

Annual Monitoring Report (AMR)

Barramundi Adventures Darwin Pty Ltd

February 2024 – February 2025

Version 3 – Post EPA Feedback

Licensee:	Barramundi Adventures Darwin Pty Ltd
EPL Licence Number:	EPL323-01
Registered Business Address:	Barramundi Adventures Darwin Pty Ltd 1612 William Access Berry Springs NT 0838
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EPL Anniversary date:	25 th February
EPL Commencement date:	25/02/2022
EPL Expiry date:	24/02/2027
Date of submission:	5/03/2025
Version:	1
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The report utilises information gained from environmental monitoring conducted by:	EcOz Environmental Consulting

This report contains the results of water quality monitoring conducted by Barramundi Adventures Darwin for the reporting period **Feb 2024-Feb 2025**.

Purpose

This Monitoring Report is prepared in accordance with the following **EPL323-01** conditions:

Condition 41

The licensee must complete and provide to the NT EPA a Monitoring Report, as prescribed by this licence, within 10 business days after each anniversary date of this licence.

Condition 42

The licensee must ensure that each Monitoring Report:

- is prepared in accordance with the requirements of the NT EPA 'Guideline for Reporting on Environmental Monitoring'
- includes a tabulation of all monitoring data required as a condition of this licence
- includes long term trend analysis of monitoring data to demonstrate any environmental impact associated with the activity over a minimum period of three years (where the data is available)
- includes an assessment of environmental impact from the activity

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Abbreviation	Full Term
AMR	Annual Monitoring Report
BAD	Barramundi Adventures Darwin
BOM	Bureau of Meteorology
Chl-a	Chlorophyll-a
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DO	Dissolved Oxygen
DP	Discharge Point
DPA	Discharge Point A
DPB	Discharge Point B
EC	Electrical Conductivity
EPL	Environment Protection Licence
EPA	Environment Protection Authority
FRP	Filterable Reactive Phosphorus
G8150369	Blackmore River Compliance Site (Downstream)
G8155543	Blackmore River Reference Site (Upstream)
NT	Northern Territory
NT EPA	Northern Territory Environment Protection Authority
NH ₃	Ammonia (as Nitrogen)
NO _x	Nitrate + Nitrite (as Nitrogen)
PO ₄ as P	Orthophosphate (as Phosphorus)
Q	Quarterly
SSTV	Site-Specific Trigger Value
Temp	Temperature
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
Tur	Turbidity
µS/cm	Microsiemens per centimetre
mg/L	Milligrams per litre
mg/m ³	Milligrams per cubic metre
NATA	National Association of Testing Authorities
WMPC Act	Waste Management and Pollution Control Act 1998

Introduction

This Annual Monitoring Report (AMR) has been developed to meet the requirements of Environmental Protection Licence (EPL) **EPL323-01** issued to **Barramundi Adventures Pty Ltd** on **25/02/2022**.

The AMR format follows the requirements contained within the *Guideline for Reporting on Environmental Monitoring* NT EPA. Which was developed on information contained within the:

- ANZECC & ARMCANZ, 2000: *Australian Guidelines for Water Quality Monitoring and reporting*, National Water Quality Management Strategy Paper No.7
- Environment Protection Authority, South Australia, 2007: *Regulatory Monitoring and Testing – Reporting Requirements*

Regulatory Landscape

Environmental Protection Act 2019 (Northern Territory)

This report follows the principles established by the *Environment Protection Act 2019* (EP Act)

Waste Management and Pollution Control Act (Northern Territory)

Under the *Waste Management and Pollution Control Act* (WMPC Act), the NT EPA may require an environmental monitoring report to be submitted in accordance with

- A condition of an environment protection licence or approval issued under section 34 of the WMPC Act
- A condition of notice to carry out an environmental audit program issued under section 48 of the WMPC Act
- A requirement of an authorised officer direction issued under section 72 of the WMPC Act
- A requirement of a pollution abatement notice issued under section 77 of the WMPC Act.

Site Operations and Back Ground Overview

Barramundi Adventures operates under lease on the premises at Section 01612, Hundred of Ayres, Plan(s) DBK02066, located at 150 William Road, Berry Springs, NT 0838.

Prior to Barramundi Adventures leasing this site, it consisted of a series of old, disused aquaculture ponds that had been used in the past to grow Barramundi and Prawns for sale to the local and national markets.

Barramundi Adventures now operates the site in a multi-use fashion, with a section of the site utilised for a popular tourist venture where patrons can fish for Barramundi stocked into one of the ponds while enjoying drinks in relative comfort. The remaining portion of the site, consisting of four expansive ponds, is utilised to grow Barramundi for the tourist venture and/or prawns for sale to the general public. Currently, CSIRO has developed a relationship with the owner to utilise three of these ponds for the evaluation of low-input prawn farming.

The Northern Territory once had a prawn farming industry; however, over time, this has disappeared, and CSIRO is utilising the ponds to understand the complexities of farming prawns in the Northern Territory and the potential of low-input prawn farming in the region. Low-input prawn aquaculture incorporates extremely low stocking densities compared to traditional commercial prawn farming operations and relies on the natural productivity of the earthen ponds to supplement the prawns' diet, thereby reducing feed rates and costs. These trials are in their third year.

The aquaculture operation is not a high-yielding farm and conducts modest diet supplementation for its low-biomass stock, with water quality and pond biome health conducive to the project's success. During the project assessment stage, the NT EPA deemed that the operations described above as a Scheduled Activity and therefore required an Environmental Protection Licence.

EPA Justification for EPL

Scheduled Activity	Collecting, transporting, storing, recycling, treating, or disposing of a listed waste (as per table 1) on a commercial or fee service basis, other than in or for the purpose of a sewage treatment plant. Operating premises, other than a sewage treatment plant, associated with collecting, transporting, storing, recycling, treating, or disposing of a listed waste (as per table 1) on a commercial fee for service basis.
Description	Barramundi Adventures Darwin Pty Ltd operates a recreational barramundi fishing facility. Operations result in the generation of a listed waste (animal effluent and residues) . The licenced activity comprises the disposal of animal effluent and residues from Authorised Discharge Points to the Blackmore estuary .

Environment Protection Licence 323-01

Table 1 – Listed Wastes Authorised to be Handled

Listed Waste	Collection	Transport	Storage	Treatment	Recycling	Disposal
Animal effluent and residues	✗	✗	✗	✗	✗	✓

✓ Activity authorised by this licence

✗ Activity not authorised by this licence

Executive Summary

Site Operations Summary

Barramundi Adventures Darwin (BAD) continued operations as a low-intensity aquaculture and recreational fishing facility at Berry Springs, NT, in accordance with Environmental Protection Licence (EPL) EPL323-01. The site consists of a tourist fish-out pond and multiple production ponds used for barramundi and prawn farming.

During the 2024/25 reporting period, key site activities included:

- Year-round barramundi stocking and maintenance in the tourist pond and selected production ponds.
- Prawn production, with the second crop harvested in April 2024 and a third cohort stocked in November 2024 for harvest in April/May 2025.

Discharges & Environmental Compliance

Water discharges from the site were limited to rainfall-driven overflow and controlled harvest-related releases.

- Rainfall discharge occurred in February/March 2024.
- Harvest discharge was recorded in April 2024, associated with full pond drainage for prawn harvesting.

Monitoring Overview

Environmental monitoring was conducted in accordance with EPL323-01, with two sampling events:

- **29 February 2024** – Sampling coincided with a rainfall-driven discharge event.
- **9 April 2024** – Sampling coincided with a harvest-related discharge event.

Water quality monitoring was conducted at four locations:

- **DPA & DPB** – Discharge points receiving water from the production ponds.
- **G8155543 (Upstream)** – A background monitoring site in the Blackmore River.
- **G8150369 (Downstream)** – The compliance monitoring site in the Blackmore River.

Key Findings from 2024 Monitoring Events

Field Monitoring

- Dissolved Oxygen (DO) SSTV exceedance: DO levels at the Blackmore River sites (G8155543 & G8150369) were below the site-specific trigger value (SSTV) of 75-100% saturation in both monitoring events.
- Discharge Points showed higher DO than the Blackmore River: DO levels at DPA and DPB were higher than at the Blackmore River sites, suggesting site discharge was not responsible for the low DO in the river.

Laboratory Monitoring (Nutrient & TSS Analysis)

29 February 2024 Sampling:

SSTV exceedances at Downstream Compliance Point (G8150369):

- Ammonia (0.03 mg/L, SSTV = 0.026 mg/L) exceedance of 0.004
- Chlorophyll-a (3 mg/m³, SSTV = 2 mg/m³) exceedance of 1 mg/m³

Exceedances at Upstream Site (G8155543):

- **TSS** (11 mg/L, SSTV = 10 mg/L) – exceedance of 1 mg/L
- TSS at downstream site (G8150369) was below SSTV, indicating natural settlement of suspended solids before reaching the compliance point.

*9 April 2024 Sampling (Harvest Discharge):***Multiple exceedances at the downstream compliance point (G8150369):**

- **Ammonia** (0.11 mg/L, SSTV = 0.026 mg/L), exceedance of 0.084 mg/L
- **Total Nitrogen** (0.7 mg/L, SSTV = 0.300 mg/L), exceedance of 0.04 mg/L
- **Total Suspended Solids (TSS)** (108 mg/L, SSTV = 10 mg/L), exceedance of 98 mg/L
- **Total Phosphorus (TP)** (0.12 mg/L, SSTV = 0.030 mg/L), exceedance of 0.09 mg/L

Exceedance at Upstream Site (G8155543):

- Orthophosphate (0.02 mg/L, SSTV = 0.009 mg/L), exceedance of 0.11 mg/L

See:

- **Water Quality Monitoring**
- **Temporal and Trend Analysis**
- **SSTV exceedance investigation**
- **And Non-compliance Incident Report for additional information.**

Monitoring Objectives

Monitoring is conducted as per conditions contained within the **EPL 323-01: Attachment 2: Water Quality Monitoring Program** (see image 1 and table 2). The main purpose of this WQMP is to set out the monitoring and reporting activities to be undertaken to maintain compliance with **EPL323** requirements and to ensure that BAD operations do not impact downstream receiving environments.

Monitoring plan

The monitoring plan includes four sampling locations (image 1). These locations are:

- **Authorised Discharge Point A (DPA)** – receives discharge from ponds 2, 3, 4 and 5
- **Authorised Discharge Point B (DPB)** – receives discharge from ponds 1 and 2.
- **G8155543** – Blackmore River approx. 1km upstream of Discharge Point A
- **G8150369** – Blackmore River approx. 1km downstream of the intake point, also compliance point.

