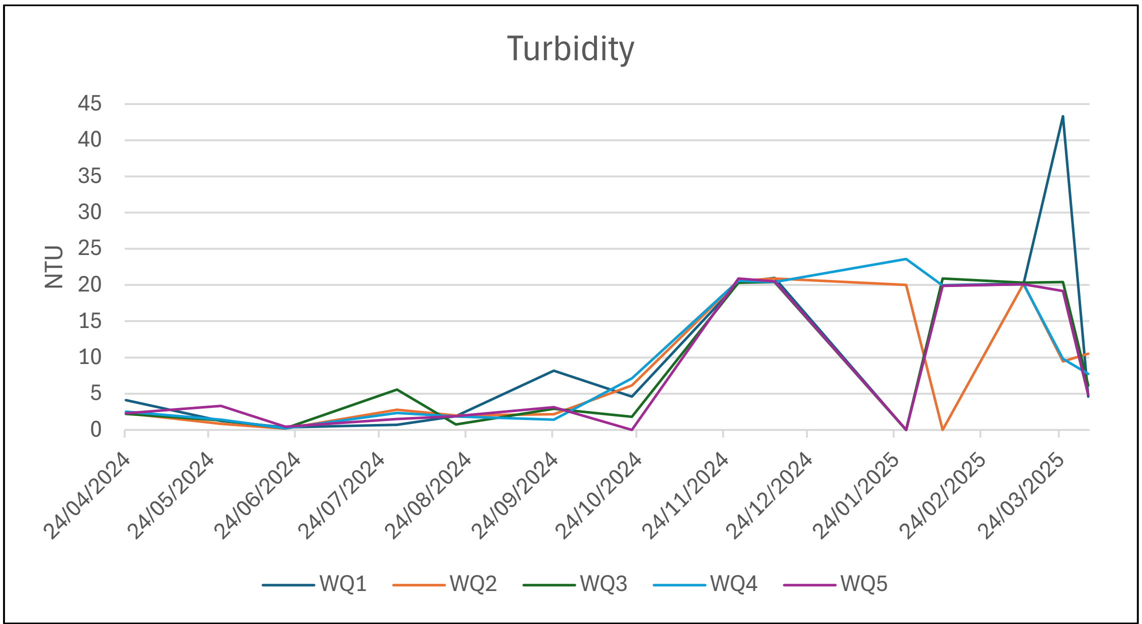


Figure 27: Turbidity results from Coastal Waters

Turbidity percentiles are presented in Table 22 below:

Table 22: Percentile calculations for Turbidity (units: NTU) for Open Coastal Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
Water Quality Objective	0.7	1.1	2.1
Control Sites (WQ3, WQ4)	1.4	5.8	20.4
Impact Sites (WQ1, WQ2, WQ5)	0.8	4.3	20.2
All Sites (WQ1, WQ2, WQ3, WQ4, WQ5)	1.3	4.6	20.3

6.5 Total Dissolved Solids

TDS varied across the sampling period but was consistent between sampling locations at each event. A distinct decrease in TDS at all sample locations was measured in the December 2024 sampling event.

The TDS value of 23,500 mg/L record at WQ3 in October 2024 appears to be on an outlier. Enquiries with the laboratory indicated that QA/QC checks do not show any errors in analysis or reporting. Corresponding Electrical Conductivity measurement of 50,883 µS/cm for the same sample does not support this laboratory result. Sensitivity analysis indicates the outlier had little effect on the percentile ranges.

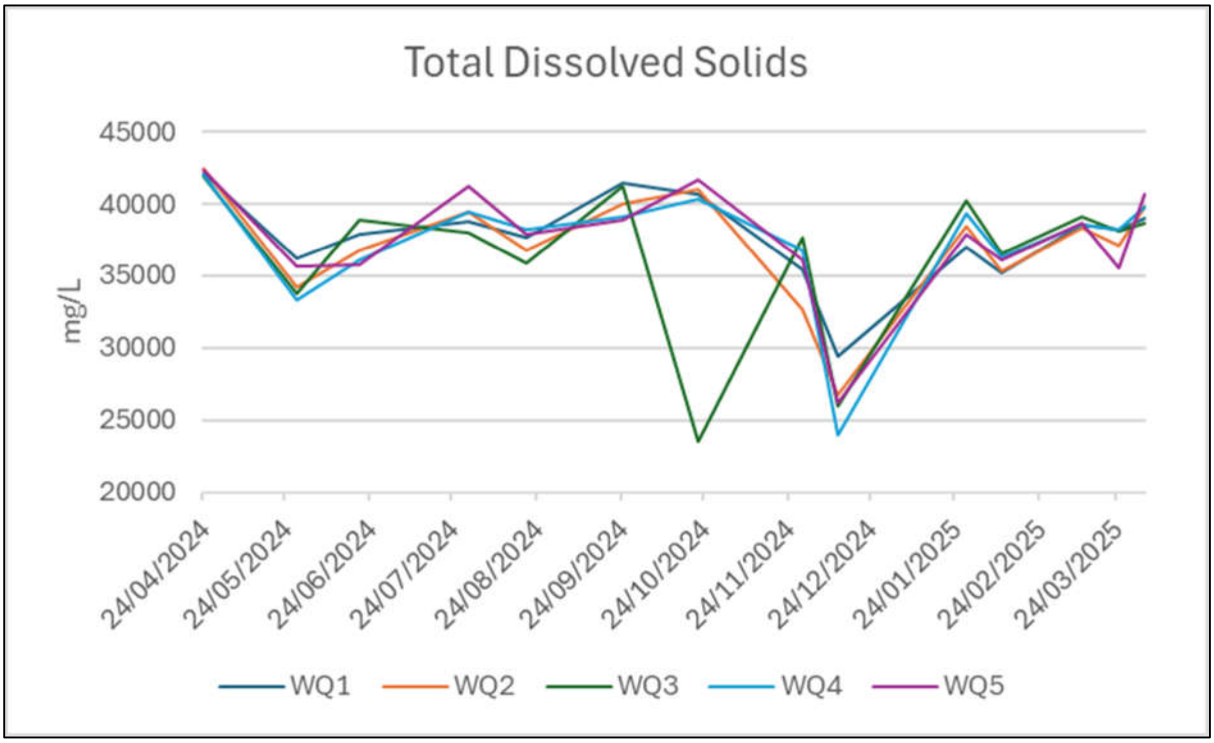


Figure 28: Total Dissolved Solids results from Coastal Waters

Percentile ranges for TDS split between 'Control' sites and 'Impact' sites are presented in Table 23 below.

Table 23: Percentile calculations for Total Dissolved Solids (units: mg/L) for Open Coastal Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
Control Sites (WQ3, WQ4)	35,480	38,200	39,880
Impact Sites (WQ1, WQ2, WQ5)	35,520	37,900	40,700
All Sites (WQ1, WQ2, WQ3, WQ4, WQ5)	35,620	38,150	40,160

6.6 Total Suspended Solids

Total suspended solids were not detected at concentrations above the limit of reporting in all samples from the May, June and July 2024 and February, March and April 2025 sampling events. The highest TSS was measured in the December 2024 sampling event, with lower concentrations detected in April 2024 and September 2024. TSS in marine waters does not appear to be influenced by rainfall.

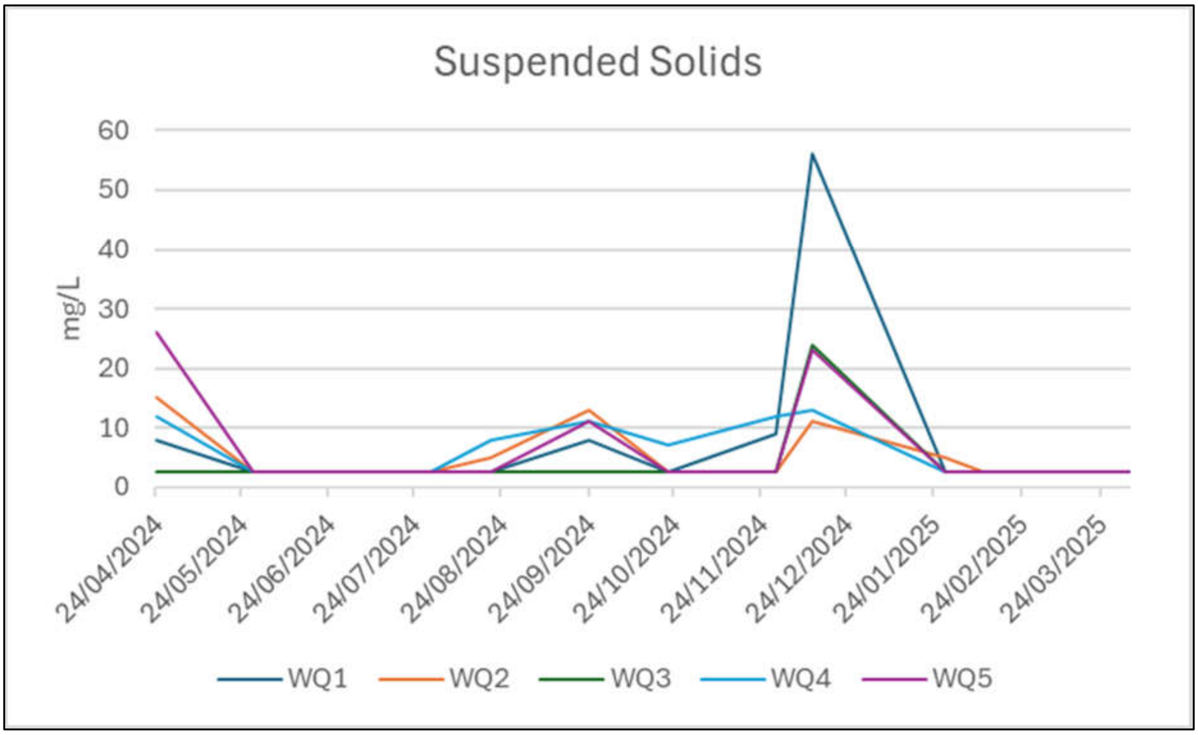


Figure 29: Total Suspended Solids results from Coastal Waters

Percentile ranges for TSS split between 'Control' sites and 'Impact' sites are presented in Table 24 below:

Table 24: Percentile calculations for Total Suspended Solids (units: mg/L) for Open Coastal Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
Water Quality Objective	0.9	1.4	2.2
Control Sites (WQ3, WQ4)	<5	<5	8.8
Impact Sites (WQ1, WQ2, WQ5)	<5	<5	8.4
All Sites (WQ1, WQ2, WQ3, WQ4, WQ5)	<5	<5	8.0

6.7 Ammonia

Ammonia concentrations were generally consistent between all sampling locations. Ammonia was not detected in all samples between July and October 2024 and December 2024 to January 2025. The November 2024 peak may be associated with decomposition of organic material derived from coral spawning.

