

Territory Wildlife Park – Annual Return Waste Water Monitoring Report

March 2023 to March 2024

Rob Hall, Director Territory Wildlife Park – 12 March 2024

1. Summary

This report has been prepared for the Annual Return of the Territory Wildlife Parks (TWP) waste water testing as required by the Northern Territory Environment Protection Authority (NTEPA). The period of the report is from 12 March 2023 to 11 March 2024.

The TWP Aquarium facilities generate waste water containing listed waste such as animal effluent and residues. This waste water is disposed of via three authorised discharge points into Berry Creek, subject to the conditions of the Environment Protection License 307.

As required by the Environment Protection License and in accordance with **Appendix A**, Territory Wildlife Park staff collect water samples for testing of Berry Creek and water flowing to Berry Creek during a waste water discharge event and on the falling tide to ensure it is within acceptable parameters.

2. Surface Water Monitoring Program

A Standard Operating Procedure (SOP) for Waste Water Management was implemented in Oct 2022 following consultation with NTEPA to ensure TWP was meeting its compliance requirements (**See Attachment 1**). This SOP identifies the locations and method of surface water sampling and collection as well as the required sample testing parameters and frequencies. Results of the samples are detailed in **Sections 3 to 4** of this report.

Water samples are currently being analysed by:

Envirolab Services (WA) Pty Ltd trading as MPL Laboratories
ABN 53 140 099 207
16-18 Hayden Court Myaree WA 6154
Phone: +61 8 9317 2505 / fax +61 8 9317 4163
Email: lab@mpl.com.au
www.mpl.com.au

3. Water Testing Results

The following three charts present the required data recorded for the period 01 March 2023 to 29 Feb 2024 for SP1, SP2 and SP3, locations as per **site map Attachment 2**. Excel format data sheets can be found in **Attachment 3**

4. Waste Water Sample Records - March 2023 to February 2024 – Site 1

SP1	Month	Temp °C	PH	Dissolved oxygen mg/L	Dissolved Oxygen Percentage	Electrical conductivity	Turbidity	Total nitrogen	Total phosphorous
Trigger Values		°C	pH units 7.0-8.0	mg/L	% Saturation 85-120	µS/cm 320-390	NTU 2-15	µg/L 300 or mg/L 0.3	µg/L 10 or mg/L 0.01
Discharge Point 1 Lat: 12° 42' 4.38" S Lon: 130° 59' 43.60" E	Mar-23	28.8	7.3	6.68	86.6%	51	11	0.64	<0.010
	Apr-23	28.7	7.6	7.28	94.0%	150	4.4	0.69	<0.010
	May-23	27.8	7.9	5.59	70.7%	320	0.53	<0.10	0.013
	Jun-23	28.9	8.0	5.87	76.0%	350	0.75	<0.10	<0.010
	Jul-23	28.5	7.9	3.23	41.5%	360	0.72	0.14	<0.010
	Aug-23	29.4	8.1	7.99	101.4%	350	0.69	0.12	<0.010
	Sep-23	29.7	7.7	5.34	69.8%	380	0.70	0.19	0.025
	Oct-23	30.0	8.0	8.19	107.9%	350	1.3	0.18	<0.010
	Nov-23	29.7	8.0	5.64	74.1%	370	0.64	0.25	<0.010
	Dec-23	28.0	7.6	1.97	25.3%	280	4.1	0.50	<0.010
	Jan-24	28.7	7.5	6.55	85.1%	170	3.2	0.35	0.018
	Feb-24	29.9	7.5	3.71	49.0%	170	3.2	0.35	0.018