Image 1: Map of Barramundi Adventures Darwin layout, monitoring sites and receiving waterways

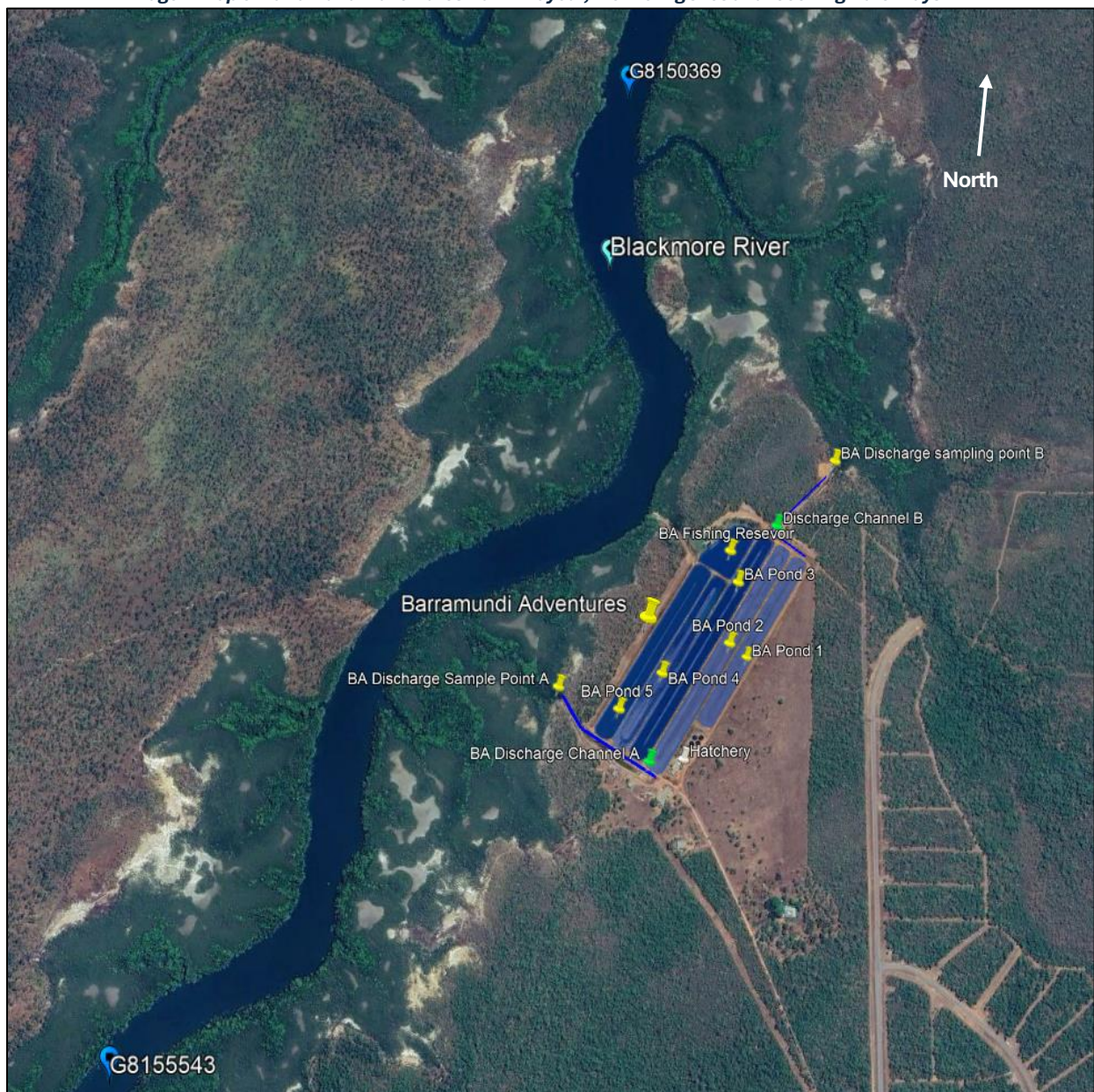


Table 2: Water Quality Monitoring Program (as contained within the attachment 2 of EPL 323-01)

Site Code Latitude Longitude				Authorised Discharge Points		Monitoring Points		Compliance Point	
				DPA	DPB	Hatchery	G8155543	G8150369	SSTVs ¹
				-12.706225	-12.700979	-12.707707	-12714234	-12.690000	
				130.956850	130.963476	130.959962	130.947110	130.959000	
Parameter	Abbr.	Units	Analysis	Monitoring Frequency					
Field Measurements									
Flow	Flow	kL/day	Automatic in situ	C	C	N/A	N/A	N/A	N/A
Potential of Hydrogen	pH	Units	In situ	M	M	M	Q	Q	6.0 - 8.5
Electrical Conductivity	EC	µs/cm							N/A
Dissolved Oxygen	DO	% sat.							75 -100%
Turbidity	Tur	NTU							N/A
Temperature	Temp	°C							N/A
Laboratory Parameters									
Total Suspended Solids	TSS	mg/L		M	M	M	Q	Q	10
Total Nitrogen	TN								0.300
Total Phosphorus	TP								0.030
Ammonia	NH ₃								0.026
Nitrate + Nitrite	NO _x								NA
Filterable reactive phosphorous	FRP								0.009
Chlorophyll-a	Chl-a								0.002
KEY: C = Continuous during discharge, intervals must not be less than daily. M = Monthly during discharge and at least once per discharge event. Q = Quarterly during discharge and at least once per discharge event. ¹ Site – specific trigger values as per BAD Water Quality Monitoring Plan (EcOz 2022) N/A – Not Applicable									

Note: Sampling of tide -affected monitoring points must be conducted on an outgoing tide.

Discharges

Receiving waters

Discharges from the site report to the Blackmore River approximately 1.5kms below the Southport township within a tidal region of the Blackmore River Estuary. During the Wet Season, water within the estuary within the region of the discharge location can be predominately freshwater to light brackish, whilst during the dry season receiving waters are at near sea levels >50,000µS/cm.

The Blackmore River is an extensive catchment area of over 63,500 hectares and has an annual rainfall of 1837mm (*BOM- Southport NT*), with potential flows for the system exceeding 1,100,000 megalitres.

According to the *Blackmore River and Estuary report card 2009*, over 7700 tonnes of suspended solids and 8.7 tonnes of phosphorous are discharged from the Blackmore River into the Darwin estuary each year.

Table 3: Blackmore River catchment loads (2006-2007) Blackmore River and Estuary report card 2009 -
https://denr.nt.gov.au/_data/assets/pdf_file/0020/254711/blackmore_river.pdf

Blackmore River whole catchment load for an average wet season	
Total Suspended Solids (tonnes/year)	7,740
Total Nitrogen (tonnes/year)	191
Total Phosphorous (tonnes/year)	8.7
Total catchment area (ha) excludes Darwin River dam catchment	63,500

At the site, there are two types of discharges, **Rainfall and Harvest**. These are explained in the following sections.

Rainwater discharge

During extended periods of rainfall, accumulated rainwater increases the water level in the ponds, eventually exceeding their capacity.

To prevent structural breaches, the ponds are discharged once either the water level reaches a predetermined point, or, if extremely rainfall is expected in the near future. Given that freshwater is less dense than saltwater, it predominantly accumulates at the surface and can be removed using tiered pond gates whereby water is removed only from the top ~10cm of the water column. Rainfall discharge events are assumed to primarily release freshwater although data is insufficient to confirm this. This discharge exits the ponds and flows along discharge channel A and discharge channel B and enters the Blackmore River at **DP1** and **DP2**. During such periods of heavy rainfall, it is assumed that the Blackmore River is also experiencing increased flow.

Rainfall and discharge volumes reporting period 24/25

Table 4 outlines the methodology used for quantifying discharge volumes out of the ponds. Each pond is fitted with a standard 12-inch butterfly valve which operates as the outlet for each pond and allows for the control and rate of discharge. Flows were measured at various valve positions to quantify discharge volumes.

Table 4: Methodology for quantifying discharge volumes from production ponds

Pond Valve Discharge Rates			
Valve Notch #	Valve Opening (%)	Discharge Rate (L/min)	Discharge Rate (KL/day)
Notch 1	10%	643.43	926.54
Notch 2	20%	1270.65	1829.73

Please note that only one rainfall discharge occurred across a four-day period during the 2024/25 reporting period, see **table 5** below:

Table 5: Rainfall discharge events (reporting period 24/25)

Rainfall Discharge event	Start date	End date
1	26/02/2024	1/03/2024

Table 6 below highlights the rainfall and evaporation details for the site across the 24/25 season and highlights the discharge volumes directly related to rainfall.

Table 6: Site Rainfall, Evaporation, and rainfall discharge volumes – 2024/25

Time	Rainfall	Evaporation	Rainfall - Evaporation Balance	Rainfall Discharge DPA	Rainfall Discharge DPB
	(mm)	(mm)	(mm)	(ML)	(ML)
Feb-24	344.3	182.5	161.8	1784	4459.52
Mar-24	242.5	159.5	83	7135	17838.08
Apr-24	80	175.6	-95.6	No discharge occurred throughout this period	
May-24	-	189.1	-189.1		
Jun-24	-	209.6	-209.6		
Jul-24	-	201.7	-201.7		
Aug-24	-	211.9	-211.9		
Sep-24	-	224.4	-224.4		
Oct-24	107	232.3	-125.3		
Nov-24	122	243.5	-121.5		
Dec-24	275.5	217.3	58.2		
Jan-25	200.5	197.8	2.7		
Total	1371.8 mm	2445.20 mm	-1073.4 mm	8,919 ML	22,297.60 ML

Harvest discharge

Harvest discharge occurs when ponds are drained to harvest stock, primarily prawns. During this process, the ponds are fully drained, and the discharge water flows through Discharge Channels A and B, ultimately reaching Discharge Points DP1 and DP2. (see image 1)

While harvest discharge can take place at any time of the year, it is primarily associated with prawn harvesting, which typically occurs between April and June.

During the 2024/2025 reporting period, three ponds (Ponds 1, 2, and 4) were harvested, all in April. Ponds 3 and 5 remained full throughout the reporting period. See **table 7** for volumes.

Table 7: Pond Volumes, Harvest dates and volumes discharged during harvest

Pond ID	Metres cubed	Megalitres	Harvest date	Discharge Volume
Pond 1	18,800	18.80	09/4/2024	18.80ML
Pond 2	38,100	38.10	11/4/2024	38.10ML
Pond 3	38,100	38.10	N/A	Not harvested
Pond 4	28,200	28.20	27/4/2024	28.20ML
Pond 5	28,200	28.20	N/A	Not harvested
Total Harvest Discharge 24/25 reporting period				85.10ML

Water Quality monitoring 2024/25 reporting period

Water quality monitoring of the Blackmore River was carried out on two occasions throughout the period with samples sent to a NATA accredited laboratory for analysis for all parameters listed according to the Water Quality Monitoring Program seen within **table 2 of the EL 323-01**.

Water Quality Monitoring Method

Within 30 days of a discharge event occurring (and whilst the discharge is continuing), sampling is conducted. During the reporting period 24/25 EcOZ an environmental consultant was used to conduct sampling.