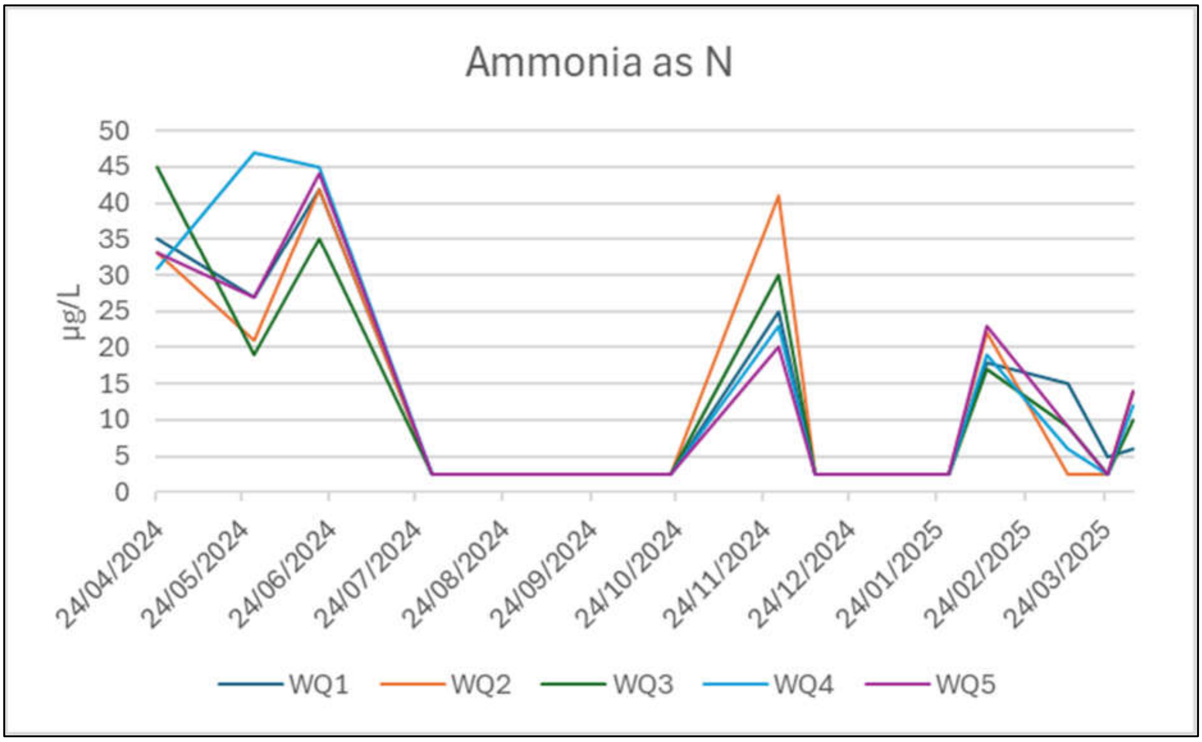


Figure 30: Ammonia results from Coastal Waters

Percentile ranges for ammonia split between 'Control' sites and 'Impact' sites are presented in Table 25 below.

Table 25: Percentile calculations for Ammonia as N (units: µg/L) for Open Coastal Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
Water Quality Objective	0	1	6
Control Sites (WQ3, WQ4)	<5	<5	30.2
Impact Sites (WQ1, WQ2, WQ5)	<5	<5	27.0
All Sites (WQ1, WQ2, WQ3, WQ4, WQ5)	<5	<5	27.0

6.8 Total Nitrite + Nitrate

Nitrite and Nitrate concentrations generally followed the same pattern across the monitoring period with the following exceptions:

- An isolated peak at WQ3 in September 2024 that was not detected in any other sample.
- Elevated concentrations at WQ2 and WQ3 in November 2024
- A moderately elevated concentration at WQ2 in April 2024.

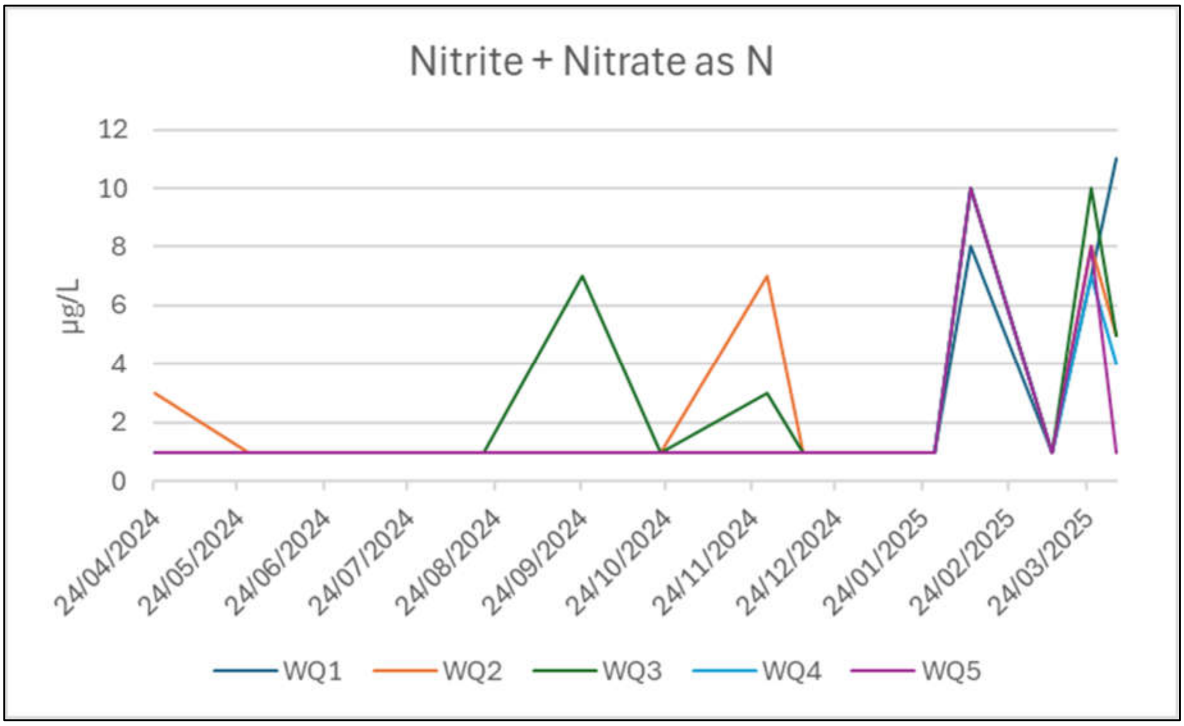


Figure 31: Total Nitrite and Nitrate results from Coastal Waters

Percentile ranges for nitrite and nitrate split between 'Control' sites and 'Impact' sites are presented in Table 26 below.

Table 26: Percentile calculations for Nitrite + Nitrate as N (units: µg/L) for Open Coastal Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
Water Quality Objective	0.14	0.49	2.0
Control Sites (WQ3, WQ4)	<2	<2	5.4
Impact Sites (WQ1, WQ2, WQ5)	<2	<2	5.8
All Sites (WQ1, WQ2, WQ3, WQ4, WQ5)	<2	<2	5.0

6.9 Total Nitrogen

Total N generally followed the same concentration pattern across all sampling events. A spike was detected at WQ5 in the July 2024 event, which is attributed to very strong onshore winds and rough conditions that likely mobilised organic material into the water column.

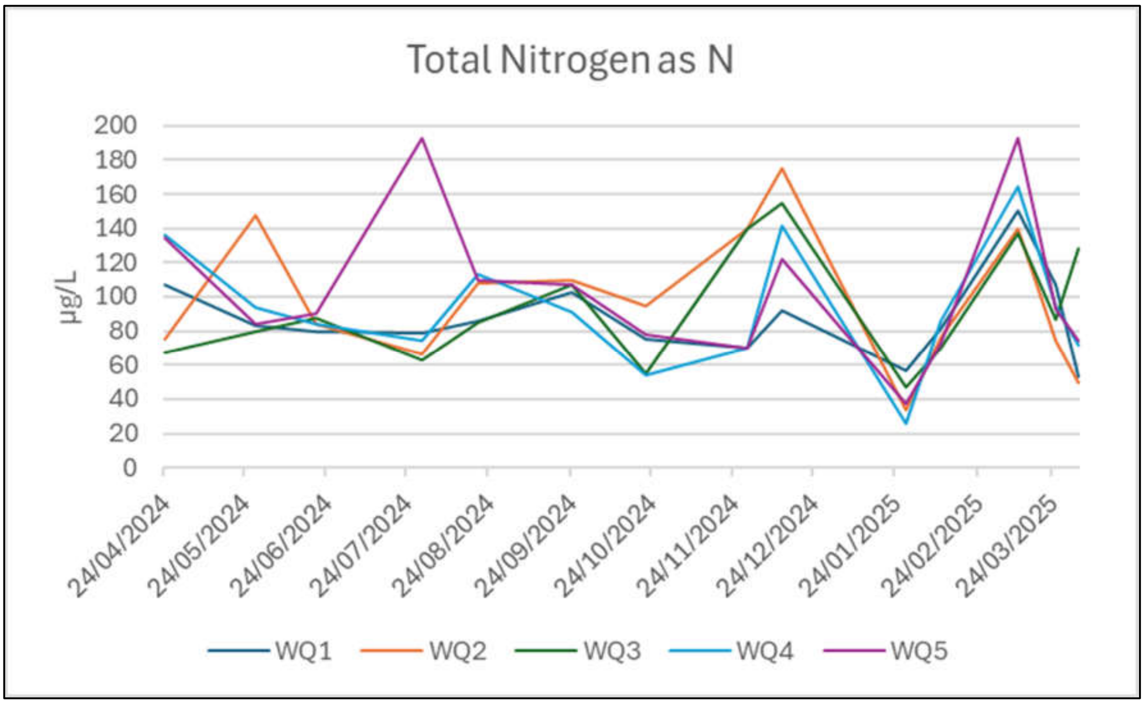


Figure 32: Total Nitrogen as N results from Coastal Waters

Percentile ranges for Total N split between 'Control' sites and 'Impact' sites are presented in Table 27 below. In comparison to the Water Quality Objectives, control site results for 20th and 50th percentiles are lower and the 80th percentile less than 10% higher. Results for all impact sites are less than Water Quality Objectives values.