5. Waste Water Sample Records - March 2023 to February 2024 – Site 2

SP 2	Month	Temp °C	PH	Dissolved oxygen mg/L	Dissolved Oxygen Percentage	Electrical conductivity	Turbidity	Total nitrogen	Total phosphorous
Trigger Values		°C	pH units 7.0-8.0	mg/L	% Saturation 85-120	µS/cm 320-390	NTU 2-15	µg/L 300 or mg/L 0.3	µg/L 10 or mg/L 0.01
Discharge Point 2 Lat: 12°42'4.98" S Lon: 130°59'37.65"E	Mar-23	27.7	7.4	4.98	63.4%	240	2.9	0.55	<0.010
	Apr-23	27.9	7.4	5.17	65.9%	260	2.3	0.65	0.018
	May-23	23	7.7	7	81.2%	350	0.84	0.18	0.030
	Jun-23	25.5	7.9	5.46	66.5%	370	1.1	0.35	0.038
	Jul-23	28.1	7.7	4.29	54.6%	380	0.70	0.32	0.024
	Aug-23	25.4	7.8	7.5	91.1%	390	0.83	0.18	<0.010
	Sep-23	27.4	7.9	3	37.7%	11000	0.97	0.15	0.019
	Oct-23	28.5	7.8	8.29	106.4%	410	1.1	0.17	0.018
	Nov-23	28.3	7.6	2.43	31.2%	420	1.4	0.29	<0.010
	Dec-23	28.8	7.8	3.02	39.3%	450	6.4	0.87	0.047
	Jan-24	28.5	7.4	3.74	48.3%	230	2.8	0.44	0.025
	Feb-24	28.7	7.4	2.87	37.2%	230	2.8	0.44	0.025

6. Waste Water Sample Records - March 2023 to February 2024 – Site 3

SP 3	Month	Temp °C	PH	Dissolved oxygen mg/L	Dissolved Oxygen Percentage	Electrical conductivity	Turbidity	Total nitrogen	Total phosphorous
Trigger Values		°C	pH units 7.0-8.0	mg/L	% Saturation 85-120	µS/cm 320-390	NTU 2-15	µg/L 300 or mg/L 0.3	µg/L 10 or mg/L 0.01
Discharge Point 3 Lat: 12°41'47.61"S Lon: 130°59'35.95"E	Mar-23	29	7.1	6.74	87.7%	48	12	0.54	<0.010
	Apr-23	29.2	7.8	7.06	92.1%	150	4.1	0.35	0.011
	May-23	26.2	8.0	7.41	91.0%	1300	0.68	<0.10	0.014
	Jun-23	28.8	8.1	7.89	101.6%	760	0.87	<0.10	<0.010
	Jul-23	28.1	8.1	4.29	54.6%	1200	0.83	0.10	<0.010
	Aug-23	26.9	7.8	8.78	109.4%	6800	1.2	0.19	<0.010
	Sep-23	29.2	7.9	6.19	8.3%	10900	0.97	0.15	0.019
	Oct-23	30.0	7.9	11.8	155.9%	11000	2.2	0.15	0.015
	Nov-23	29.9	7.9	6.29	83.0%	11000	1.4	0.22	<0.010
	Dec-23	31.0	7.9	5.69	76.7%	9800	2.0	0.34	0.015
	Jan-24	28.9	7.7	7.75	101.0%	170	5.7	0.40	0.018
	Feb-24	30.1	7.7	5.54	73.0%	170	5.7	0.40	0.018

Standard Operating Procedure – Territory Wildlife Park Waste Water Testing

Document title	Territory Wildlife Park Waste Water Testing
Contact details	Territory Wildlife Park
Approved by	Donna Jensen
Date approved	3 October 2022
Document review	Annually
TRM number	TBC

Version	Date	Author	Changes made
1.0	9/10/2022	Mark Messer	First version

Acronyms	Full form
TWP	Territory Wildlife Park
NT EPA	Northern Territory Environment Protection Authority

1. Purpose

The park's aquarium facilities result in the generation of waste water containing a listed waste (animal effluent and residues). Waste water is disposed of via three authorised discharge points into Berry Creek, subject to conditions of the Environment Protection License.

As required by the Environment Protection License and in accordance with Appendix A, Territory Wildlife Park staff collect water samples for testing of Berry Creek and water flowing to Berry Creek during a waste water discharge event and falling tide to ensure it is within acceptable parameters.

2. Scope

Territory Wildlife Park is a Northern Territory government operated Park. This procedure applies to TWP Wetlands section staff.