Water Sampling Process Overview

The water sampling steps include:

- **Pre-Sampling Preparation** – Reviewing site conditions, identifying sampling locations, ensuring appropriate laboratory bottles are available, and preparing necessary equipment and containers.
- **Field Sampling** – Water samples are collected from designated points using standardised techniques to prevent contamination.
- **Field Water Quality Measurements** – Recording on-site parameters such as temperature, pH, dissolved oxygen, salinity, and turbidity using portable meters.
- **Lab sampling** – water samples are collected from all designated points using standardised techniques to prevent contamination.
- **Sample Preservation & Handling** – samples are labelled and stored within a chilled esky to maintain sample integrity.
- **Laboratory Analysis** – Samples are sent to an accredited laboratory (ALS Smithfield NSW) for chemical, biological and physical analysis.
- **Chain of Custody Documentation** – Documentation is completed by the consultant to track sample handling and transport, ensuring traceability from collection to laboratory analysis. A chain of custody report is then received from the laboratory on arrival of the samples to the laboratory.
- **A certificate of Analysis** – is received back from the laboratory, and it is assessed and the results contained are entered into the database.

Discussion of water quality monitoring 2024/25

During the 2024/25 reporting period, two water quality sampling events were conducted in accordance with EPL 323-01 requirements. The first sampling event occurred on 29 February 2024, coinciding with a rainfall-driven discharge event. The second sampling event was conducted on 9 April 2024, during a harvest-related discharge, when prawn production ponds were drained. Both events included field measurements and laboratory analysis at four monitoring locations: two discharge points (DPA, DPB) and two compliance sites (upstream G8155543, downstream G8150369).

Field Monitoring

Field monitoring was conducted on two occasions during the 2024/25 reporting period in conjunction with laboratory sampling events.

1. **29 February 2024** – during a rainfall-driven discharge event.
2. **09 April 2024** – during a harvest discharge event.

Field measurements were collected using a YSI Pro Quatro handheld meter at four monitoring locations:

- DPA (Discharge Point A)
- DPB (Discharge Point B)
- G8155543 (Upstream – Blackmore River reference site)
- G8150369 (Downstream – Compliance monitoring site)

The parameters measured included **temperature (°C)**, **dissolved oxygen (% saturation)**, **pH (pH units)**, **electrical conductivity (EC, µS/cm)**, and **turbidity (NTU)**. Results are summarised in Table 8.

Table 8: Field Monitoring Results (February & April 2024)

Site ID	Date sampled	Temp (°C)	DO (%sat)	pH (pH units)	EC (µS/cm)	Turbidity (NTU)
DPA	29/2/2024	35.2	82.5	7.63	1131	10.4
DPB	29/2/2024	32.8	58.6	7.01	6376	10.9
G8155543 (US)	29/2/2024	31.1	49.3*	7.29	2541	17.9
G8150369 (DS)	29/2/2024	31.0	49.3*	7.11	13055	7.61
DPA	09/04/2024	29.32	97.7	7.18	23370	0.2
DPB	09/04/2024	30.3	96.3	7.52	19880	11.1
G8155543 (US)	09/04/2024	29.9	73.2*	6.93	34667	11.3
G8150369 (DS)	09/04/2024	30.2	76.1	7.33	45058	78.3

**DO values below SSTVs (See Table 2).*

Tides at time of Sample

Table 9: Tide estimates at time of sampling

Site ID	Date	Time	Summary of tide at time of sampling
G8155543 (US)	29/02/2024	09:55	2 hours after high tide, on the falling tide ~5.2 to 5.4 m
G8150369 (DS)	29/02/2024	11:51	3 hours 53 minutes after high tide, ~3.2–3.4 m
G8155543 (US)	09/04/2024	08:13	3.5 hours after low tide, on the rising tide ~5.3 to 5.6 m
G8150369 (DS)	09/04/2024	08:27	3 hours 45 mins after low tide, ~5.8–6.1 metres

Field Sampling Discussion

29 February 2024 Sampling Results

Temperature (°C)

- **Range:** 31.0°C – 35.2°C
- **Highest:** DPA (35.2°C)
- **Lowest:** G8150369 (Downstream, 31.0°C)
- **Upstream vs. Downstream:** 31.1°C → 31.0°C

Dissolved Oxygen (DO, % Saturation)

- **Range:** 49.3% – 82.5%
- **Highest:** DPA (82.5%)
- **Lowest:** G8155543 (Upstream) & G8150369 (Downstream) (49.3%) – exceeded SSTV threshold
- **DPB DO:** 58.6%

pH (pH Units)

- **Range:** 7.01 – 7.63
- **Highest:** DPA (7.63)
- **Lowest:** DPB (7.01)
- **Upstream vs. Downstream:** 7.29 → 7.11 (Within SSTVs)

Electrical Conductivity (EC, $\mu\text{S/cm}$)

- **Range:** 1131 – 13055 $\mu\text{S/cm}$
- **Lowest:** DPA (1131 $\mu\text{S/cm}$)
- **Highest:** G8150369 (Downstream, 13055 $\mu\text{S/cm}$)
- **Upstream vs. downstream:** 2541 → 13055 $\mu\text{S/cm}$

Turbidity (NTU)

- **Range:** 7.61 – 17.9 NTU
- **Highest:** G8155543 (Upstream, 17.9 NTU)
- **Lowest:** G8150369 (Downstream, 7.61 NTU)
- **Upstream v Downstream:** 17.9 → 7.61 NTU

09 April 2024 Sampling Results

Temperature ($^{\circ}\text{C}$)

- **Range:** 29.32 $^{\circ}\text{C}$ – 30.3 $^{\circ}\text{C}$
- **Highest:** DPB (30.3 $^{\circ}\text{C}$)
- **Lowest:** DPA (29.32 $^{\circ}\text{C}$)
- **Upstream v Downstream:** 29.9 → 30.2 $^{\circ}\text{C}$

Dissolved Oxygen (DO, % Saturation)

- **Range:** 73.2% – 97.7%
- **Highest:** DPA (97.7%)
- **Lowest:** G8155543 (Upstream, 73.2%) – exceeded SSTV threshold
- **Upstream v Downstream:** 73.2 → 76.1% DO

pH (pH Units)

- **Range:** 6.93 – 7.52
- **Highest:** DPB (7.52)
- **Lowest:** G8155543 (Upstream, 6.93)
- **Upstream v Downstream:** 6.93 → 7.33 pH units

Electrical Conductivity (EC, $\mu\text{S/cm}$)

- **Range:** 19,880 – 45,058 $\mu\text{S/cm}$
- **Lowest:** DPB (19,880 $\mu\text{S/cm}$)
- **Highest:** G8150369 (Downstream, 45,058 $\mu\text{S/cm}$)
- **Upstream v Downstream:** 34,667 v 45,058 $\mu\text{S/cm}$

Turbidity (NTU)

- **Range:** 0.2 – 78.3 NTU
- **Lowest:** DPA (0.2 NTU)
- **Highest:** G8150369 (Downstream, 78.3 NTU)
- **Upstream v Downstream:** 11.3 → 78.3 NTU

SSTV exceedances - Field Monitoring

Field monitoring conducted during the 2024/25 reporting period identified exceedances of Site-Specific Trigger Values (SSTVs) for Dissolved Oxygen (DO) at the two Blackmore River monitoring locations (G8155543 Upstream and G8150369 Downstream).

Exceedances occurred in both sampling events.

Non-Compliance Findings:

1. Dissolved Oxygen (DO) Below SSTV

SSTV for DO: 75-100% Saturation

29 February 2024 Sampling:

- **G8155543 (Upstream): 49.3%** (*Below SSTV, non-compliant*)
- **G8150369 (Downstream): 49.3%** (*Below SSTV, non-compliant*)

9 April 2024 Sampling:

- **G8155543 (Upstream): 73.2%** (*Below SSTV, non-compliant*)

Discussion of Field sampling non-compliances (Dissolved Oxygen)

29 February 2024 Sampling Event

During the **29 February 2024** sampling event, **Dissolved Oxygen (DO)** levels at both the upstream (G8155543) and downstream (G8150369) sites were recorded at **49.3% saturation**, which is below the Site-Specific Trigger Value (SSTV) range of **75–100% saturation**. This indicates that background conditions in the Blackmore River were naturally experiencing low DO at the time of sampling, as the upstream location is not influenced by site operations.

In contrast to the Blackmore River results, the **DO levels at the discharge points (DPA and DPB)** were higher, with:

- **DPA recording 82.5% saturation**
- **DPB recording 58.6% saturation**

These results suggest that the site's outflow did not contribute to the low DO observed in the Blackmore River, as the discharge points had higher DO than both background river sites.

9 April 2024 Sampling Event

During the **9 April 2024** sampling event, **DO at the upstream site (G8155543) was recorded at 73.2% saturation**, which is slightly below the SSTV range of **75–100% saturation**. The downstream site (G8150369) recorded **76.1% saturation**, which is **within the SSTV range**.

The discharge points again recorded higher DO than the background river sites, with:

- **DPA at 97.7% saturation**
- **DPB at 96.3% saturation**

These results reinforce the findings from the February 2024 sampling event, where the Blackmore River was already running with low DO levels, and site discharge had higher oxygen content than the river itself. This suggests that the site's outflows were not the cause of the low DO recorded at the compliance monitoring location (G8150369). See SSTV Exceedance Investigation for additional assessment.

Laboratory monitoring results

As with field sampling, laboratory sampling was conducted on **two occasions during the 2024/25 reporting period**, coinciding with key operational events:

- **29 February 2024** – during a rainfall-driven discharge event (wet season).
- **9 April 2024** – during a harvest discharge event (dry season).

Laboratory analysis was conducted by **Environmental Consultants EcOz**, an independent third party, and included nutrient and suspended solids measurements from four monitoring locations:

- **DPA (Discharge Point A)**
- **DPB (Discharge Point B)**
- **G8155543 (Upstream – Blackmore River reference site)**
- **G8150369 (Downstream – Compliance monitoring site)**

The parameters analysed included:

- Ammonia as N (mg/L), Total Nitrogen (TN, mg/L), Total Suspended Solids (TSS, mg/L), Orthophosphate (PO₄ as P, mg/L), Total Phosphorus (TP, mg/L), and Chlorophyll-a (Chl-a, mg/m³).
- Site-Specific Trigger Values (SSTVs) are included in Table 10 for reference.