Table 27: Percentile calculations for Total Nitrogen as N (units: µg/L) for Open Coastal Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
Water Quality Objective	75	95	125
Control Sites (WQ3, WQ4)8	66	87	136
Impact Sites (WQ1, WQ2, WQ5)	72	85	127
All Sites (WQ1, WQ2, WQ3, WQ4, WQ5)	70	86	132

6.10 Filterable Reactive Phosphorus as P

Filterable Reactive Phosphorus (FRP) was record in 19 samples across sample locations. All other results were reported below the laboratory limit of reporting.

FRP results generally followed the same pattern across all sample locations with the exception of a significant spike in November 2024. The spike may be a result of the preceding coral spawning event.

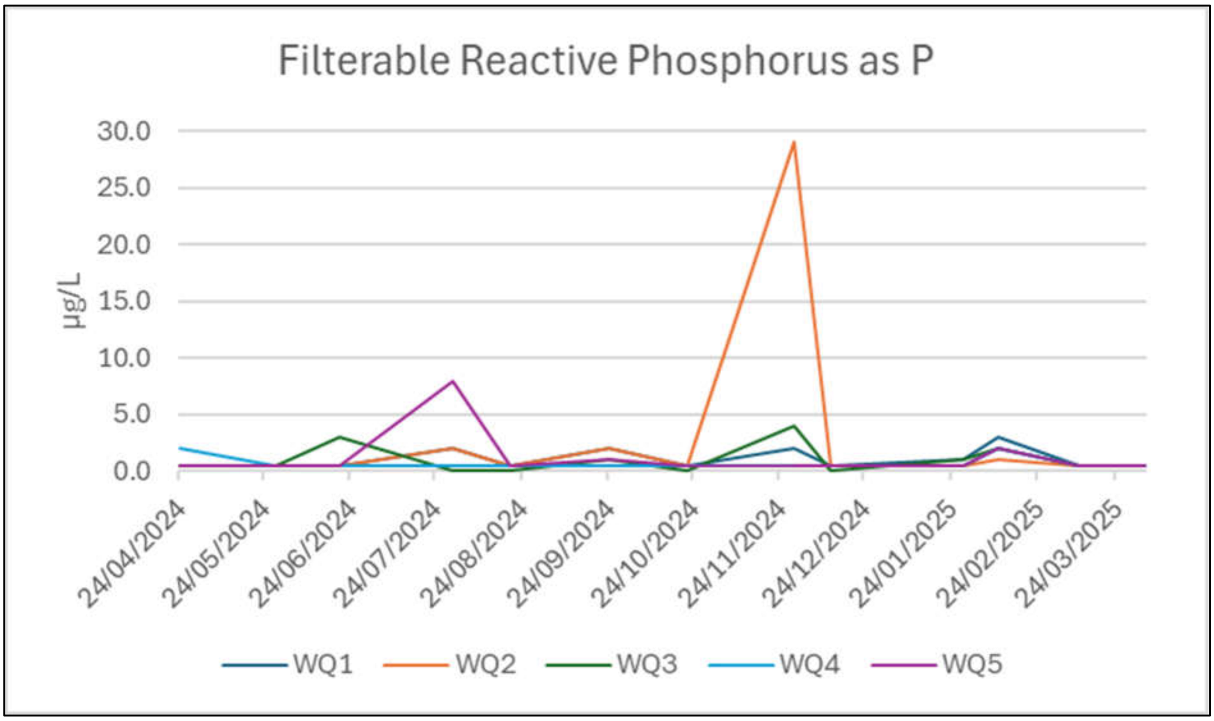


Figure 33: Filterable Recoverable Phosphorus results from Coastal Waters

Percentile ranges for FRP split between 'Control' sites and 'Impact' sites are presented in Table 28 below.

Table 28: Percentile calculations for Filterable Reactive Phosphorus as P (units: µg/L) for Open Coastal Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
Water Quality Objective	0	1	3
Control Sites (WQ3, WQ4)	<1	<1	1.2
Impact Sites (WQ1, WQ2, WQ5)	<1	<1	2
All Sites (WQ1, WQ2, WQ3, WQ4, WQ5)	<1	<1	1.8

6.11 Total Phosphorus

Of the 70 samples analysed, Total Phosphorus was reported in only 2 samples (WQ5 July 2024 and WQ2 November 2024). All other results were reported below the laboratory Limit of Reporting.

Phosphorus at WQ5 in July 2024 is attributed to adverse weather conditions as described above. The origin of the detection at WQ2 in November 2024 is not known but could be attributed to the coral spawning event in the days prior to sampling.

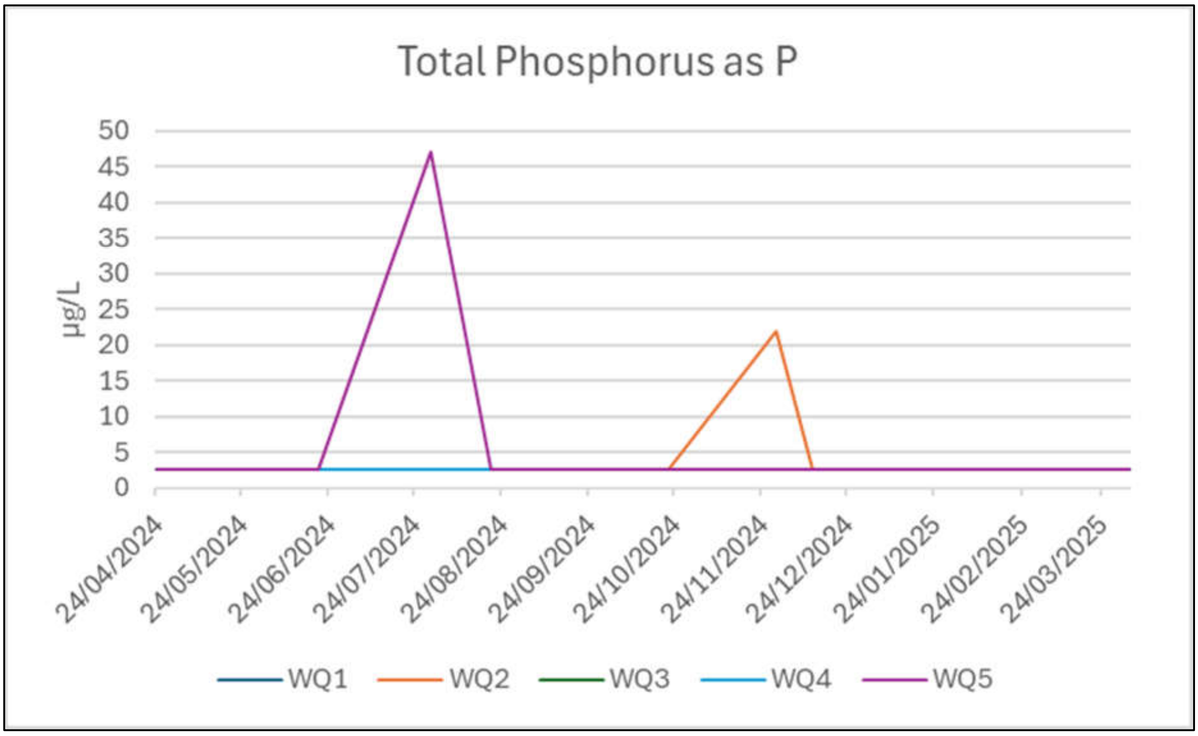


Figure 34: Total Phosphorus as P results from Coastal Waters

Percentile ranges for Total P split between 'Control' sites and 'Impact' sites are presented in Table 29 below.

Table 29: Percentile calculations for Total Phosphorus as P (units: µg/L) for Open Coastal Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
Water Quality Objective	8	11	14
Control Sites (WQ3, WQ4)	<5	<5	<5
Impact Sites (WQ1, WQ2, WQ5)	<5	<5	<5
All Sites (WQ1, WQ2, WQ3, WQ4, WQ5)	<5	<5	<5

6.12 Total Coliforms

The pattern and magnitude of Total Coliform concentrations was relatively consistent through to January 2025 where concentrations at WQ1, WQ2, WQ3 and WQ5 increased markedly while WQ4 increased and then decreased.

The increase through the wet season is likely attributed to runoff from Lindeman Island, with the largest concentration detected at WQ3 which was located at the discharge point of the largest creek on the island.