The period of time required for water samples to be collected is currently ongoing, pending data and decision making by the NT EPA Water Regulation team regarding an exemption and certification.

Water Parameters tested include:

- Flow
- pH
- Electrical Conductivity
- Dissolved Oxygen
- Temperature
- Turbidity
- Total Phosphorous
- Total Nitrogen

3. Procedure

1. Collection of Water Sampling Bottles

Water sampling bottles are collected from Envirolab services by the AO5 Supervisor of Administration or a TWP staff member and stored in the administration building. The Wetlands section staff collect the water sampling bottles from the administration building at least one day before samples are required to be collected.

2. Collection of Water Samples

Administration staff are to be notified the day before water sample collection to organise a courier for delivery of the water samples. There are three GPS sample point locations – see Appendix A – Monitoring Program and a map is also available. Sample points are also marked at the locations of sampling. GPS locations are as follows

Site 1 – Latitude: 12°42'4.38"S Longitude: 130°59'43.60"E

Site 2 – Latitude: 12°42'4.98"S Longitude: 130°59'37.65"E

Site 3 – Latitude: 12°41'47.61"S Longitude: 130°59'35.95"E

75% of water samples must be taken during a waste water discharge event and on a falling tide. Three staff members are required to complete the water sampling process; one to Backwash Ex 12 and two for collecting water samples safely (croc-wise monitoring). Water samples are collected from the surface of the water. Parameters recorded by Wetlands Section staff during water sample collection include temperature and dissolved oxygen. Always ensure equipment is in working order and carry spare batteries.

3. Recording Water Sampling

When collecting the water samples, Wetlands section staff must ensure the following information is recorded on the sample bottles:

- The date on which the sample was collected
- The time at which the sample was collected
- The location at which the sample was collected
- The name of the person who collected the sample
- Any significant environmental impacts at site of collection such as flushing event and tide

The AO5 Supervisor of administration completes the chain of custody forms relating to the sample.

4. Delivery of Water Samples

Once all samples are collected, Wetlands section staff deliver the samples to the administration building. The AO5 Supervisor of Administration or a TWP staff member delivers the water samples and relevant forms to Envirolab for testing.

5. Authorising environment

Person/Parties	Roles and Responsibilities
<i>AO5 Supervisor of Administration</i>	<i>Organising pickup and delivery of water sample bottles and filling out relevant forms</i>
<i>Wetlands Section Staff</i>	<i>Collecting accurate water samples in accordance with the Environment Protection License and Appendix A – Monitoring Program</i>

6. Legislation and related documents

NT Environment Protection License EPL 307
Waste Management and Pollution Control Act
TWP Environmental Management Plan
WH&S Procedure
Appendix A – Monitoring Program



Territory Wildlife Park							
Aquarium Waste Water Sampling Records Mar 2023 to Mar 2							
SP1	Month	Temp °C	PH	Dissolved oxygen mg/L	Dissolved Oxygen Percentage	Electrical conductivity	Turbidity
Trigger Values		°C	pH units 7.0-8.0	mg/L	% Saturation 85-120	µS/cm 320-390	NTU 2- 15
Discharge Point 1 Lat: 12° 42' 4.38" S Lon: 130° 59' 43.60" E	Mar-23	28.8	7.3	6.68	86.6%	51	11
	Apr-23	28.7	7.6	7.28	94.0%	150	4.4
	May-23	27.8	7.9	5.59	70.7%	320	0.53
	Jun-23	28.9	8.0	5.87	76.0%	350	0.75
	Jul-23	28.5	7.9	3.23	41.5%	360	0.72
	Aug-23	29.4	8.1	7.99	101.4%	350	0.69
	Sep-23	29.7	7.7	5.34	69.8%	380	0.70
	Oct-23	30.0	8.0	8.19	107.9%	350	1.3
	Nov-23	29.7	8.0	5.64	74.1%	370	0.64
	Dec-23	28.0	7.6	1.97	25.3%	280	4.1
	Jan-24	28.7	7.5	6.55	85.1%	170	3.2
	Feb-24	29.9	7.5	3.71	49.0%	170	3.2
	Mar-24	0	0.0	0.00	0.0%	0	0.0