Table 10: Monitoring results 2024/25 reporting period against SSTVs

Site ID	Date Sampled	Ammonia as N	TN	TSS	PO4 as P	TP	Chl-a
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/m3
	SSTVs	0.026	0.300	10	0.009	0.030	2
DPA	29/02/2024	0.14	1.1	<5	<0.01	0.06	23
DPB	29/02/2024	0.06	0.4	<5	<0.01	<0.01	3
G8155543 (Upstream)	29/02/2024	<0.01	0.2	11	<0.01	<0.01	2
G8150369 (Downstream)	29/02/2024	0.03	0.3	<5	<0.01	<0.01	3
DPA	9/04/2024	1.04	2.4	<5	<0.01	<0.01	<1
DPB	9/04/2024	0.82	3.1	8	<0.01	0.17	10
G8155543 (Upstream)	9/04/2024	0.02	0.3	<5	0.02	0.030	1
G8150369 (Downstream)	9/04/2024	0.11	0.7	108	<0.01	0.12	<1

Note: SSTVs apply only to Blackmore River sites (G8150369 and G8155543). Values exceeding SSTVs are highlighted in red.

Water Quality Laboratory Results – 29/02/2024

Laboratory sampling was conducted due to rainfall-driven pond overflow.

Ammonia as N (mg/L)

SSTV: 0.026 mg/L

- **Range:** <0.01 – 0.14 mg/L
- **Highest concentration:** DPA (0.14 mg/L)
- **Lowest concentration:** G8155543 (Upstream, <0.01 mg/L)
- **Upstream vs. Downstream:** <0.01 mg/L → 0.03 mg/L (**Exceeds SSTV by 0.004 mg/L**)

Total Nitrogen (TN, mg/L)

SSTV: 0.30 mg/L

- **Range:** 0.2 – 1.1 mg/L
- **Highest concentration:** DPA (1.1 mg/L)
- **Lowest concentration:** G8155543 (Upstream, 0.2 mg/L)
- **Upstream vs. Downstream:** 0.2 mg/L → 0.3 mg/L (Meets SSTV)

Total Suspended Solids (TSS, mg/L)

SSTV: 10 mg/L

- **Range:** <5 – 11 mg/L
- **Highest concentration:** G8155543 (Upstream, 11 mg/L) (Exceeds SSTV)
- **Lowest concentration:** DPA, DPB, & G8150369 (Downstream) (<5 mg/L)
- **Upstream vs Downstream:** 11 mg/L (exceeds SSTV) → <5 mg/L

Orthophosphate (PO₄ as P, mg/L)

SSTV: 0.009 mg/L

- **All sites recorded PO₄ levels <0.01 mg/L**
- **Upstream vs. Downstream:** <0.01 mg/L → <0.01 mg/L (No change, meets SSTV)

Total Phosphorus (TP, mg/L)

SSTV: 0.030 mg/L

- **Range:** <0.01 – 0.06 mg/L
- **Highest concentration:** DPA (0.06 mg/L)
- **Upstream vs. Downstream:** <0.01 mg/L → <0.01 mg/L (No change, meets SSTV)

Chlorophyll-a (Chl-a, mg/m³)

SSTV: 2 mg/m³

- **Range:** 2 – 23 mg/m³
- **Highest concentration:** DPA (23 mg/m³)
- **Upstream vs. Downstream:** 2 mg/m³ → 3 mg/m³ (above SSTV)

Comparative Observations – 29 February 2024

- DPA recorded the highest concentrations of **Ammonia** (0.14 mg/L), **Total Nitrogen (TN)** (1.1 mg/L), **Total Phosphorus (TP)** (0.06 mg/L), and **Chlorophyll-a** (23 mg/m³).
- At the Blackmore River sites, **G8155543 (Upstream) exceeded the SSTV for Total Suspended Solids (TSS) (11 mg/L, SSTV = 10 mg/L)**, while TSS at **G8150369 (Downstream) was below the SSTV (<5 mg/L)**.
- Downstream (G8150369) recorded slightly higher Ammonia (0.03 mg/L) and Chlorophyll-a (3 mg/m³) compared to the upstream site (G8155543), with **Ammonia exceeding its SSTV (0.026 mg/L) by 0.004 mg/L** and **Chlorophyll-a exceeded the SSTV by 1 mg/m³**.
- **Total Nitrogen (TN)** at G8150369 (0.3 mg/L) met the SSTV, showing a slight increase compared to the upstream site (0.2 mg/L).
- **Total Phosphorus (TP)** and **Orthophosphate (PO₄ as P)** remained below SSTVs at both upstream and downstream sites.
- **TSS levels decreased** from upstream to downstream, suggesting natural settlement of suspended particles before reaching the compliance site (G8150369).

Summary of laboratory sampling 9/04/2024

Laboratory sampling was conducted **on 9 April 2024** to coincide with harvesting operations. Harvest discharge occurs when ponds are drained to harvest stock, primarily prawns. During this process, the ponds are fully drained, and the discharge water flows through Discharge Channels A and B, ultimately reaching Discharge Points DP1 and DP2. While harvest discharge can take place at any time of the year, it is primarily associated with prawn harvesting, which typically occurs between April and June.

During the **2024/2025 reporting period**, three ponds (Ponds 1, 2, and 4) were harvested, all in April. Ponds 3 and 5 remained full throughout the reporting period. The parameters recorded included Ammonia as N (mg/L), Total Nitrogen (TN, mg/L), Total Suspended Solids (TSS, mg/L), Orthophosphate (PO₄ as P, mg/L), Total Phosphorus (TP, mg/L), and Chlorophyll-a (Chl-a, mg/m³). SSTVs (Site-Specific Trigger Values) apply only to the Blackmore River sites (G8150369 and G8155543).

Ammonia as N (mg/L)

SSTV: 0.026 mg/L

- **Range:** 0.02 – 1.04 mg/L
- **Highest concentration:** DPA (1.04 mg/L)
- **Lowest concentration:** G8155543 (Upstream, 0.02 mg/L)
- **Upstream vs. Downstream:** 0.02 mg/L → **0.11 mg/L** (Increase at downstream site, exceeding SSTV by 0.084 mg/L)

Total Nitrogen (TN, mg/L)

SSTV: 0.300 mg/L

- **Range:** 0.3 – 3.1 mg/L
- **Highest concentration:** DPB (3.1 mg/L)
- **Lowest concentration:** G8155543 (Upstream, 0.3 mg/L)
- **Upstream vs. Downstream:** 0.3 mg/L → **0.7 mg/L** (Increase at downstream site, exceeding SSTV by 0.4 mg/L)

Total Suspended Solids (TSS, mg/L)

SSTV: 10 mg/L

- **Range:** <5 – 108 mg/L
- **Highest concentration:** G8150369 (Downstream, 108 mg/L) (Exceeds SSTV by 98 mg/L)
- **Lowest concentration:** DPA (<5 mg/L)
- **Upstream vs. Downstream:** <5 mg/L → **108 mg/L** (Significant increase at downstream site)

Orthophosphate (PO₄ as P, mg/L)

SSTV: 0.009 mg/L

- **Range:** <0.01 – 0.02 mg/L
- **Highest concentration:** G8155543 (Upstream, 0.02 mg/L) (Exceeds SSTV by 0.011 mg/L)
- **Lowest concentration:** DPA, DPB, & G8150369 (Downstream) (<0.01 mg/L, Below SSTV)
- **Upstream vs. Downstream:** 0.02 mg/L → <0.01 mg/L (Decrease at downstream site)

Total Phosphorus (TP, mg/L)

SSTV: 0.030 mg/L

- **Range:** <0.01 – 0.12 mg/L
- **Highest concentration:** G8150369 (Downstream, 0.12 mg/L) (Exceeds SSTV by 0.09 mg/L)
- **Lowest concentration:** DPA, G8155543 (Upstream) (<0.01 mg/L)
- **Upstream vs. Downstream:** 0.03 mg/L → 0.12 mg/L (Increase at downstream, exceeding SSTV)

Chlorophyll-a (Chl-a, mg/m³)

SSTV: 2 mg/m³

- **Range:** <1 – 10 mg/m³
- **Highest concentration:** DPB (10 mg/m³)
- **Lowest concentration:** DPA & G8150369 (Downstream, <1 mg/m³, below SSTV)
- **Upstream vs. Downstream:** 1 mg/m³ → <1 mg/m³ (Decrease at downstream site, below SSTV)

Comparative Observations – 9 April 2024

- **DPA** recorded the highest levels of Ammonia (1.04 mg/L) and Total Nitrogen (2.4 mg/L).
- **DPB** had the highest Total Nitrogen (3.1 mg/L) and Chlorophyll-a (10 mg/m³).
- **G8155543** (Upstream) recorded the highest Orthophosphate (0.02 mg/L), exceeding the SSTV.
- **G8150369** (Downstream) showed significant increases in TSS (108 mg/L), Ammonia (0.11 mg/L), TN (0.7 mg/L), and TP (0.12 mg/L), exceeding SSTVs for these parameters.

Summary of Laboratory Non-Compliances

29 February 2024 Sampling Event

- **Ammonia (0.03 mg/L)** at G8150369 (Downstream) exceeded the SSTV of 0.026 mg/L by **0.004 mg/L**.
- **Total Suspended Solids (TSS)** (11 mg/L) at G8155543 (Upstream) exceeded the SSTV of 10 mg/L by **1 mg/L**.
- **Chlorophyll-a** (3 mg/m³) at G8150369 (Downstream) exceeded the SSTV of 2 mg/m³ by **1 mg/m³**.

Key Observations from the 29/2/24 laboratory sampling:

- **Ammonia and Chlorophyll-a** exceedances occurred at the downstream compliance site (G8150369), both were low levels of exceedance.
- **TSS exceeded the SSTV at the upstream site** (G8155543), but decreased below the SSTV downstream, indicating natural sedimentation and this upstream exceedance is not considered to be related to the site discharge.

9 April 2024 Sampling Event

- **Ammonia (0.11 mg/L)** at G8150369 (Downstream) exceeded the SSTV of 0.026 mg/L by 0.084 mg/L.
- **Total Nitrogen (TN)** (0.7 mg/L) at G8150369 (Downstream) exceeded the SSTV of 0.300 mg/L by 0.4 mg/L.
- **Total Suspended Solids (TSS)** (108 mg/L) at G8150369 (Downstream) exceeded the SSTV of 10 mg/L by 98 mg/L.
- **Orthophosphate (PO₄ as P)** (0.02 mg/L) at G8155543 (Upstream) exceeded the SSTV of 0.009 mg/L by 0.011 mg/L.
- **Total Phosphorus (TP)** (0.12 mg/L) at G8150369 (Downstream) exceeded the SSTV of 0.030 mg/L by 0.09 mg/L.

Key Observations:

- The downstream site (**G8150369**) recorded multiple exceedances, including Ammonia, TN, TSS, and TP.
- **TSS** at G8150369 increased significantly (from <5 mg/L upstream to 108 mg/L downstream), suggesting external sediment input.
- Orthophosphate exceeded the SSTV at the upstream site (**G8155543**) but was below detection at the downstream site.
- Both outlet sites recorded low levels of TSS – indicating a potential external exceedance source.