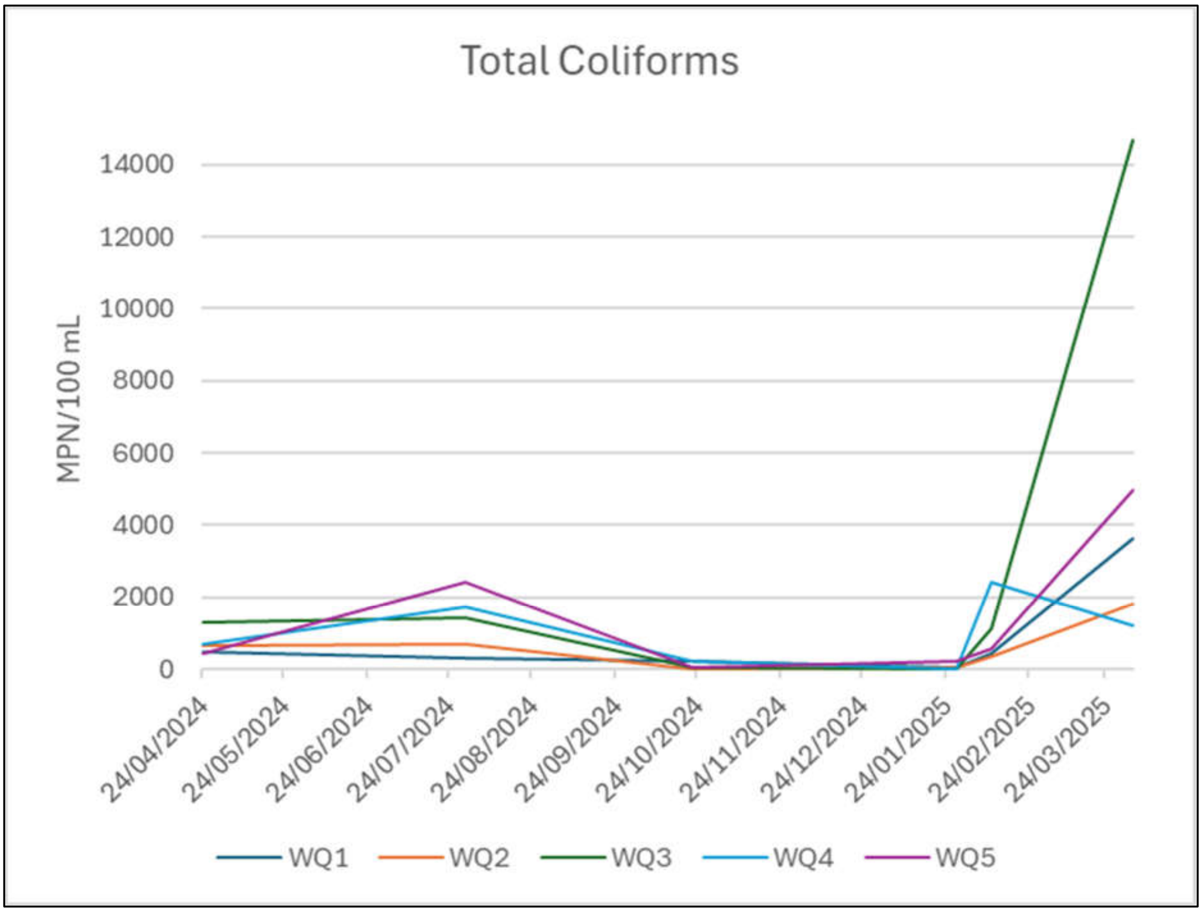


Figure 35: Total Coliforms results from Coastal Waters

Percentile ranges for Total Coliforms split between 'Control' sites and 'Impact' sites are presented in Table 30 below.

Table 30: Percentile calculations for Total Coliforms (units: MPN/100 ml) for Open Coastal Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
Control Sites (WQ3, WQ4)	39	1160	2008
Impact Sites (WQ1, WQ2, WQ5)	57	423	1948
All Sites (WQ1, WQ2, WQ3, WQ4, WQ5)	54	518	1811

6.13 E. coli

E. coli was recorded at or above the limit of reporting in all sample dates except WQ2, WQ3 and WQ4 in October 2024 and WQ1, WQ2, WQ4 and WQ5 in January 2025. Both of these were monthly sampling events. E. coli concentrations follow the same trend as Total Coliforms with the following noted:

- The highest concentration was detected at WQ5 in the July 2024 sampling event. No rain was recorded prior to the sampling event and the *E. coli* is not attributed to a terrestrial source.

- *E. coli* in samples collected from January 2025 to April 2025 followed the same pattern as Total Coliforms.

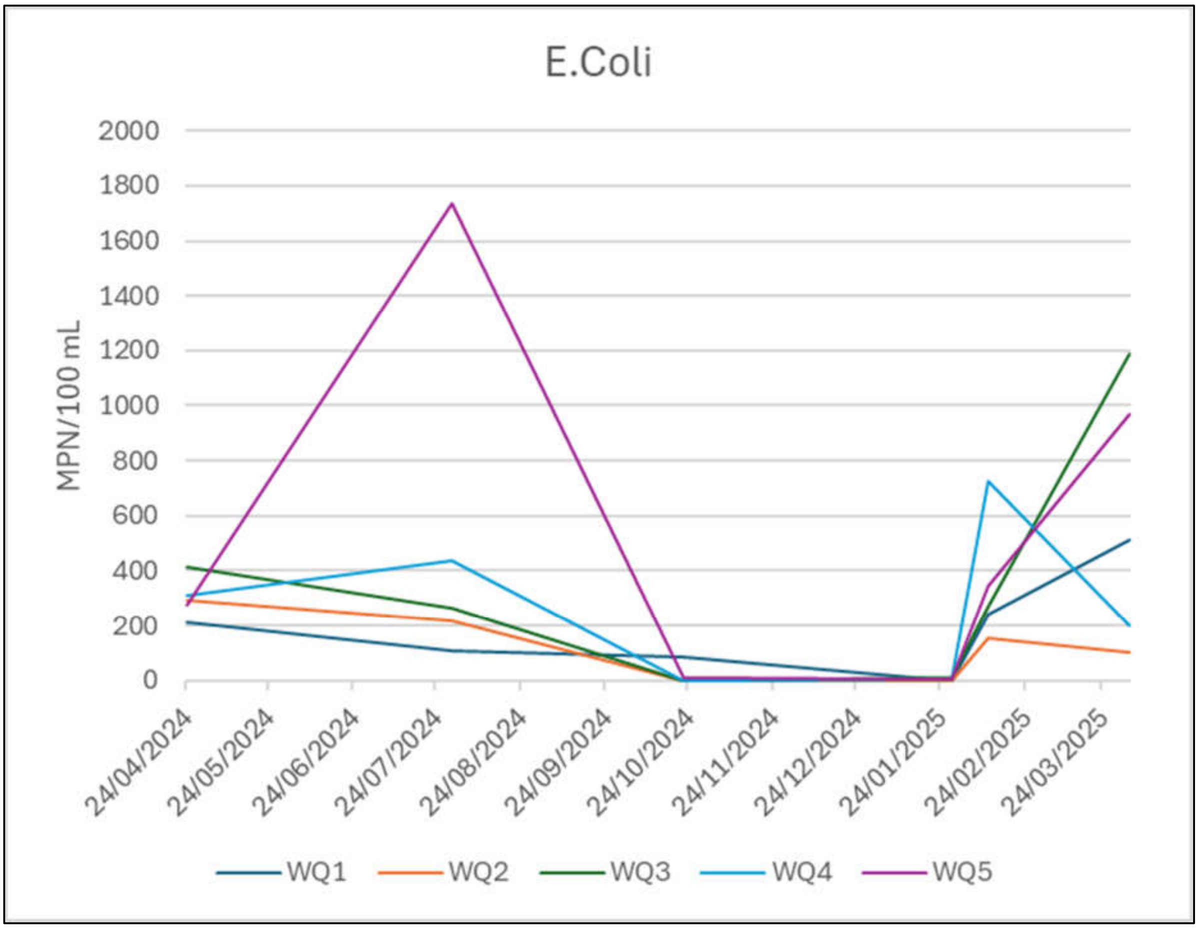


Figure 36: E. coli results from Coastal Waters

Percentile ranges for *E. coli* split between 'Control' sites and 'Impact' sites are presented in Table 31 below.

Table 31: Percentile calculations for E. coli (units: MPN/100 ml) for Open Coastal Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
Control Sites (WQ3, WQ4)	3	267	552
Impact Sites (WQ1, WQ2, WQ5)	4	184	378
All Sites (WQ1, WQ2, WQ3, WQ4, WQ5)	5	217	430

6.14 Thermotolerant Coliforms

Thermotolerant coliforms were not identified in all samples from April 2024 and July 2024 sampling events and in WQ4 only from the October 2024 event. Thermotolerant coliforms did not follow any pattern in samples collected over the wet season. The highest concentration was at WQ4 in February 2025.