SP 2	Month	Temp °C	PH	Dissolved oxygen mg/L	Dissolved Oxygen Percentage	Electrical conductivity	Turbidity
Trigger Values		°C	pH units 7.0-8.0	mg/L	% Saturation 85-120	µS/cm 320-390	NTU 2- 15
Discharge Point 2 Lat: 12° 42' 4.98" S Lon: 130° 59' 37.65" E	Mar-23	27.7	7.4	4.98	63.4%	240	2.9
	Apr-23	27.9	7.4	5.17	65.9%	260	2.3
	May-23	23	7.7	7	81.2%	350	0.84
	Jun-23	25.5	7.9	5.46	66.5%	370	1.1
	Jul-23	28.1	7.7	4.29	54.6%	380	0.70
	Aug-23	25.4	7.8	7.5	91.1%	390	0.83
	Sep-23	27.4	7.9	3	37.7%	11000	0.97
	Oct-23	28.5	7.8	8.29	106.4%	410	1.1
	Nov-23	28.3	7.6	2.43	31.2%	420	1.4
	Dec-23	28.8	7.8	3.02	39.3%	450	6.4
	Jan-24	28.5	7.4	3.74	48.3%	230	2.8
	Feb-24	28.7	7.4	2.87	37.2%	230	2.8
	Mar-24	0	0	0.00	0.0%	0	0

SP 3	Month	Temp °C	PH	Dissolved oxygen mg/L	Dissolved Oxygen Percentage	Electrical conductivity	Turbidity
Trigger Values		°C	pH units 7.0-8.0	mg/L	% Saturation 85-120	µS/cm 320-390	NTU 2- 15
Discharge Point 3 Lat: 12°41'47.61"S Lon: 130°59'35.95"E	Mar-23	29	7.1	6.74	87.7%	48	12
	Apr-23	29.2	7.8	7.06	92.1%	150	4.1
	May-23	26.2	8.0	7.41	91.0%	1300	0.68
	Jun-23	28.8	8.1	7.89	101.6%	760	0.87
	Jul-23	28.1	8.1	4.29	54.6%	1200	0.83
	Aug-23	26.9	7.8	8.78	109.4%	6800	1.2
	Sep-23	29.2	7.9	6.19	8.3%	10900	0.97
	Oct-23	30.0	7.9	11.8	155.9%	11000	2.2
	Nov-23	29.9	7.9	6.29	83.0%	11000	1.4
	Dec-23	31.0	7.9	5.69	76.7%	9800	2.0
	Jan-24	28.9	7.7	7.75	101.0%	170	5.7
	Feb-24	30.1	7.7	5.54	73.0%	170	5.7
	Mar-24	0.0	0	0.00	0.0%	0	0

024	
Total nitrogen	Total phosphorous
µg/L 300 or mg/L 0.3	µg/L 10 or mg/L 0.01
0.64	<0.010
0.69	<0.010
<0.10	0.013
<0.10	<0.010
0.14	<0.010
0.12	<0.010
0.19	0.025
0.18	<0.010
0.25	<0.010
0.50	<0.010
0.35	0.018
0.35	0.018
0.00	0.0

Total nitrogen	Total phosphorous
µg/L 300 or mg/L 0.3	µg/L 10 or mg/L 0.01
0.55	<0.010
0.65	0.018
0.18	0.030
0.35	0.038
0.32	0.024
0.18	<0.010
0.15	0.019
0.17	0.018
0.29	<0.010
0.87	0.047
0.44	0.025
0.44	0.025
0	0

Total nitrogen	Total phosphorous
µg/L 300 or mg/L 0.3	µg/L 10 or mg/L 0.01
0.54	<0.010
0.35	0.011
<0.10	0.014
<0.10	<0.010
0.10	<0.010
0.19	<0.010
0.15	0.019
0.15	0.015
0.22	<0.010
0.34	0.015
0.40	0.018
0.40	0.018
0	0