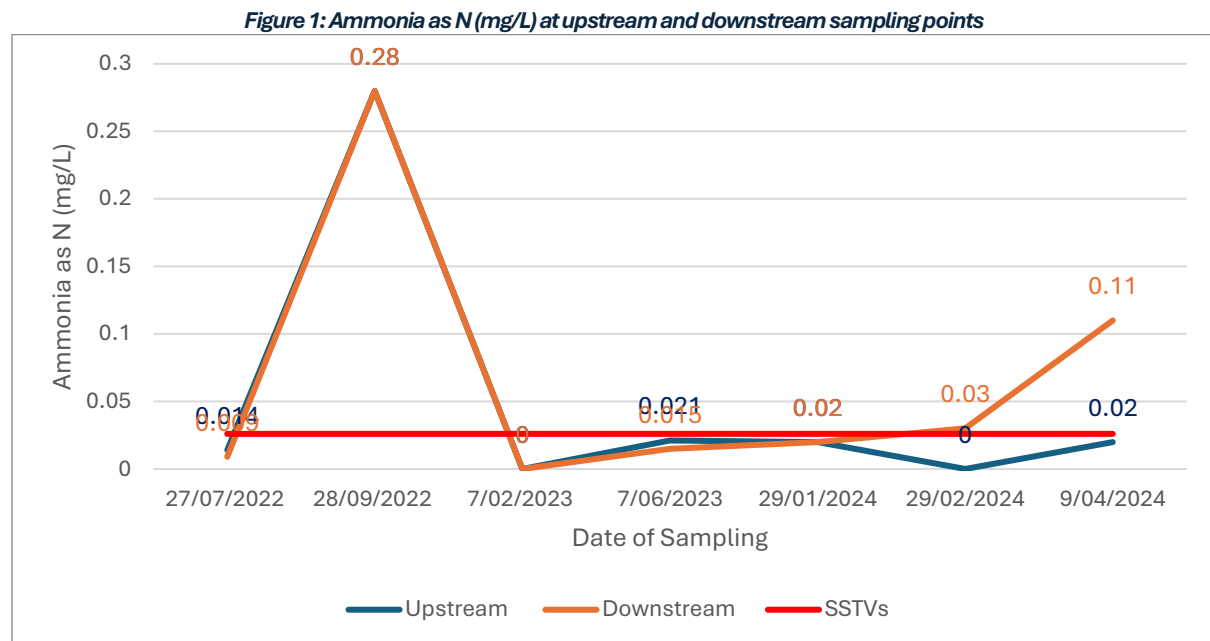
Temporal and Trend Analysis

Below is a series of graphs utilised to highlight trends across time including a summary of 24/25 results:

Temporal and Trend Analysis – Ammonia as N (mg/L)

Overview

The graph illustrates Ammonia (as N) concentrations at upstream (G8155543) and downstream (G8150369) sites across multiple sampling events, including the 29/02/2024 and 9/04/2024 results.



Key Observations

Historical Trends:

- A peak in **September 2022 (~0.28 mg/L at both sites)** was followed by a return to lower levels.
- Between **July 2023 and January 2024**, ammonia levels remained **low** at both sites, below SSTV.

Recent Results (2024 Sampling Events):

29/02/2024:

- Upstream: <0.01 mg/L
- Downstream: 0.03 mg/L (above SSTV: 0.026 mg/L)

9/04/2024:

- Upstream: 0.02 mg/L
- Downstream: 0.11 mg/L (significantly exceeds SSTV)

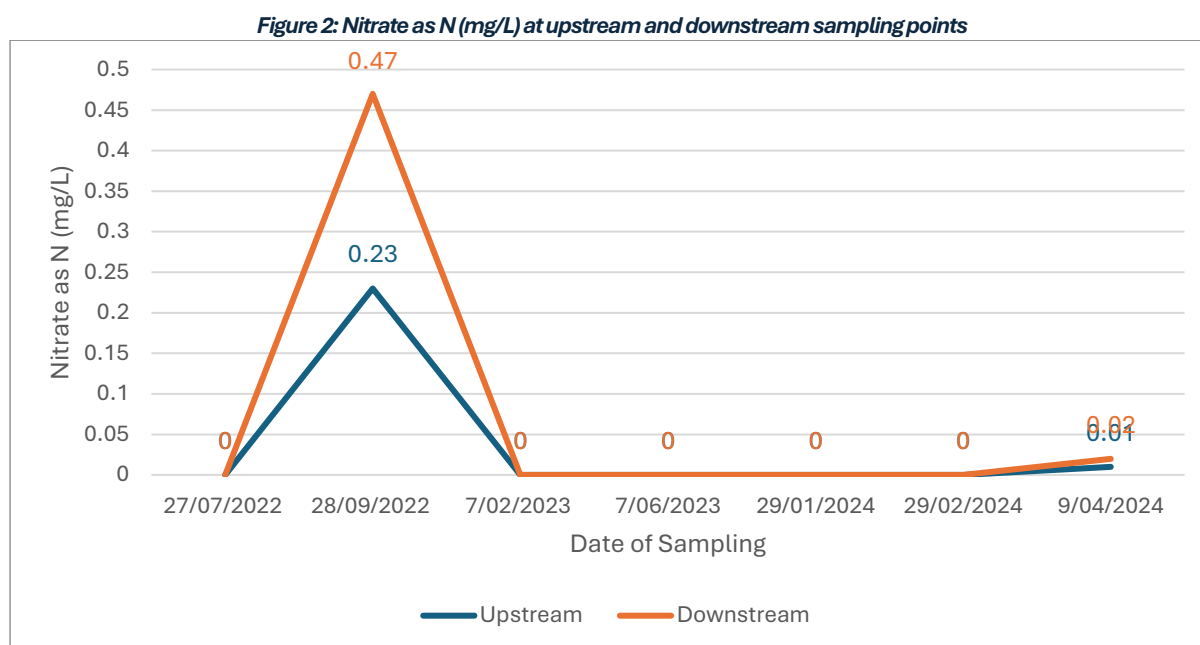
Comparative Analysis:

- Ammonia concentrations increased at both sites between February and April 2024.
- The downstream site consistently exceeded the SSTV in 2024 sampling events.
- The largest increase was observed at the downstream site in April 2024 (0.11 mg/L), which is five times the SSTV.

Temporal and Trend Analysis – Nitrate as N (mg/L)

Overview

The graph illustrates nitrate (as N) concentrations at upstream (G8155543) and downstream (G8150369) sites across multiple sampling events, including the 29/02/2024 and 9/04/2024 results. There is no Site-Specific Trigger Value (SSTV) for this parameter.



Key Observations

Historical Trends:

- A peak in **September 2022** (~0.45 mg/L downstream, ~0.23 mg/L upstream) was followed by a sharp decline to near-zero levels.
- From **February 2023 to January 2024**, nitrate levels remained **below detection limits** at both sites.

Recent Results (2024 Sampling Events):

29/02/2024:

- Upstream: <0.01 mg/L
- Downstream: <0.01 mg/L

9/04/2024:

- Upstream: 0.01 mg/L
- Downstream: 0.02 mg/L

Comparative Analysis:

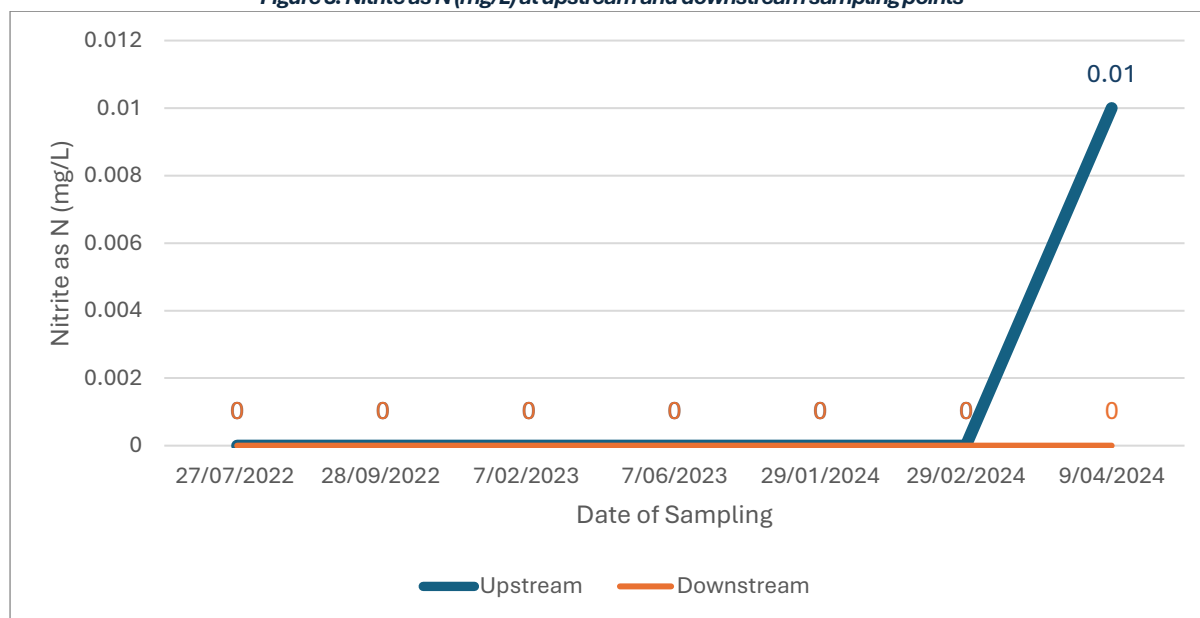
- Nitrate levels have remained low **since early 2023**, with no significant increases observed.
- This contrasts with the **spike in 2022**, which was significantly higher at both sites.

Temporal and Trend Analysis – Nitrite as N (mg/L)

Overview

The graph illustrates nitrite (as N) concentrations at upstream (G8155543) and downstream (G8150369) sites across multiple sampling events, including the 29/02/2024 and 9/04/2024 results. There are no SSTVs for this parameter.

Figure 3: Nitrite as N (mg/L) at upstream and downstream sampling points



Key Observations

Historical Trends:

- Nitrite concentrations remained **below detection limits at both sites** across all sampling events **before 2024**.