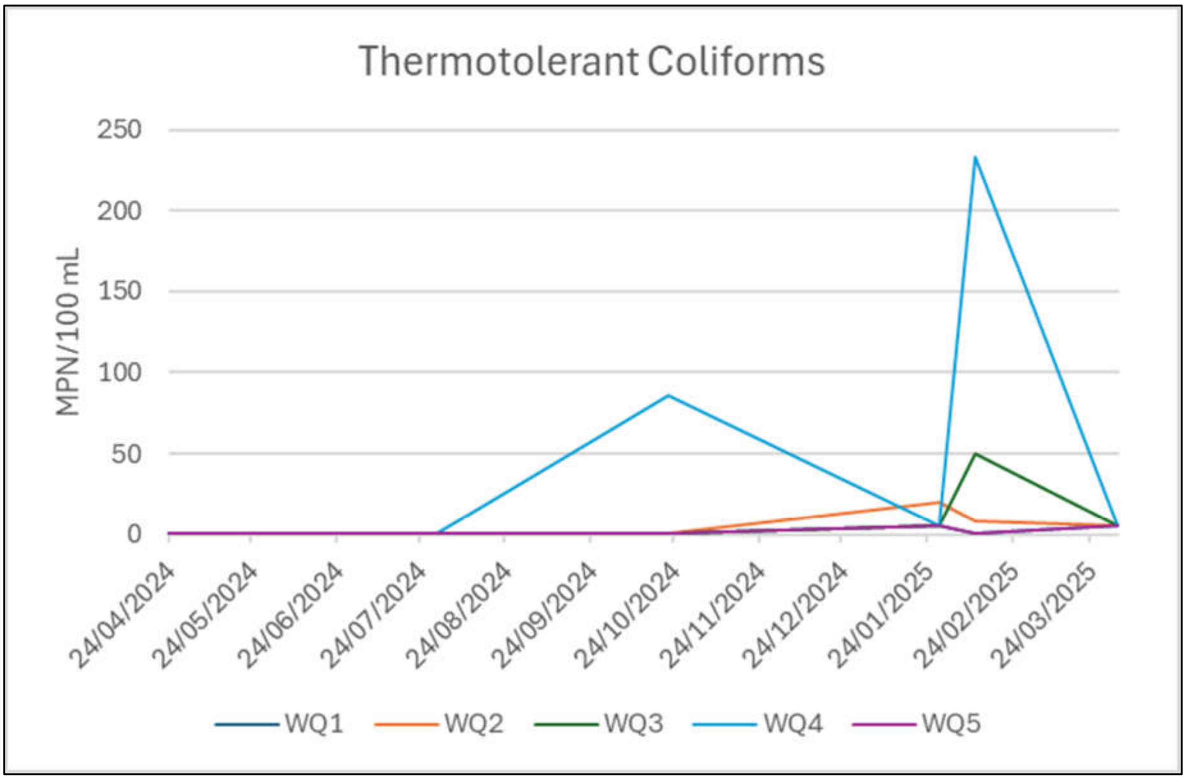


Figure 37: Thermotolerant Coliforms results from Coastal Waters

Percentile ranges for Thermotolerant Coliforms split between 'Control' sites and 'Impact' sites are presented in Table 32 below.

Table 32: Percentile calculations for Thermotolerant Coliforms (units: MPN/100 ml) for Open Coastal Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
Control Sites (WQ3, WQ4)	<1	5	64
Impact Sites (WQ1, WQ2, WQ5)	<1	<1	5
All Sites (WQ1, WQ2, WQ3, WQ4, WQ5)	<1	<1	5

6.15 Heterotrophic Plate Count

Heterotrophic Plate Count concentrations followed the same pattern between all sample locations across all sample events. The HPC concentrations were elevated in samples WQ3 and WQ5 from the July 2024 event compared against the other samples collect during that event. However, it is noted that HPC was still slightly elevated in the other samples.

HPC was also detected in the February 2025 sample event, albeit at lower concentrations than the July 2024 event.

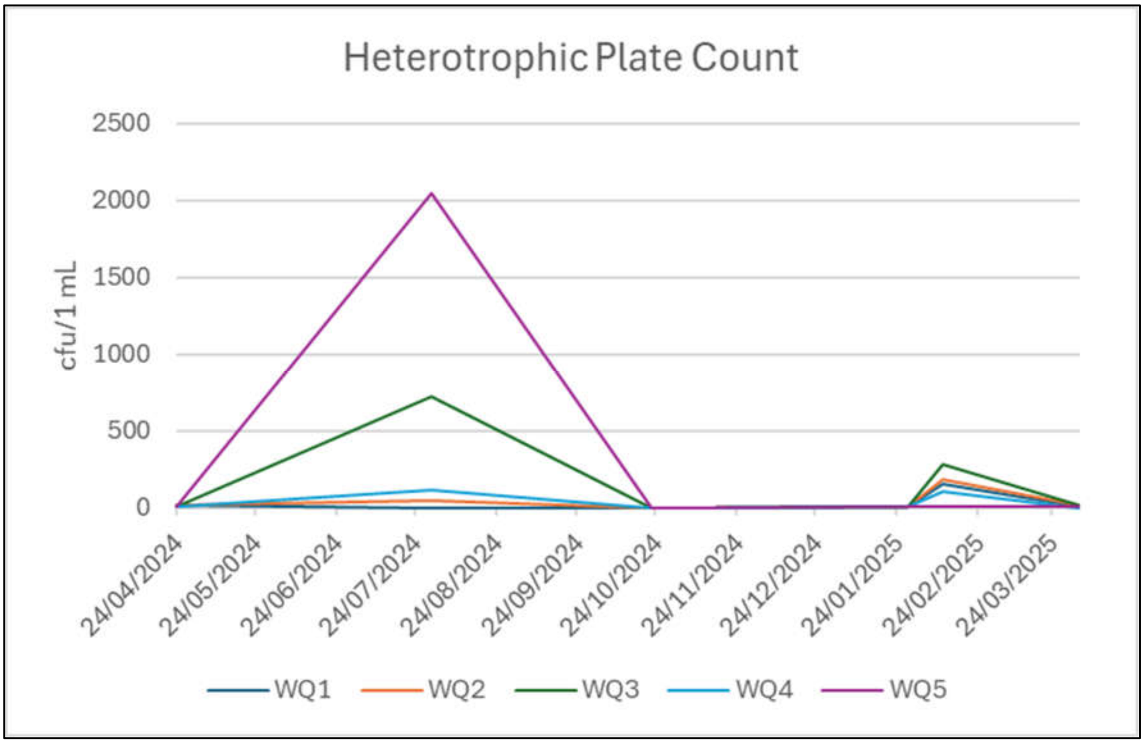


Figure 38: Heterotrophic Plate Count results from Coastal Waters

Percentile ranges for HPC split between 'Control' sites and 'Impact' sites are presented in Table 33 below.

Table 33: Percentile calculations for Heterotrophic Plate Count (units: cfu/1 ml) for Open Coastal Waters on Lindeman Island

	20th Percentile	50th Percentile	80th Percentile
Control Sites (WQ3, WQ4)	<1	8	178
Impact Sites (WQ1, WQ2, WQ5)	<1	9	70
All Sites (WQ1, WQ2, WQ3, WQ4, WQ5)	<1	9	108

6.16 Organophosphorus Pesticides

No Organophosphorus Pesticides were detected above the LOR at any Open Coastal Waters site on Lindeman Island during the sampling period.

6.17 Temperature and Salinity

A YSI EXO3 Multiparameter Sonde data logger collected Electrical Conductivity and Total Dissolved Solids data from 28 May 2024 to 11 November 2024 and 12 December 2024 to 9 June 2025. The unit was unserviceable from 12 November 2024 to 10 December 2024. The sonde was installed on the most inshore starboard navigation marker within the jetty channel directly in front of the proposed resort area at the edge of the channel, closest to Lindeman Island (Figure 2).

The 20th, 50th, 80th percentile and minimum and maximum EC, and temperature for each month of the sampling program is presented on the graph below. EC increases with ocean temperature. An unseasonable drop in surface water temperature and corresponding EC was measured in February, during a period of extended rainfall.

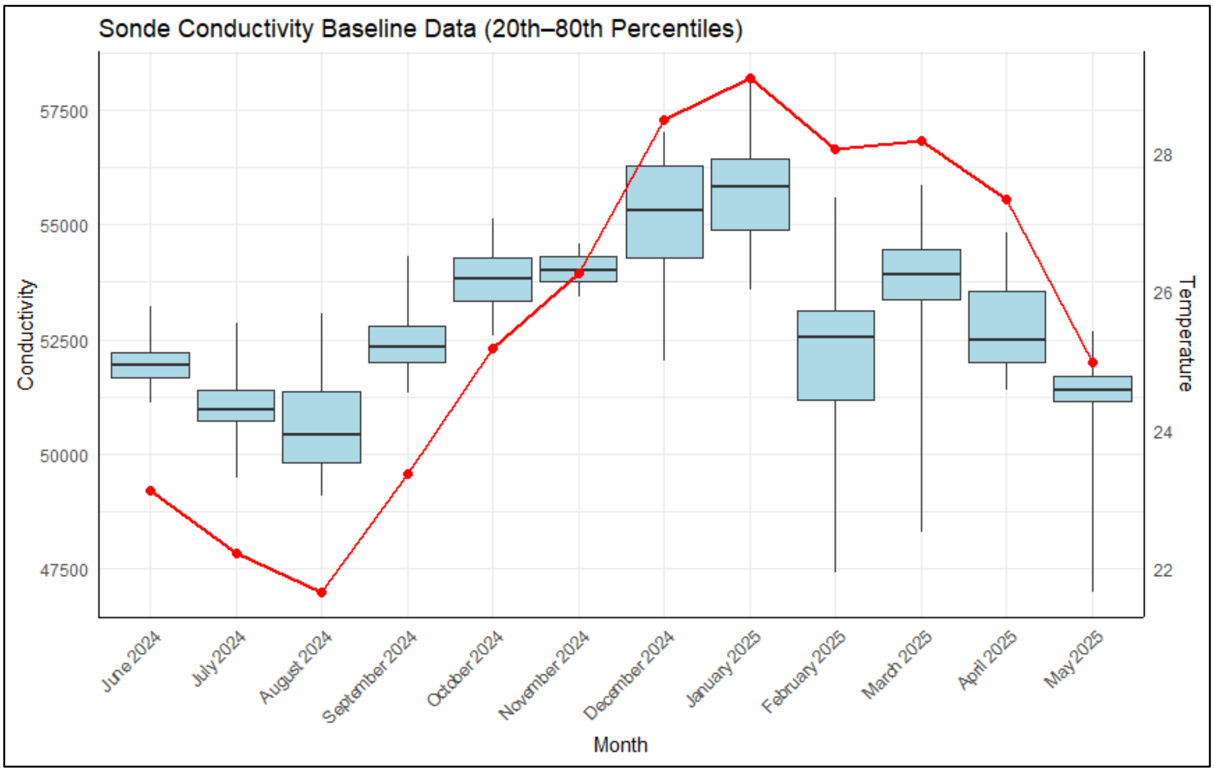


Figure 39: Electrical Conductivity and Temperature, Lindeman Island 2024 - 2025

EC and temperature compensated TDS are presented below on the chart below. Temperature compensated TDS results indicate variability over the wet season from freshwater inputs.