Reference	Description	Sample Description	Sample No.	Replicate
MARCH 2023 - RESULTS				
RptUnits				
PQL				
Matrix	Tide Approx 3.9m (outgoing)			
Method				
PEC0598	TWP Waster water testing EPL307	TWP - Site Sp1	01	0
PEC0598	TWP Waster water testing EPL307	TWP - Site Sp2	02	0
PEC0598	TWP Waster water testing EPL307	TWP - Site Sp3	03	0
APRIL 2023 - RESULTS				
RptUnits				
PQL				
Matrix	Tide Approx 5.1m (incoming)			
Method				
PED0636	TWP Waster water testing - EPL307	TWP - Site SP 1	01	0
PED0636	TWP Waster water testing - EPL307	TWP - Site SP 2	02	0
PED0636	TWP Waster water testing - EPL307	TWP - Site SP 3	03	0
BED1213	TWP Waster water testing - EPL307	TWP - Site SP 1	DUP1	1
MAY 2023 - RESULTS				
RptUnits				
PQL				
Matrix	Tide Approx 5.9m (outgoing)			
Method				
PEE1662	TWP Waste Water Testing - EPL307	TWP - Site Sp1	01	0
PEE1662	TWP Waste Water Testing - EPL307	TWP - Site Sp 2	02	0
PEE1662	TWP Waste Water Testing - EPL307	TWP - Site Sp3	03	0
BEE3443	TWP Waste Water Testing - EPL307	TWP - Site Sp1	DUP1	1
BEE2809	TWP Waste Water Testing - EPL307	TWP - Site Sp1	DUP2	1
JUNE 2023 - RESULTS				
RptUnits				
PQL				
Matrix	Tide Approx 2.9m (incoming)			
Method				
PEF1005	TWP Waste Water Testing - EPL307	TWP - Site Sp 1	01	0
PEF1005	TWP Waste Water Testing - EPL307	TWP - Site Sp 2	02	0
PEF1005	TWP Waste Water Testing - EPL307	TWP - Site Sp 3	03	0
BEF1913	TWP Waste Water Testing - EPL307	TWP - Site Sp 1	DUP2	1
BEF2350	TWP Waste Water Testing - EPL307	TWP - Site Sp 1	DUP2	1
JULY 2023 - RESULTS				
RptUnits				
PQL				
Matrix	Tide Approx 3.7m (incoming)			
Method				
PEG0742	TWP Waste Water Testing - EPL307	TWP - Site Sp1	01	0
PEG0742	TWP Waste Water Testing - EPL307	TWP - Site Sp2	02	0
PEG0742	TWP Waste Water Testing - EPL307	TWP - Site Sp3	03	0
BEG1411	TWP Waste Water Testing - EPL307	TWP - Site Sp1	DUP2	1
AUGUST 2023 - RESULTS				
RptUnits				
PQL				
Matrix	Tide Approx 4.5m (outgoing)			
Method				
PEH1120	TWP Waste Water Testing - EPL307	TWP - Site Sp 1	01	0
PEH1120	TWP Waste Water Testing - EPL307	TWP - Site Sp 2	02	0
PEH1120	TWP Waste Water Testing - EPL307	TWP - Site Sp 3	03	0