Recent Results (2024 Sampling Events):

29/02/2024:

- Upstream: <0.01 mg/L
- Downstream: <0.01 mg/L

9/04/2024:

- Upstream: 0.01 mg/L
- Downstream: <0.01 mg/L

Comparative Analysis:

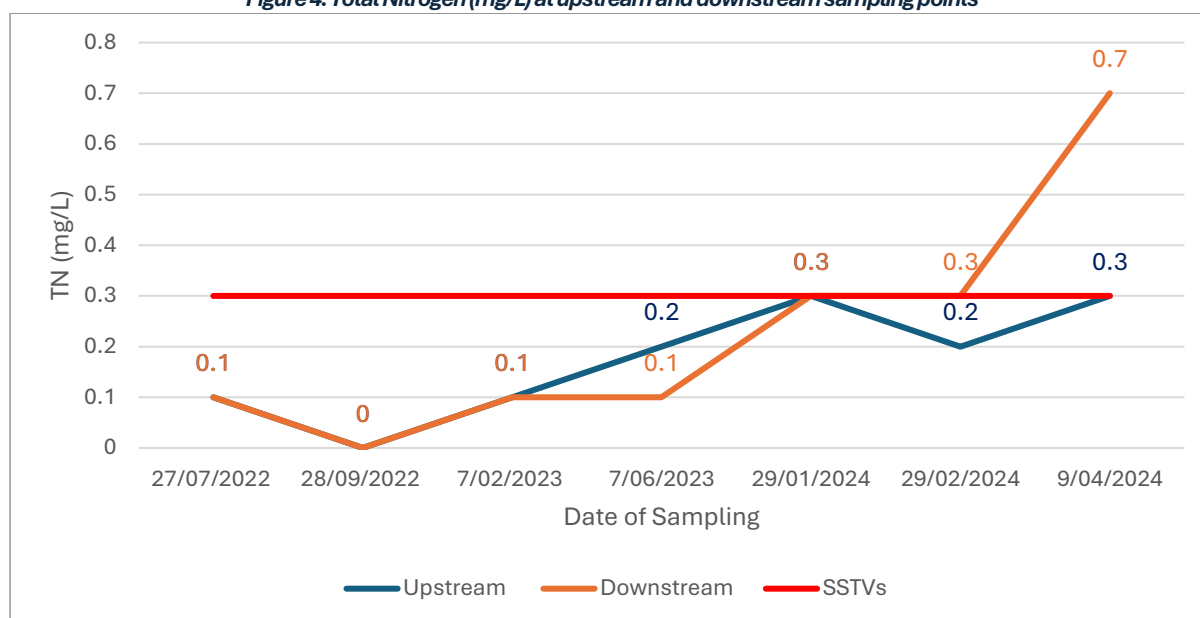
- Upstream concentrations increased slightly in April 2024 (0.01 mg/L).
- Downstream concentrations remained unchanged throughout all sampling events.
- The graph indicates no long-term trends in nitrite levels.

Temporal and Trend Analysis – Total Nitrogen (TN, mg/L)

Overview

The graph illustrates total nitrogen (TN) concentrations at upstream (G8155543) and downstream (G8150369) sites across multiple sampling events, including the 29/02/2024 and 9/04/2024 results. The Site-Specific Trigger Value (SSTV 0.30 mg/L applies to the Blackmore River sites only.

Figure 4: Total Nitrogen (mg/L) at upstream and downstream sampling points



Key Observations

Historical Trends:

- TN levels fluctuated at both sites over time, with an overall increasing trend.
- July 2022 – September 2022:** TN levels were low but declined at both sites.
- February 2023 – January 2024:** Gradual increases were observed at both locations, with values approaching the SSTV (0.30 mg/L) by early 2024.

Recent Results (2024 Sampling Events):

29/02/2024:

- Upstream:** 0.3 mg/L
- Downstream:** 0.3 mg/L (meets SSTV)

9/04/2024:

- Upstream:** 0.3 mg/L
- Downstream:** 0.7 mg/L (exceeds SSTV by 0.4 mg/L)

Comparative Analysis:

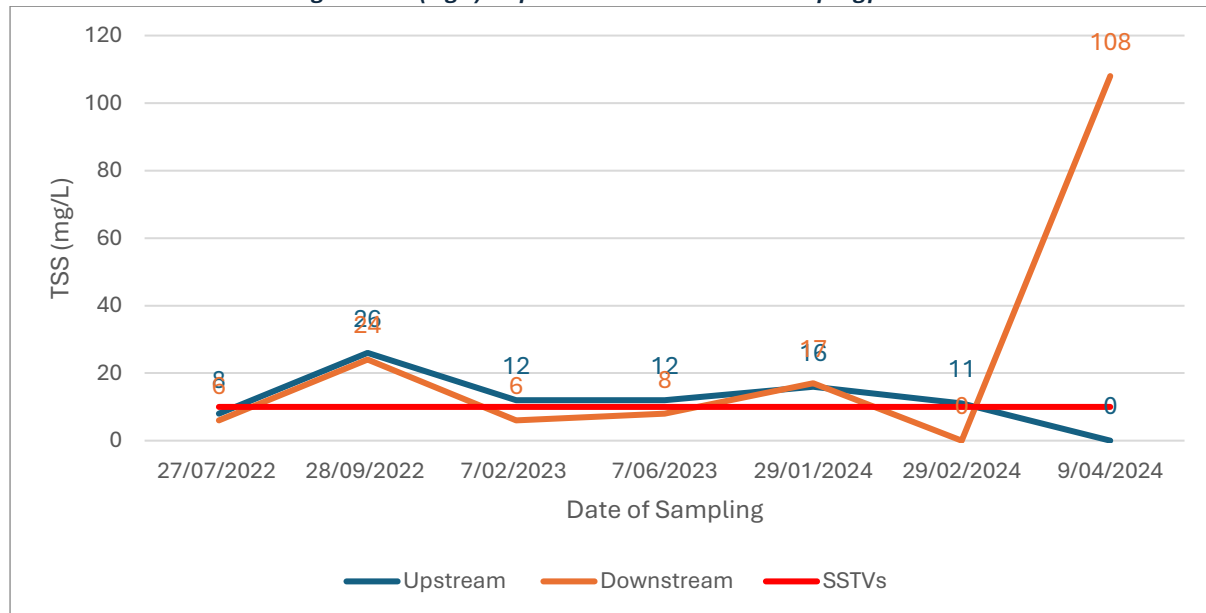
- TN levels at the upstream site remained stable at 0.3 mg/L.
- Downstream TN increased significantly in April 2024 (0.7 mg/L), exceeding the SSTV.
- This suggests a recent increase in total nitrogen concentration at the downstream site, which has not been reflected at the upstream site.
- The upstream and downstream values were nearly identical in February 2024 but diverged significantly by April 2024.

Temporal and Trend Analysis – Total Suspended Solids (TSS, mg/L)

Overview

The graph illustrates total suspended solids (TSS) concentrations at upstream (G8155543) and downstream (G8150369) sites across multiple sampling events, including the 29/02/2024 and 9/04/2024 results. The Site-Specific Trigger Value (SSTV 10mg/L) applies to the Blackmore River sites only.

Figure 5: TSS (mg/L) at upstream and downstream sampling points



Key Observations

Historical Trends:

- TSS levels fluctuated over time, with periodic increases and decreases at both sites.
- September 2022: Both sites recorded a peak (~20 mg/L), followed by a decline in subsequent months.
- June 2023 – January 2024: Moderate variations with TSS levels at the downstream site, mostly hovering near the SSTV (10 mg/L).

Recent Results (2024 Sampling Events):

29/02/2024:

- Upstream:** <5 mg/L
- Downstream:** <5 mg/L (below SSTV)

9/04/2024:

- Upstream:** <5 mg/L
- Downstream:** 108 mg/L (exceeds SSTV significantly)

Comparative Analysis:

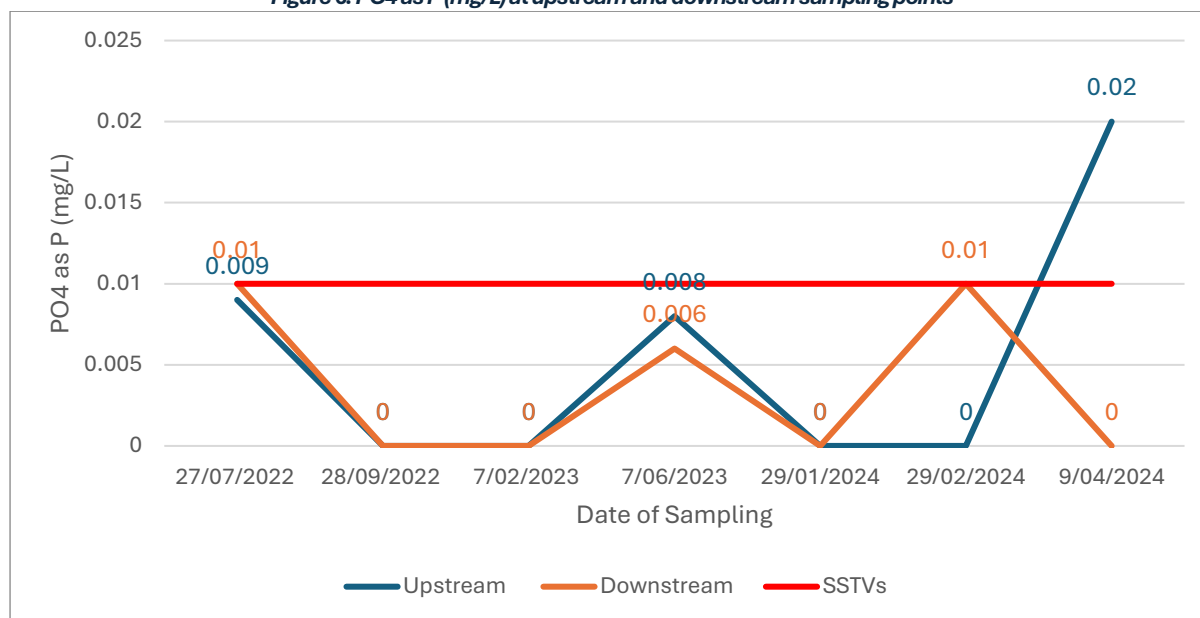
- TSS remained low and stable at the upstream site during both 2024 sampling events.
- The downstream site experienced a sharp increase in April 2024 (108 mg/L), **exceeding the SSTV by a large margin.**
- This marks the highest recorded TSS concentration at the downstream site across all sampling events.
- The TSS levels at the downstream site were low in February but spiked in April, diverging significantly from the upstream site. Both discharge sites recorded low TSS during the April sampling event.

Temporal and Trend Analysis – Orthophosphate (PO₄ as P, mg/L)

Overview

The graph illustrates orthophosphate (PO₄ as P) concentrations at upstream (G8155543) and downstream (G8150369) sites across multiple sampling events, including the 29/02/2024 and 9/04/2024 results. The Site-Specific Trigger Value (SSTV 0.009 mg/L) applies to the Blackmore River sites only.

Figure 6: PO₄ as P (mg/L) at upstream and downstream sampling points



Key Observations

Historical Trends:

- Orthophosphate concentrations have fluctuated at both sites, with periodic increases and decreases.
- July 2022 – September 2022:** Both sites recorded measurable orthophosphate levels, followed by a decline to undetectable levels.
- June 2023 – January 2024:** A similar pattern was observed, with brief increases followed by reductions to below detection limits.