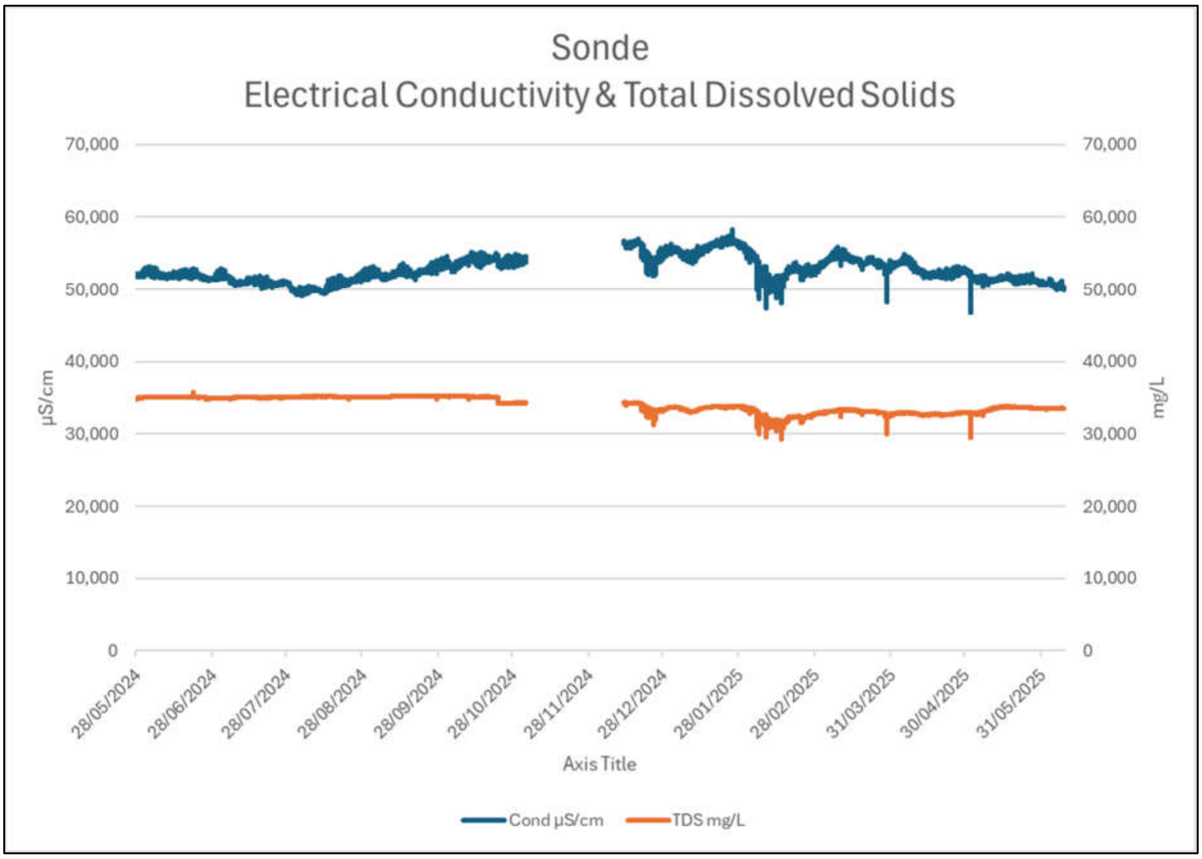


Figure 40: Electrical Conductivity and Total Dissolved Solids data collected via the YSI sonde sample location WQ5 on Lindeman Island, 2024 - 2025

Percentiles for EC and TDS across the monitoring period are presented in the table below:

Table 34: Percentile calculations for EC and TDS for Coastal Waters

	20th Percentile	50th Percentile	80th Percentile
Electrical Conductivity (uS/cm)	51,221	52,334	54,218
Total Dissolved Solids (mg/L)	32,962	33,793	35,100

7. FIELD QA/QC ASSESSMENT

The following sample pairs exceeded the data quality indicator of 20% relative percent difference where the results were greater than five time the limit of reporting as per Qld DES (2018) *Monitoring and Sampling Manual*:

- Ammonia in triplicate pair LIND01 and TW1.
- TDS in duplicate pair LIND01 and DW2 and LIND01 and TW2.
- TDS, TSS, ammonia, Total N and Total P between duplicate pair LIND01 and DW3.
- TSS ammonia, Total N and Total P between triplicate pair LIND01 and TW3.
- TDS between duplicate pair LIND01 and DW4 and between triplicate pair LIND01 and TW4.

- TDS between duplicate pair LIND01 and DW9.
- Total P between triplicate pair LIND01 and TW9.
- TDS and TSS between duplicate pair LIND01 and DW10.
- Total P between triplicate pair LIND01 and TW10.
- TSS between triplicate pair LIND01 and TW11
- TSS between duplicate pair LIND01 and DW12 and triplicate pair LIND01 and TW12.
- TDS between duplicate pair LIND01 and DW13 and triplicate pair LIND01 and TW13.

TDS and TSS outliers were attributed to stirring up of the substrate while sampling. The primary sample result was typically lower than the duplicate and triplicate and were the first sample collected. The primary sample was used for calculating percentiles.

The ammonia, nitrogen and phosphorus outliers are attributed to collection of organic material in the samples. As above, the outliers appear to be attributed to stirring up of substrate during sampling.

All other duplicate and triplicate pair results were within the Data Quality Indicators. Catchment Solutions accepts the reliability of the analytical data.

8. SUMMARY OF BASELINE WATER QUALITY RESULTS

Based on observations made during the sampling program and in accordance with the WQMP, baseline data has been separated into the following sample sites:

- LIND01 as a stand-alone data point due to its perennial nature with no flow.
- Ephemeral stream samples LIND02, LIND03, LIND04, LIND05 and LIND06 have been grouped to provide a representation of surface water quality in flowing surface waters.
- Marine sample control sites WQ3 and WQ4 have been grouped as they are outside the influence of site construction activities.
- Marine impact locations WQ1, WQ2 and WQ5 have been grouped to provide a representation of water quality in the coastal zone adjacent to the resort. It is noted that WQ5 is located in shallow water in close proximity to the shoreline where water quality is influenced by wind direction and strength.

8.1 Baseline Water Quality – Dam

The summary of baseline water quality from LIND01 is presented below:

Table 35: Baseline monitoring results for Terrestrial Fresh Water location LIND01 (2024 – 2025)

Island Fresh Waters – Perennial (LIND01)	Unit	20th Percentile	50th Percentile	80th Percentile
Electrical Conductivity	µS/cm	114	133	380
pH	pH units	6.4	7.5	8.6
Dissolved Oxygen	% Saturation	40.6	60.0	72.1
Turbidity	NTU	2.1	14.0	27.8
Total Dissolved Solids	mg/L	78	87	101
Total Suspended Solids	mg/L	<5	<5	11
Ammonia	mg/L	<0.01	0.025	0.030
Total Nitrite + Nitrite	mg/L	<0.01	<0.01	<0.01
Total Nitrogen as N	mg/L	0.40	0.65	1.00
Total Phosphorus	mg/L	<0.01	0.04	0.08
Total Coliforms	MPM/100 mL	3094	5803	12584
E. Coli	MPM/100 mL	13	58	492
Thermotolerant Coliforms	MPM/100 mL	68	432	1117
Heterotrophic Plate Count	cfu/1 mL	136	465	1228
Organophosphorus Pesticides	µg/L	Non-detect for all OPPs		

8.2 Baseline Water Quality – Ephemeral Streams

The summary of baseline water quality data from ephemeral stream sample locations LIND02, LIND03, LIND04, LIND05 and LIND06 are presented in the table below:

Table 36: Baseline monitoring results for the Inland Fresh Water locations LIND02 – LIND06 (2024 – 2025)

Island Fresh Waters – Ephemeral (LIND04, LIND05, LIND06)	Unit	20th Percentile	50th Percentile	80th Percentile
Electrical Conductivity	µS/cm	148	384	653
pH	pH units	7.0	8.1	8.5
Dissolved Oxygen	% Saturation	57.6	77.2	91.5
Turbidity	NTU	31.4	62.9	116.4
Total Dissolved Solids	mg/L	198	261	346
Total Suspended Solids	mg/L	<5	10	35.2
Ammonia	mg/L	<0.01	0.03	0.06
Total Nitrite + Nitrite	mg/L	<0.01	0.01	0.026
Total Nitrogen	mg/L	0.40	0.70	1.02
Total Phosphorus	mg/L	0.04	0.10	0.148
Total Coliforms	MPM/100 ml	12420	24,196 upper LOR	24,196 upper LOR
E. Coli	MPM/100 ml	50	243	499
Thermotolerant Coliforms	MPM/100 ml	73	576	4402
Heterotrophic Plate Count	cfu/1 ml	222	1500	2896
Organophosphorus Pesticides	µg/L	<LOR	<LOR	<LOR

8.3 Baseline Water Quality – Marine Control Sites

Baseline monitoring results from control sites WQ3 and WQ4 is presented in the table below:

Table 37: Baseline monitoring results for the Open Coastal Water control locations WQ3 and WQ4 (2024 – 2025)