BEH2034	TWP Waste Water Testing - EPL307	TWP - Site Sp 1	DUP1	1
SEPTEMBER 2023 - RESULTS				
RptUnits				
PQL				
Matrix				
Method				
PEI0944	TWP Waster water testing - EPL307	TWP - Site SP1	01	0
PEI0944	TWP Waster water testing - EPL307	TWP - Site SP2	02	0
PEI0944	TWP Waster water testing - EPL307	TWP - Site SP3	03	0
BEI1728	TWP Waster water testing - EPL307	TWP - Site SP3	DUP1	1
BEI2385	TWP Waster water testing - EPL307	TWP - Site SP1	DUP1	1
OCTOBER 2023 - RESULTS				
RptUnits				
PQL				
Matrix	Tide approx 3.1m (outgoing)			
Method				
PEJ0820	TWP Waster water testing - EPL307	TWP - Site SP1	01	0
PEJ0820	TWP Waster water testing - EPL307	TWP - Site SP 2	02	0
PEJ0820	TWP Waster water testing - EPL307	TWP - Site SP 3	03	0
BEJ1628	TWP Waster water testing - EPL307	TWP - Site SP1	DUP1	1
NOVEMBER 2023 - RESULTS				
RptUnits				
PQL				
Matrix	Tide Approx 2.9m (incoming)			
Method				
PEK1679	TWP Waster water testing - EPL307	TWP - Site Sp1	01	0
PEK1679	TWP Waster water testing - EPL307	TWP - Site Sp 2	02	0
PEK1679	TWP Waster water testing - EPL307	TWP - Site Sp 3	03	0
BEK2967	TWP Waster water testing - EPL307	TWP - Site Sp 3	DUP2	1
BEK3086	TWP Waster water testing - EPL307	TWP - Site Sp1	DUP1	1
DECEMBER 2023 - RESULTS				
RptUnits				
PQL				
Matrix	Tide Approx 2.8m (outgoing)			
Method				
PEL0965	TWP Waster water testing - EPL307	TWP - Site SP1	01	0
PEL0965	TWP Waster water testing - EPL307	TWP - Site SP 2	02	0
PEL0965	TWP Waster water testing - EPL307	TWP - Site SP 3	03	0
JANUARY 2024 - RESULTS				
RptUnits				
PQL				
Matrix	Tide Approx 1.8 (outgoing)			
Method				
PFB0464	TWP Waster water testing - EPL307	TWP - Site Sp1	01	0
PFB0464	TWP Waster water testing - EPL307	TWP - Site Sp 2	02	0
PFB0464	TWP Waster water testing - EPL307	TWP - Site SP 3	03	0
BFB1429	TWP Waster water testing - EPL307	TWP - Site SP 3	DUP2	1
FEBRUARY 2024 - RESULTS				
RptUnits				
PQL				
Matrix	Tide 1.7m (incoming)			
Method				
PFB0464	TWP Waster water testing - EPL307	TWP - Site Sp1	01	0
PFB0464	TWP Waster water testing - EPL307	TWP - Site Sp 2	02	0
PFB0464	TWP Waster water testing - EPL307	TWP - Site SP 3	03	0
BFB1429	TWP Waster water testing - EPL307	TWP - Site SP 3	DUP2	1
MARCH 2024 - RESULTS				
RptUnits				

PQL				
Matrix	Tide Approx 1.8 (outgoing)			
Method				
PEL0965	TWP Waster water testing - EPL307	TWP - Site SP1	01	0
PEL0965	TWP Waster water testing - EPL307	TWP - Site SP 2	02	0
PEL0965	TWP Waster water testing - EPL307	TWP - Site SP 3	03	0

LICENCE WASTE WATER TESTING MARCH 2023 to MARCH 2024

Date Sampled	Type of Sample	Inorganics - Physical Parameters		
		pH	Electrical Conductivity	Turbidity
		pH units	µS/cm	NTU
			2.0	0.10
		Water	Water	Water
		INORG-001	INORG-002	INORG-022
08/03/2023	Water	7.3	51	11
08/03/2023	Water	7.4	240	2.9
08/03/2023	Water	7.1	48	12
		pH units	µS/cm	NTU
			2.0	0.10
		Water	Water	Water
		INORG-001	INORG-002	INORG-022
12/04/2023	Water	7.6	150	4.4
12/04/2023	Water	7.4	260	2.3
12/04/2023	Water	7.8	150	4.1
12/04/2023	Water	7.7	151	
		pH units	µS/cm	NTU
			2.0	0.10
		Water	Water	Water
		INORG-001	INORG-002	INORG-022
22/05/2023	Water	7.9	320	0.53
22/05/2023	Water	7.7	350	0.84
22/05/2023	Water	8.0	1300	0.68
22/05/2023	Water			
22/05/2023	Water	7.9	318	
		pH units	µS/cm	NTU
			2.0	0.10
		Water	Water	Water
		INORG-001	INORG-002	INORG-022
14/06/2023	Water	8.0	350	0.75
14/06/2023	Water	7.9	370	1.1
14/06/2023	Water	8.1	760	0.87
14/06/2023	Water			0.760
14/06/2023	Water			
		pH units	µS/cm	NTU
			2.0	0.10
		Water	Water	Water
		INORG-001	INORG-002	INORG-022
12/07/2023	Water	7.9	360	0.72
12/07/2023	Water	7.7	380	0.70
12/07/2023	Water	8.1	1200	0.83
12/07/2023	Water	7.9	357	
		pH units	µS/cm	NTU
			2.0	0.10
		Water	Water	Water
		INORG-001	INORG-002	INORG-022
16/08/2023	Water	8.1	350	0.69
16/08/2023	Water	7.8	390	0.83
16/08/2023	Water	7.8	6800	1.2