Recent Results (2024 Sampling Events):

29/02/2024:

- Upstream:** 0.00 mg/L
- Downstream:** <0.01 mg/L (meets SSTV)

9/04/2024:

- Upstream:** 0.02 mg/L (exceeds SSTV)
- Downstream:** <0.01 mg/L (below SSTV)

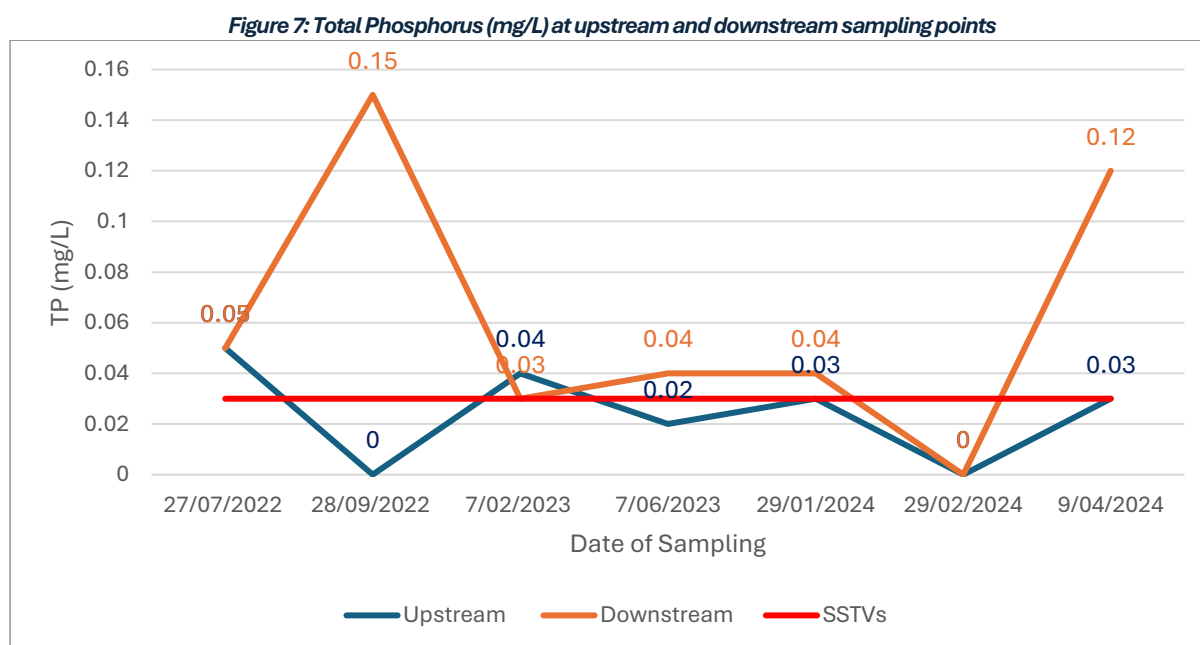
Comparative Analysis:

- Upstream PO₄ increased in April 2024 (0.02 mg/L).
- Downstream PO₄ levels peaked in February 2024 (0.01 mg/L) but dropped below detection limits in April.
- The April 2024 increase in upstream PO₄ was not reflected at the downstream site, marking a divergence in recent trends.
- Overall, phosphate concentrations have remained near or below the SSTV throughout most of the dataset.

Temporal and Trend Analysis – Total Phosphorus (TP, mg/L)

Overview

The graph illustrates total phosphorus (TP) concentrations at upstream (G8155543) and downstream (G8150369) sites across multiple sampling events, including the 29/02/2024 and 9/04/2024 results. The Site-Specific Trigger Value (SSTV 0.03 mg/L) applies to the Blackmore River sites only.



Key Observations

Historical Trends:

- TP concentrations have varied significantly over time, with notable peaks in **September 2022** and **April 2024** at the downstream site.
- July 2022 – September 2022:** A sharp spike at the downstream site (~0.15 mg/L), followed by a return to lower levels.
- February 2023 – January 2024:** TP levels remained close to or below the SSTV, with fluctuations at both river sites.

Recent Results (2024 Sampling Events):

29/02/2024:

- Upstream:** <0.01 mg/L
- Downstream:** <0.01 mg/L (below SSTV)

9/04/2024:

- Upstream:** 0.03 mg/L
- Downstream:** 0.12 mg/L (significantly exceeds SSTV)

Comparative Analysis:

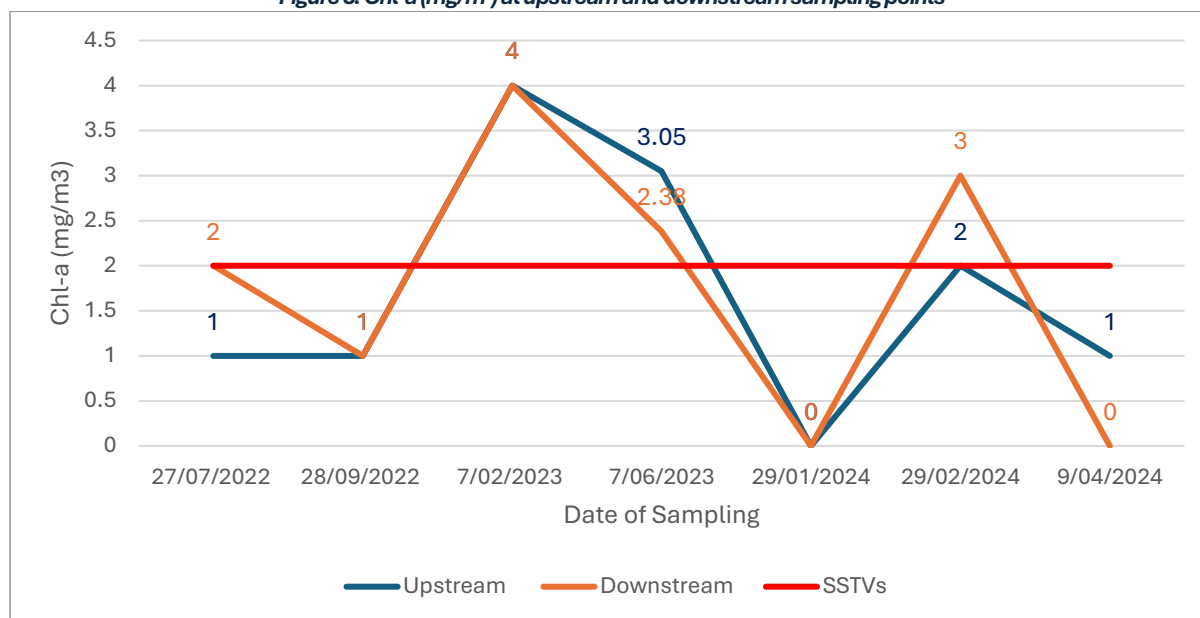
- Upstream TP increased slightly in April 2024 (0.03 mg/L).
- Downstream TP increased sharply in April 2024 (0.12 mg/L), exceeding the SSTV by a wide margin.
- The February 2024 values were below detection limits at both sites, but by April 2024, there was a clear divergence with a substantial increase downstream.
- The April 2024 downstream peak (0.12 mg/L) is the second-highest TP concentration recorded, after the September 2022 peak (~0.15 mg/L).

Temporal and Trend Analysis – Chlorophyll-a (Chl-a, mg/m³)

Overview

The graph illustrates Chlorophyll-a (Chl-a) concentrations at upstream (G8155543) and downstream (G8150369) sites across multiple sampling events, including the 29/02/2024 and 9/04/2024 results. The Site-Specific Trigger Value (SSTV 2 mg/L) applies to the Blackmore River sites only.

Figure 8: Chl-a (mg/m³) at upstream and downstream sampling points



Key Observations

Historical Trends:

- Chlorophyll-a concentrations varied over time, with notable peaks in February 2023 and February 2024 at both sites.
- July 2022 – February 2023: Gradual increases in Chl-a concentrations, peaking in February 2023 (~4.0 mg/m³). This peak exceeded the SSTV limit (2.0 mg/m³).
- June 2023 – January 2024: A decline in concentrations, reaching the lowest recorded values (~1.0 mg/m³) in January 2024.

Recent Results (2024 Sampling Events):

29/02/2024:

- Upstream:** 2.0 mg/m³
- Downstream:** 3.0 mg/m³ (exceeded the SSTV)

9/04/2024:

- Upstream:** 1.0 mg/m³
- Downstream:** <1.0 mg/m³ (below SSTV)

Comparative Analysis:

- Chlorophyll-a levels remained below the SSTV (2.0 mg/m³) throughout the 2024 sampling events.
- Downstream Chl-a values declined from February to April 2024, reaching the lowest levels recorded at this site.
- Upstream values followed a similar trend, decreasing in April 2024.
- Unlike other analytes where downstream concentrations increased in April 2024, Chlorophyll-a showed a decrease.

SSTV exceedance investigation

Potential Non-Compliance Summary

Field Monitoring SSTV exceedances

Field monitoring identified exceedances of Site-Specific Trigger Values (SSTVs) for Dissolved Oxygen (DO) at the Blackmore River monitoring locations (G8155543 Upstream and G8150369 Downstream) during both sampling events. The primary findings include:

29 February 2024 Sampling:

- DO levels at both upstream (49.3%) and downstream (49.3%) sites were below the SSTV range (75–100% saturation), indicating background low oxygenation conditions.
- Discharge points (DPA: 82.5%, DPB: 58.6%) recorded higher DO levels than the Blackmore River sites, suggesting site discharge did not contribute to low river oxygenation.

9 April 2024 Sampling:

- Upstream DO (73.2%) was slightly below the SSTV.
- Downstream DO (76.1%) met the SSTV.
- Discharge points (DPA: 97.7%, DPB: 96.3%) again recorded higher DO than river sites, supporting the previous conclusion that site discharges were not responsible for low DO in the Blackmore River.

Analysis of field sampling SSTVs and potential non-compliances:

Since DO was below the SSTV at the downstream compliance site (G8150369) on only one occasion (29 February 2024), this does not trigger a non-compliance as per Condition 36.1. The upstream exceedances do not influence non-compliance determinations as they represent background river conditions, independent of site discharge. The consistently low DO recorded at the upstream Blackmore River site on both sampling occasions confirms that the river already exhibited reduced oxygen levels, indicating that site discharge did not contribute to this condition.

The above Field SSTV exceedances – do not meet the criteria for a non-compliance.

Laboratory Monitoring Non-Compliance Findings

Both laboratory events recorded exceedances to SSTVs. These exceedances are assessed below:

29 February 2024 laboratory Sampling SSTV exceedances:

The 29 February 2024 sampling event identified SSTV exceedances at the Blackmore River compliance point Downstream (G8150369) for Ammonia and Chlorophyll-a; however, these do not meet the EPL definition of non-compliance as outlined in Condition 36.