Coastal/marine waters – Control Sites (WQ3, WQ4)	Unit	20th Percentile	50th Percentile	80th Percentile
Electrical Conductivity	µS/cm	48,830	53,495	56,526
pH	pH units	7.9	8.2	8.2
Dissolved Oxygen	% Saturation	63	71	87
Turbidity	NTU	1.4	5.8	20.4
Total Dissolved Solids	mg/L	35,480	38,200	39,880
Total Suspended Solids	mg/L	<5	<5	8.8
Ammonia	µg/L	<5	<5	30.2
Total Nitrite + Nitrate	µg/L	<2	<2	5.4
Total Nitrogen	µg/L	66	87	136
Filterable Recoverable Phosphorus as P	µg/L	<1	<1	1.2
Total Phosphorus	µg/L	<5	<5	<5
Total Coliforms	MPM/100 ml	39	1160	2008
E. Coli	MPM/100 ml	3	267	552
Thermotolerant Coliforms	MPM/100 ml	<1	5	64
Heterotrophic Plate Count	cfu/1 ml	<1	8	178
Organophosphorus Pesticides	µg/L	<LOR	<LOR	<LOR

8.4 Baseline Water Quality – Marine Impact Sites

Baseline monitoring results from control sites WQ1, WQ2 and WQ5 is presented in the table below:

Table 38: Baseline monitoring results for the Open Coastal Water impact locations WQ1, WQ2 and WQ5 (2024 – 2025)

Coastal/marine waters – Impact Sites (WQ1, WQ2, WQ5)	Unit	20th Percentile	50th Percentile	80th Percentile
Electrical Conductivity	µS/cm	49,120	53,594	56,595
pH	pH units	7.7	8.1	8.2
Dissolved Oxygen	% Saturation	61	73	90
Turbidity	NTU	1.2	4.6	20.2
Total Dissolved Solids	mg/L	35,520	37,900	40,700
Total Suspended Solids	mg/L	<5	<5	8.4
Ammonia	µg/L	<1	3.8	27.0
Total Nitrite + Nitrate	µg/L	<2	<2	5.8
Total Nitrogen	µg/L	72	85	127
Filterable Recoverable Phosphorus as P	µg/L	<1	<1	2
Total Phosphorus	µg/L	<5	<5	<5
Total Coliforms	MPM/100 ml	57	423	1948 upper LOR
E. Coli	MPM/100 ml	4	184	378
Thermotolerant Coliforms	MPM/100 ml	<1	<1	5
Heterotrophic Plate Count	cfu/1 ml	<1	9	70
Organophosphorus Pesticides	µg/L	<LOR	<LOR	<LOR

8.5 Baseline Water Quality – Temperature, Electrical Conductivity and Total Dissolved Solids

Baseline monitoring results from temperature and EC constant monitoring is presented in the table below:

Table 39: Baseline monitoring results for the Open Coastal Water Sonde data (2024 – 2025)

Coastal/marine waters – Jetty Channel	Unit	20th Percentile	50th Percentile	80th Percentile
Electrical Conductivity	µS/cm	51,221	52,334	54,218
Total Dissolved Solids	mg/L	32,962	33,793	35,100

9. CONSTRUCTION / OPERATIONAL PHASE WATER QUALITY MONITORING PROGRAM

Construction and operation of the resort are to be managed such that receiving water quality, both terrestrial and marine, is not degraded beyond background conditions. Discharges from site must not result in:

- Visible contamination of receiving waters.
- Formation of sediment plumes.
- Persistent turbidity increases beyond natural variability.
- Adverse alteration of ambient water quality conditions.

Water quality is to be assessed against baseline water quality monitoring data.

Monitoring and Response Framework

The monitoring and response framework and order of tasks is presented below:

- Monitoring program (what will be measured) – Section 9.1.
- Sampling schedule (when it will be measured) - Section 9.2.
- Assessment methodology (how results will be interpreted) – Section 9.3.
- Trigger values (what benchmarks apply) – Section 9.4.
- Assessment criteria (how significance is determined) – Section 9.5.
- Management triggers (when action is required) – Section 9.6.
- Significant impact definition (when a problem exists) – Section 9.7
- Corrective actions (what action is taken) – Section 9.8.

9.1 Updated Water Quality Monitoring Program

The original Water Quality Monitoring Plan prepared by WEC in 2018 was updated in 2025 by NGH to reflect minor changes in sampling locations and changes to legislation. The updated version (NGH, 2025) is included in Attachment D.

9.2 Sampling Schedule

The sampling schedule, methodology and QA/QC for the Construction / Operational phase water quality monitoring from the NGH (2025) Water Quality Monitoring Plan is considered suitable for ongoing monitoring and is presented in Table 40 below:

Table 40: Construction / Operational Phase Sampling Schedule

Parameter		Analysis	Sampling Interval
Physical	Temperature	In-situ / Automatic	WQ1 – WQ5 and LIND01 Quarterly 2 x Rainfall Events Post Cyclonic Event LIND02 to LIND06 When Possible
	pH		
	Total Suspended Solids		
	Dissolved Oxygen		
	Electrical Conductivity / salinity		
	Turbidity	In-situ	
Chemical	Total Dissolved Solids	Laboratory	
	Total Nitrogen		
	Ammonia		
	Oxidised Nitrogen		
	Total Phosphorus		
	Reactive Phosphorus		
	Organophosphorus Pesticides		
Biological	Faecal Coliforms	Laboratory	
	Heterotrophic Plate Count		
	Total Coliforms		
	E. coli		
	Temperature	Fixed Continuous	Hourly
	Electrical Conductivity	Fixed Continuous	Hourly

9.3 Assessment of Results

The following sections define the methodology for identifying threshold levels and the duration of change in monitored water quality that would constitute a significant impact on receiving environments. The methodology adopts a multiple-lines-of-evidence approach, incorporating:

- Baseline (reference) conditions with the Natural Variability Envelope (NVE) represented at the 20^{th}, 50^{th}, and 80^{th} Percentiles of baseline data.
- Published Guideline Trigger Values (GTV), where available and relevant.
- Site-Specific Trigger Values (SSTVs).
- Magnitude, duration and frequency of exceedance.
- Spatial extent of impact.
- Origin of impact.
- Ecological relevance.

Exceedance of a Trigger Value, including an SSTV or Guideline Trigger Value, does not in itself indicate environmental harm. Trigger values are investigation thresholds used to identify potential impacts requiring further assessment.

9.4 Trigger Values and Threshold Levels

Guideline Trigger Values
ANZG (2018) default guideline values for toxicants are adopted as threshold levels for ammonia and OPPs. The 95% species protection for slightly to moderately disturbed ecosystems was selected for freshwaters and 99% level of species protection adopted for marine waters of the Great Barrier Reef Marine Park (where available).

Table 41: Guideline Trigger Values

Analyte	Unit	Fresh Waters	Marine Waters
Ammonia	mg/L	0.72	0.5
Azinphos methyl	ug/L	0.02	N/A
Chlorpyriphos	ug/L	0.01	0.0005
Diazinon	ug/L	0.01	N/A
Dimethoate	ug/L	0.15	N/A
Fenitrothion	ug/L	0.2	0.001
Malathion	ug/L	0.05	N/A
Parathion	ug/L	0.004	N/A
Profenophos	ug/L	0.02	N/A
Temephos	ug/L	0.05	0.0004

Site-Specific Trigger Values

Site-Specific Trigger Values are set at the 80th Percentile of the baseline values for total suspended solids, turbidity, nutrients (total nitrogen, ammonia, nitrate and nitrite, total phosphorus, reactive phosphorus), organophosphorus pesticides, faecal coliforms, total coliforms and *E. coli*.

Table 42: Site-Specific Trigger Values

Analyte	Unit	Dam	Ephemeral Streams	Marine Control Sites	Marine Impact Sites
Turbidity	NTU	27.8	116.4	20.4	20.2
Total Suspended Solids	mg/L	11	35.2	8.8	8.4
Ammonia	mg/L	0.030	0.06	0.03	0.027
Total Nitrite + Nitrate	mg/L	<0.01	0.026	0.0054	0.0058
Total Nitrogen	mg/L	1.00	1.02	0.136	0.127
Filterable Recoverable Phosphorus as P	mg/L	-	-	0.0012	0.002
Total Phosphorus	mg/L	0.08	0.148	<0.005	<0.005
Total Coliforms	MPM/100 ml	12,584	24,196 upper LOR	2,008	1984 upper LOR
E. Coli	MPM/100 ml	492	499	552	378
Thermotolerant Coliforms	MPM/100 ml	1,117	4,402	64	5
Heterotrophic Plate Count	cfu/1 ml	1,228	2896	178	70
Organophosphorus Pesticides	µg/L	<LOR	<LOR	<LOR	<LOR

Natural Variability Envelope

Physical stress indicators temperature, pH, dissolved oxygen, total dissolved solids and electrical conductivity will be compared against the Natural Variability Envelope (20th, 50th, 80th Percentiles of baseline data).

Trigger values adopted for the dam and ephemeral streams are the baseline 20th, 50th and 80th Percentiles for each analyte presented in Tables 35 and 36.

Trigger values adopted for Coastal Marine Waters are the baseline 20th, 50th and 80th Percentiles for each analyte presented in Tables 37, 38 and 39.

9.5 Assessment Criteria

Results collected during Construction and Operational Phase monitoring shall be assessed against Baseline Conditions, the Natural Variability Envelope (NVE), Site-Specific Trigger Values (SSTVs) and Guideline Trigger Values (GTVs).

Exceedance of a trigger value does not automatically indicate environmental harm or a significant impact. Exceedances shall be evaluated using the following impact assessment criteria.

Magnitude of Change

Magnitude refers to the degree to which measured water quality differs from Baseline Conditions, the NVE, SSTVs or GTVs.

Assessment should consider:

- The extent of exceedance above the applicable trigger value.
- The degree of departure from Baseline Conditions.
- Whether the exceedance represents a minor fluctuation or a substantial change in water quality.

Larger exceedances are generally associated with an increased likelihood of environmental impact and higher management response levels.

Duration of Change

Duration refers to the length of time water quality remains outside Baseline Conditions, the NVE or applicable trigger values.