16/08/2023	Water			
		pH units	µS/cm	NTU
			2.0	0.10
		Water	Water	Water
		INORG-001	INORG-002	INORG-022
13/09/2023	Water	8.0	350	0.52
13/09/2023	Water	7.7	380	0.70
13/09/2023	Water	7.9	11000	0.97
13/09/2023	Water	7.9	10900	
13/09/2023	Water			
		pH units	µS/cm	NTU
			2.0	0.10
		Water	Water	Water
		INORG-001	INORG-002	INORG-022
11/10/2023	Water	8.0	350	1.3
11/10/2023	Water	7.8	410	1.1
11/10/2023	Water	7.9	11000	2.2
11/10/2023	Water			
		pH units	µS/cm	NTU
			2.0	0.10
		Water	Water	Water
		INORG-001	INORG-002	INORG-022
22/11/2023	Water	8.0	370	0.64
22/11/2023	Water	7.6	420	1.4
22/11/2023	Water	7.9	11000	1.4
22/11/2023	Water			1.38
22/11/2023	Water			
		pH units	µS/cm	NTU
			2.0	0.10
		Water	Water	Water
		INORG-001	INORG-002	INORG-022
13/12/2023	Water	7.6	280	4.1
13/12/2023	Water	7.8	450	6.4
13/12/2023	Water	7.9	9800	2.0
		pH units	µS/cm	NTU
			2.0	0.10
		Water	Water	Water
		INORG-001	INORG-002	INORG-022
07/02/2024	Water	7.5	170	3.2
07/02/2024	Water	7.4	230	2.8
07/02/2024	Water	7.7	170	5.7
07/02/2024	Water			
		pH units	µS/cm	NTU
			2.0	0.10
		Water	Water	Water
		INORG-001	INORG-002	INORG-022
07/02/2024	Water	7.5	170	3.2
07/02/2024	Water	7.4	230	2.8
07/02/2024	Water	7.7	170	5.7
07/02/2024	Water			
		pH units	µS/cm	NTU

			2.0	0.10
		Water	Water	Water
		INORG-001	INORG-002	INORG-022
	Water			
	Water			
	Water			

Inorganics - Nutrients				
Total Nitrogen	Total Phosphorus	Temp	DO p mg/l	DO %
mg/L	mg/L			
0.10	0.010			
Water	Water			
INORG-127	INORG-060_TP			
0.64	<0.010	28.8	6.68	86.6%
0.55	<0.010	27.7	4.98	63.4%
0.54	<0.010	29	6.74	87.7%
mg/L	mg/L			
0.10	0.010			
Water	Water			
INORG-127	INORG-060_TP			
0.69	<0.010	28.7	7.28	94.0%
0.65	0.018	27.9	5.17	65.9%
0.35	0.011	29.2	7.06	92.1%
mg/L	mg/L			
0.10	0.010			
Water	Water			
INORG-127	INORG-060_TP			
<0.10	0.013	27.8	5.59	70.7%
0.18	0.030	23	7	81.2%
<0.10	0.014	26.2	7.41	91.0%
	0.0122			
mg/L	mg/L			
0.10	0.010			
Water	Water			
INORG-127	INORG-060_TP			
<0.10	<0.010	28.9	5.87	76.0%
0.35	0.038	25.5	5.46	66.5%
<0.10	<0.010	28.8	7.89	101.6%
	<0.010			
mg/L	mg/L			
0.10	0.010			
Water	Water			
INORG-127	INORG-060_TP			
0.14	<0.010	28.5	3.23	41.5%
0.32	0.024	28.1	4.29	54.6%
0.10	<0.010	28.1	4.29	54.6%
mg/L	mg/L			
0.10	0.010			
Water	Water			
INORG-127	INORG-060_TP			
0.12	<0.010	29.4	7.99	101.4%
0.18	<0.010	25.4	7.5	91.1%
0.19	<0.010	26.9	8.78	109.4%