- **Ammonia:** 0.03 mg/L (exceeded SSTV of 0.026 mg/L by 0.004 mg/L), but this does not meet non-compliance criteria as it did not exceed the SSTV on three consecutive occasions nor exceed the SSTV by three times or more on a single occasion.
- **Chlorophyll-a:** 3 mg/m³ (exceeded SSTV of 2 mg/m³ by 1 mg/m³), but similarly, this does not meet non-compliance criteria under EPL 323.

At the upstream monitoring site (G8155543), **TSS exceeded the SSTV:**

- Total Suspended Solids (TSS): 11 mg/L (SSTV = 10 mg/L, exceeded by 1 mg/L).
- However, at the downstream compliance site (G8150369), TSS was below SSTV (<5 mg/L), indicating natural settlement of suspended solids before reaching the compliance point.
- Since EPL compliance is assessed at G8150369 (Downstream), this upstream exceedance does not constitute a non-compliance.

The results indicate that site discharge was not a contributing factor to the low field sampling results for DO recorded at Blackmore River sites, nor to the upstream TSS exceedance. Additionally, the Ammonia and Chlorophyll-a exceedances do not meet the EPL-defined criteria for non-compliance.

The above SSTV field sampling exceedances recorded on the 29/2/2024 do not meet the criteria for non-compliance.

9 April 2024 Sampling:

The 9 April 2024 sampling event identified SSTV exceedances at the Blackmore River compliance point (G8150369) for Ammonia, Total Nitrogen (TN), Total Suspended Solids (TSS), and Total Phosphorus (TP). Based on EPL 323, the Ammonia, TSS, and TP exceedances qualify as non-compliances under Condition 36.2.

Downstream Compliance Site (G8150369)

- **Ammonia:** 0.11 mg/L (exceeded SSTV of 0.026 mg/L by a factor of 4.23, meeting EPL Condition 36.2 and constituting a non-compliance).
- **Total Nitrogen (TN):** 0.7 mg/L (exceeded SSTV of 0.300 mg/L by 0.4 mg/L but does not meet the non-compliance threshold as per EPL 323).
- **Total Suspended Solids (TSS):** 108 mg/L (exceeded SSTV of 10 mg/L by a factor of 10.8, meeting EPL Condition 36.2 and constituting a non-compliance).
- **Total Phosphorus (TP):** 0.12 mg/L (exceeded SSTV of 0.030 mg/L by a factor of 4.0, meeting EPL Condition 36.2 and constituting a non-compliance).

Upstream Monitoring Site (G8155543)

- Orthophosphate (PO₄ as P): 0.02 mg/L (exceeded SSTV of 0.009 mg/L by 0.011 mg/L, but this was an upstream exceedance and is unrelated to site operations).
- At the downstream site (G8150369), Orthophosphate was below detection limits, further indicating that this exceedance was not due to site discharge.

Analysis of SSTV Exceedances 9/4/2024

- Upstream exceedances do not constitute non-compliance under EPL 323, as they reflect background river conditions rather than site discharge impacts.
- The exceedances of Ammonia (4.23x SSTV), TSS (10.8x SSTV), and TP (4.0x SSTV) meet EPL Condition 36.2 and must be reported as non-compliances to NT EPA.
- TSS levels at the discharge points (DPA & DPB) were well below the SSTV (<5 mg/L & 8 mg/L), suggesting that the high TSS at G8150369 may be influenced by external factors, such as tidal movement or sediment resuspension in the Blackmore River.
- The TP exceedance at the compliance site coincided with increased TSS, reinforcing the likelihood that sediment-bound phosphorus was mobilised by tidal activity rather than originating from the site's discharge.

Conclusion

The EPL-defined non-compliances from this sampling event are the:

- **Ammonia (4.23x SSTV),**
- **TSS (10.8x SSTV), and**
- **TP (4.0x SSTV) exceedances at the Downstream site G8150369.**

Other exceedances do not meet the EPL non-compliance threshold

Non-compliances

Incident Report – Non-Compliance Exceedances (9 April 2024 Sampling Event)

Incident Summary

The 9 April 2024 laboratory sampling event identified three exceedances of Site-Specific Trigger Values (SSTVs) at the Blackmore River Downstream compliance site (G8150369):

- **Ammonia:** 0.11 mg/L (SSTV = 0.026 mg/L, exceeded by a factor of 4.23).
- **Total Suspended Solids (TSS):** 108 mg/L (SSTV = 10 mg/L, exceeded by a factor of 10.8).
- **Total Phosphorus (TP):** 0.12 mg/L (SSTV = 0.030 mg/L, exceeded by a factor of 4.0).

As per EPL 323, Condition 36.2, exceedances that are more than three times the SSTV on a single occasion constitute a non-compliance.

Reporting Delays

The exceedances were not reported to NT EPA within 24 hours, nor was a follow-up written report submitted within 7 days, as required under EPL Condition 37.

This was not intentional but occurred due to the timing of laboratory result availability which was not received by Barramundi Adventures until >30 days post the sampling event.

Prawn harvesting activities had already concluded before the laboratory results were received, meaning no immediate action was taken at the time and relevant staff related to Prawn Management had returned to other duties.

Data Analysis & Investigation

TSS Exceedance (108 mg/L) and Potential Downstream Influences

- TSS at the **discharge points (DPA & DPB) was low (<5 mg/L & 8 mg/L)**, suggesting that site discharge did not contribute significantly to the high TSS recorded at the downstream site G8150369.
- Given that the upstream **TSS was below SSTV combined with low discharge results** but **increased significantly at the downstream compliance site**, this suggests a potential external influence, such as tidal activity, sediment resuspension, or natural riverbed disturbances.
- The simultaneous **exceedance of TP** (which is often sediment-bound) supports this theory, **as TP levels can rise when TSS increases due to resuspension of particulate-bound phosphorus.**
- Additionally – Field sampling at the Downstream site on the 9/4/2024 highlighted that Discharge NTU was significantly lower than the NTU recorded downstream (DPA 0.2NTU and DPB 11.1) which recorded 78.3 NTU.

- Further analysis of the field sampling results on the 9/4/2024 also highlights that there is a significant increase in electrical conductivity between the upstream site (34,667 and the downstream site 45058 us/cm) this indicates saltwater intrusion upstream.
- The available data is insufficient to definitively determine whether the non-compliances were caused by farm operations or by natural environmental factors.

Ammonia Exceedance (0.11 mg/L)

Ammonia was 4.23 times the SSTV, meeting the EPL non-compliance threshold.

- Although this result could potentially indicate that the ammonia discharge from the site influenced this downstream result. Further investigation is required to determine whether the exceedance was linked to a short-term event, river mixing dynamics, or an external source.

Corrective & Preventative Actions

To prevent future delays in reporting and improve environmental monitoring accuracy, the following corrective actions will be implemented:

Immediate Actions:

- ✓ Immediate review of laboratory results upon receipt – internal protocols and procedures processes will be established to assess exceedances as soon as lab results are received, ensuring that any non-compliance is identified early.
- ✓ Environmental Consultants will be advised to instruct laboratories to include Barramundi Adventures in the laboratory analysis report email link to improve timelines.
- ✓ Immediate notification of non-compliances to NT EPA – Any future exceedance meeting Condition 36.2 will be reported within 24 hours, with a formal written report submitted within 7 days.

Regulatory & Stakeholder Engagement:

- ✓ Request a meeting with NT EPA to discuss potential improvements – The site proposes engaging with regulators to:
 - Explore opportunities to reduce monitoring costs while improving data accuracy.

Conclusion

The Ammonia, TSS, and TP exceedances on 9 April 2024 met the EPL-defined criteria for non-compliance, but the available data does not definitively confirm whether these exceedances were due to farm operations or external factors.

- The high TSS recorded at the downstream site (G8150369) does not correspond with discharge sampling results or upstream background levels, suggesting a potential downstream influence, such as tidal resuspension, rather than direct site discharge. This raises questions about the source of the Total Phosphorus exceedance and whether the Ammonia exceedance may have been influenced by external factors rather than site operations.
- Barramundi Adventures has suggested a meeting with NT EPA to discuss monitoring improvements.
- Improved Protocols and Procedures and compliance monitoring processes will be introduced to ensure timely reporting to NT EPA.

By implementing these corrective actions, Barramundi Adventures Darwin aims to improve environmental compliance, enhance data quality, and engage with regulators to optimise future monitoring strategies.

Declaration

I, Dorian Rondot of Barramundi Adventures Darwin Pty Ltd, prepared this report and confirm that, to the best of my knowledge and ability, all information provided is true and accurate.



26/03/2025

Version 3 post EPA Feedback

Figure 9: Certificate of Analysis Barramundi Adventuress Laboratory Sampling 29/2/2024



Page : 3 of 3
 Work Order : ES2406617
 Client : ECOZ ENVIRONMENTAL SERVICES
 Project : EZ23098 CSIRO Monitoring of EPL323-01

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	DPA	DPB	G8155543	G8150369	----
Sampling date / time					29-Feb-2024 00:00	29-Feb-2024 00:00	29-Feb-2024 00:00	29-Feb-2024 00:00	----
Compound	CAS Number	LOR	Unit		ES2406617-001	ES2406617-002	ES2406617-003	ES2406617-004	-----
					Result	Result	Result	Result	---
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		<5	<5	11	<5	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		0.14	0.06	<0.01	0.03	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		0.03	0.01	<0.01	<0.01	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		0.06	0.09	<0.01	<0.01	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		0.09	0.10	<0.01	<0.01	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		1.0	0.3	0.2	0.3	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^A Total Nitrogen as N	----	0.1	mg/L		1.1	0.4	0.2	0.3	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.06	<0.01	<0.01	<0.01	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	0.01	----
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	1	mg/m ³		23	3	2	3	----

Figure 10: Certificate of Analysis Barramundi Adventures 09/04/2024



Page : 3 of 3
 Work Order : ES2411094
 Client : ECOZ ENVIRONMENTAL SERVICES
 Project : EZ23098 CSIRO Monitoring of EPL323-01

Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID				DPA	DPB	G8155543	G8150369	----
Sampling date / time				09-Apr-2024 00:00	09-Apr-2024 00:00	09-Apr-2024 00:00	09-Apr-2024 00:00	----
Compound	CAS Number	LOR	Unit	ES2411094-001	ES2411094-002	ES2411094-003	ES2411094-004	-----
				Result	Result	Result	Result	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	8	<5	108	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	1.04	0.82	0.02	0.11	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	0.44	<0.01	0.01	<0.01	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	0.29	0.03	0.01	0.02	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.73	0.03	0.02	0.02	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.7	3.1	0.3	0.7	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^A Total Nitrogen as N	----	0.1	mg/L	2.4	3.1	0.3	0.7	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	<0.01	0.17	0.03	0.12	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.02	<0.01	----
EP008: Chlorophyll a & Pheophytin a								
Chlorophyll a	----	1	mg/m ³	<1	10	1	<1	----
EP030: Biochemical Oxygen Demand (BOD)								
Biochemical Oxygen Demand	----	2	mg/L	<2	4	<2	<2	----