Assessment should consider:

- Whether the exceedance is temporary or sustained.
- The rate at which water quality returns to Baseline Conditions.
- The number of consecutive monitoring events during which exceedances are observed.

Short-duration exceedances associated with natural events are generally of lower significance than persistent departures from Baseline Conditions.

Frequency of Exceedance

Frequency refers to how often exceedances occur over the monitoring period.

Assessment should consider:

- Single isolated exceedances.
- Repeated exceedances across multiple monitoring events.
- Persistent or recurring exceedances indicating an ongoing source of impact.

Increasing frequency generally indicates an increased likelihood that the exceedance is associated with site activities and may require management intervention.

Spatial Extent

Spatial extent refers to the geographic distribution of observed water quality changes.

Assessment should consider:

- Whether exceedances are confined to a single monitoring location or occur across multiple locations.
- The relationship between upstream, downstream, control and impact monitoring sites, where applicable.

- Whether impacts are localised or evident throughout receiving environments.

Impacts observed only at impact locations may indicate a site-related source, whereas similar responses at both control and impact locations may indicate regional or naturally occurring influences. Due to complex environmental conditions, care must be taken when evaluating water quality data from impact locations against control locations to ensure the water quality data is comparable.

Ecological Relevance

Ecological relevance refers to the likelihood that observed water quality changes may adversely affect environmental values.

Assessment should consider:

- Potential adverse effects on aquatic flora and fauna.
- Potential degradation of aquatic habitat quality.
- Potential alteration of ecosystem processes.
- The sensitivity of receiving environments and ecological receptors.

An exceedance may be considered of low significance where no adverse ecological consequence is expected, even if a trigger value has been exceeded.

Overall Impact Assessment

The significance of a water quality exceedance shall be determined through consideration of all assessment criteria collectively. The significance of an exceedance generally increases where:

- The magnitude of exceedance is large.
- Exceedances are sustained or recurring.
- Impacts occur across multiple monitoring locations.
- Site activities are identified as the likely cause.
- Adverse ecological effects are observed or considered likely.

The outcomes of the impact assessment shall be used to determine the appropriate management response and trigger level in accordance with Section 9.6.

9.6 Corrective Action / Management Triggers

Management trigger levels are based on the magnitude, duration, frequency, spatial extent and potential ecological significance of departures from Baseline Conditions, SSTVs, GTVs and the NVE.

Consideration of the influence of short-duration exceedances associated with natural environmental processes shall be undertaken. Examples may include:

- Rainfall and flood events.
- Cyclonic activity.
- Wind-driven turbidity events.

- Tidal fluctuations.
- Coral spawning events.
- Naturally occurring algal blooms.

Level 1 – Alert

A Level 1 Alert is triggered where one or more of the following occurs:

- An exceedance of an SSTVs, GTVs or the NVE is recorded.
- An exceedance is minor in magnitude and limited in duration (single event).
- The exceedance is not observed at multiple monitoring locations.
- No adverse ecological effects are evident or anticipated.

Response:

- Review monitoring results and field observations.
- Inspect relevant erosion, sediment and water quality controls. Where possible, confirm source of water quality impact (site derived, natural, other anthropogenic).
- Confirm data quality and sampling procedures.
- Increase surveillance and consider additional monitoring where appropriate.

Level 2 – Action

A Level 2 Action is triggered where impact is attributed to site activities and one or more of the following occurs:

- Exceedances are repeated or sustained.
- Exceedance magnitude is substantial relative to Baseline Conditions or trigger values (>250% of the applicable trigger value).
- Water quality remains outside the NVE for an extended period.
- Impacts extend beyond the immediate source area.

Response:

- Undertake investigation and root cause analysis.
- Implement corrective actions to eliminate or reduce the source of impact.
- Increase monitoring frequency to monthly until water quality returns to Baseline Conditions.
- Review the adequacy of erosion, sediment and water quality controls and modify where required.

Level 3 – Escalated Response

A Level 3 Escalation is triggered where impact is attributed to site activities and one or more of the following occurs:

- Exceedances are persistent and are not consistent with expected natural variability.
- A sustained shift in water quality outside Baseline Conditions and the NVE is observed.
- Impacts are spatially extensive and occur across multiple receiving environments.
- Guideline Trigger Values or SSTVs are exceeded to a degree indicating likely environmental harm.
- Measurable adverse ecological effects are observed or are reasonably likely to occur.
- A statistically significant and persistent trend away from Baseline Conditions is identified and attributable to site activities.

Response:

- Immediately implement management measures to stop or minimise the impact.
- Notify relevant management personnel and regulatory authorities where required.
- Undertake remediation and environmental rehabilitation as appropriate.
- Continue increased monitoring frequency until recovery toward Baseline Conditions is demonstrated.
- Review and revise management plans, controls and construction practices to prevent recurrence.
- Engage subject matter expert to review and revise.

9.7 Significant Impact Determination

A Significant Impact is considered to have occurred where the weight of evidence indicates that site activities have caused, or are likely to cause, a sustained deterioration in water quality beyond natural variability resulting in actual or potential adverse effects on environmental values.

The criteria below are consistent with the Level 3 escalation criteria in Section 9.6 but are applied for the specific purpose of determining whether a Significant Impact has occurred. In determining significance, consideration shall be given to:

- Magnitude of exceedance relative to Baseline Conditions, SSTVs, GTVs and the Natural Variability Envelope.
- Duration of exceedance and recovery time.
- Frequency and recurrence of exceedances.
- Spatial extent of impacts.
- Whether impacts are attributable to site activities.
- Actual or likely adverse ecological effects.

A Significant Impact will generally be identified where one or more of the following occur:

- Exceedances persist for three or more consecutive monitoring events.
- Water quality remains outside the Natural Variability Envelope for an extended period.
- Impacts are observed across multiple receiving environments.
- A statistically significant and persistent trend away from Baseline Conditions is identified.
- Measurable adverse ecological effects are observed or are reasonably likely to occur.

Determination of a Significant Impact shall be based on the collective weight of evidence and professional judgement, rather than any single trigger value exceedance.

9.8 Corrective Actions

Corrective actions are to be commensurate to the type and magnitude of water quality issue and resulting environmental impact. In general, corrective actions involve: (1) immediately stopping the impact where practicable, (2) isolating, containing and rectifying the issue, and (3) implementing additional controls or modifying project activities to prevent recurrence. These corrective actions are discussed below.

Immediate Actions

Implemented as soon as a trigger is exceeded and attributed to site activities:

- Cease or modify relevant works contributing to the impact.
- Isolate the source area (e.g. bunding, diversion drains).
- Contain affected water (e.g. hold within sediment basins or excavations).

- Deploy temporary controls, such as sediment socks / silt curtains, inlet protection, temporary bunds or check dams.
- Inspect all erosion and sediment controls (ESC) across the site.
- Notify the Environmental Representative / Site Supervisor within 1 business day.

Investigation and Root Cause Analysis

Where repeated exceedances are measured:

- Identify the source and pathway of impact (e.g. stockpile erosion, dewatering discharge, batters).
- Review recent rainfall or tidal conditions, construction staging and disturbed areas, adequacy of installed controls vs design, inspection records.
- Re-confirm whether exceedance is construction-related, or attributable to natural/background variation

Corrective actions include, but are not limited to the following:

Table 43: Corrective Actions

Issue	Response
TSS / Turbidity Exceedances	• Repair or replace failed controls. • Increase capacity or redundancy of controls including larger sediment basins or sediment traps. • Improve soil stabilisation by applying mulch, hydromulch, jute matting, erosion control blankets etc. • Reduce exposed soil areas by staging works or limiting clearing footprint. • Reduce runoff velocity with check dams, level spreaders, flow control structures etc. • Where possible stage works during the dry season. • Stabilise hillslopes.

Issue	Response
Non-compliant water discharge	• Hold water in sediment tanks and add flocculant • pH adjustment through lime dosing or neutralisation system • Hydrocarbon removal through oil / water separator and use of absorbent booms and pads. • Use geofabric filtration bags.
Exceedance associated with dewatering	• Reduce discharge rate to allow for adequate treatment • Re-route discharge to vegetated areas or sediment basins and away from drainage lines. • No discharge during unsuitable conditions.
Surface water flow	• Install or upgrade diversion drains and bunds or cut off drains • Regrade disturbed areas to avoid concentrated flow. • Stabilise flow paths to prevent scour • Direct runoff to treatment controls prior to discharge to waterways.
Contamination and spill response	• Immediately stop the source. • Deploy spill kit. • Excavate and remove contaminated material. • Review chemical storage procedures.
Coastal Environments	• Instal or extend silt curtains • Adjust timing of works to suitable tidal windows / tidal stage • Relocate discharge points away from sensitive receptors including coral and seagrass. • Change technique to one with less disturbance

Issue	Response
System Improvements	• Review and revise erosion and sediment control plan, site procedures and staging plan. • Additional supervision during high risk works • Update risk assessments • Implement additional controls ahead of the onset of wet season conditions. • Annual Water Quality Program Review.

10. REFERENCES

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11. LIMITATIONS

Catchment Solutions Pty Ltd has prepared according to the agreed scope of work (J1228) outlined in for Well Smart Investment Holdings (Bris) Pty Ltd. It's intended solely for the use of the Corporation for this specific project and its stated purpose.

The report is not meant for use in other projects or by third parties. Catchment Solutions relied on information from the client, their agents, and third parties to create the report. Reading the report in its entirety is recommended, and it should not be used in parts or different contexts, nor by third parties. The report is not equivalent to legal advice; only qualified legal professionals can provide legal advice.

The report's details are based on information provided for laboratory analysis by ALS and Mackay Regional Council Laboratory.

Catchment Solutions' advice relies on laboratory analysis and project information. However, the accuracy of the advice might be limited by unforeseen factors and undiscovered variations in surface water conditions.