	<0.010			
mg/L	mg/L			
0.10	0.010			
Water	Water			
INORG-127	INORG-060_TP			
0.14	<0.010	29.7	5.34	69.8%
0.19	0.025	27.4	3.0	37.7%
0.15	0.019	29.2	6.19	8.3%
	<0.010			
mg/L	mg/L			
0.10	0.010			
Water	Water			
INORG-127	INORG-060_TP			
0.18	<0.010	30.0	8.19	107.9%
0.17	0.018	28.5	8.29	106.4%
0.15	0.015	30.0	11.8	155.9%
0.160				
mg/L	mg/L			
0.10	0.010			
Water	Water			
INORG-127	INORG-060_TP			
0.25	<0.010	29.7	5.64	74.1%
0.29	<0.010	28.3	2.43	31.2%
0.22	<0.010	29.9	6.29	83.0%
	<0.010			
mg/L	mg/L			
0.10	0.010			
Water	Water			
INORG-127	INORG-060_TP			
0.50	<0.010	28.0	1.97	25.3%
0.87	0.047	28.8	3.02	39.3%
0.34	0.015	31.0	5.69	76.7%
mg/L	mg/L			
0.10	0.010			
Water	Water			
INORG-127	INORG-060_TP			
0.35	0.018	28.7	6.55	85.1%
0.44	0.025	28.5	3.74	48.3%
0.40	0.018	28.9	7.75	101.0%
	0.0188			
mg/L	mg/L			
0.10	0.010			
Water	Water			
INORG-127	INORG-060_TP			
0.35	0.018	29.9	3.7	49.0%
0.44	0.025	28.7	2.87	37.2%
0.40	0.018	30.1	5.54	73.0%
	0.0188			
mg/L	mg/L			

0.10	0.010			
Water	Water			
INORG-127	INORG-060_TP			

Appendix A – Monitoring Program

Table 1 Surface Water Monitoring Program

Site Code Longitude Latitude			Sample Locations		
			SP1	SP2	SP3
			130°59'43.60"E	130°59'37.65"E	130°59'35.95"E
			12°42'4.38"S	12°42'4.98"S	12°41'47.61"S
Parameter	Units	Analysis	Frequency		
Field Measurement					
Flow	L/s	Field	Monthly during discharge events*		
pH	pH units				
Electrical Conductivity (EC)	µS/cm				
Dissolved Oxygen (DO)	% saturation				
Temperature	°C				
Turbidity	NTU				
Nutrients					
Total Phosphorous	µg/L	Unfiltered	Monthly during discharge events*		
Total Nitrogen					

*75% of sample events must be conducted during a backflush event.

Appendix A – Monitoring Program

Table 2 Surface Water Monitoring trigger values

Parameter	Units	Trigger values
Physical Parameters		
pH	pH units	7.0 – 8.0 ¹
Electrical Conductivity (EC)	µS/cm	320 – 390 ¹
Dissolved Oxygen (DO)	% saturation	85 – 120 ²
Turbidity	NTU	2 – 15 ²
Nutrients		
Total Phosphorous	µg/L	10 ²
Total Nitrogen		300 ²

¹Darwin Harbour Water Quality Objectives for freshwater rivers and streams

²Australian and New Zealand Guidelines for Fresh and Marine Water Quality – Volume 1 – Chapter 2 – Aquatic ecosystems (ANZECC, 2000)