Technical Memorandum

To:	Outcross NRLX (Tony Dean)
From:	AWC – Will Dale, Jesse Munro
Date:	29th January 2025
Pg/Attach.:	10 pages plus Attachments
Job ref:	1-201354_05_21a_NRLX_GW_SW_EFF_

Northern Rivers Livestock Exchange (NRLX): Environmental Monitoring Report (December 2024)

AWC commenced routine environmental monitoring at the NRLX in June 2021. Monitoring includes extraction of groundwater samples from monitoring bores, collection of water samples from the effluent storage/irrigation ponds and surface waters. Soil samples are also collected from the irrigation zone annually and results are included in a separate report (March). Under the current environmental protection license (EPL) quarterly collection of water samples from surface waters, effluent storage/irrigation ponds and monitoring of ground water field parameters are required. Table 1 provides details of the EPL and project.

Table 1 Site and project details

NRLX	
Site Identification	Lot 1 DP 1240949, Dargaville Drive, Casino NSW 2470
Current reporting period	December 2024 (Quarterly monitoring)
EPL	3878 (7-Jun-2023)
Attachments	Attachment 1 Historic treated effluent quality monitoring results Attachment 2 Historic monitoring results (field parameters) for GW1, GW2 and GW3 Attachment 3 Historic monitoring results for SW1 trigger event Attachment 4 Historic monitoring results for SW2 trigger event Attachment 5 Site Map Attachment 6 Laboratory sheets

1.0 Summary

The following is a summary of the current monitoring results:

- All treated effluent (EPA1) analyte concentrations are within the historical range of values
- Field parameters for groundwater (EPA4, EPA5, EPA6) typically exceeded relevant field monitoring WQOs
- Surface water (EPA7, EPA8) results were all within the existing ranges with many analytes exceeding the site based WQOs

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1.1 Water Quality Objectives

Water Quality Objectives (WQO) were sourced from *Environmental Earth Services* (EES, 2019), as provided in Table 2 below and are attributable to groundwater and surface water. There are no trigger values as part of the EPL.

Table 2 Water Quality Objectives (Sourced ESS 2019)

Analyte	WQO
pH	6.5 – 8.0
EC (dS/m)	0.125 – 2.2
Thermotolerant coliforms (cfu/100 mL)	1000
BOD_5 (mg/L)	15
Total Suspended Solids (TSS) (mg/L)	40
Chlorophyll *'a'* (mg/L)	0.003
Dissolved Oxygen (DO) (%)	85 - 110

Analyte	WQO
Total Nitrogen (TN) (mg/L)	0.35
Oxidised Nitrogen (NOx) (mg/L)	0.04
Ammonia (mg/L)	0.02
Total Phosphorus (TP) (mg/L)	0.025
Plant available Phosphorus (mg/L)	0.02

1.2 Weather Monitoring – Rainfall

Monthly rainfall totals recorded at the Casino Airport (BOM station 058208) for September (82.2 mm), October (145.8 mm) and November (147.8 mm) were above their respective historic averages of 35.4 mm, 70.7 mm and 106.0 mm. (refer Figure 1).

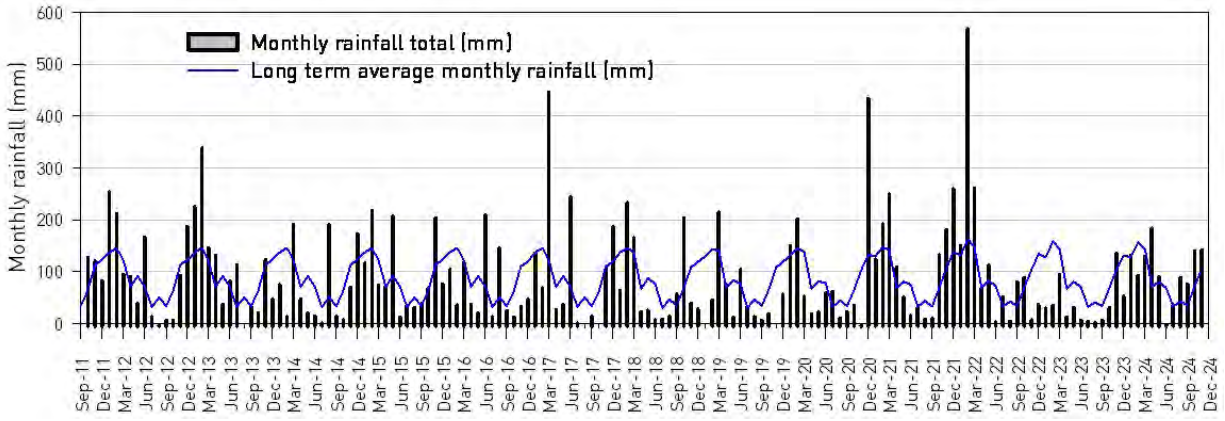

Figure 1 Monthly rainfall records and long-term averages Source: BOM station 058208 Casino Airport)

2.0 Surface Water Monitoring (EPA7, EPA8)

Routine surface water sampling was undertaken by AWC on the 10th of December 2024. The locations of the sampling sites are shown in the attached site plan.

2.1 Surface Water Quality Results

EAL performed all analysis. A summary of monitoring results compared with WQOs, and summary descriptive statistics of the historic data set are provided in Table 3 and Table 4. Selected parameters are shown in graph form in Figure 2. Key findings include:

SW1 (EPA7)

- Ammonia (0.077 mg/L), Chlorophyll *'a'* (0.064 mg/L), Nitrate & Nitrite (0.225 mg/L), TN (1.35 mg/L), TP (0.133 mg/L), Phosphate (0.024 mg/l) and Thermotolerant Coliforms (10800 cfu/100 mL) recorded values above their respective WQOs
- Thermotolerant Coliforms (10800 cfu/100 mL) recorded a value above the 75th%ile
- BOD (1.8 mg/L) and DOC (16.9mg/L) recorded values below their respective 25th%iles

SW2 (EPA8)

- Ammonia as N (0.083 mg/L), Chlorophyll *'a'* (0.28 mg/L), TN (2.74 mg/L), TP (0.953), Phosphate (0.039 mg/L), Suspended Solids (2020 mg/L) and Thermotolerant Coliforms (8000 cfu/100 mL) recorded values above their respective WQOs
- Nitrate recorded a value below its detection limit
- BOD (3.1 mg/L), Nitrate & Nitrite (0.012 mg/L), Nitrite (0.007 mg/L) and Phosphate (0.039 mg/L) recorded values below their respective 25th%ile
- Suspended Solids (2020 mg/L) recorded a value above its 75th%ile

Table 3 Current results for SW1 (EPA7) with a summary statistics of the historic data set

SW1 (EPA 7) – current monitoring results, WQOs and summary statistics									
Parameter	**WQOs**	**Current**	**n**	**Min.**	**Max.**	**Mean**	**Median**	**25th %ile**	**75th %ile**
pH	6.5-8.0	7.58	23	6.18	8.38	7.52	7.59	7.03	8.06
EC (dS/m)	0.125-2.2	0.48	22	0.0154	5.08	1.17	1.13	0.45	1.33
TDS (mg/L)	-	326	20	110	1648.0	671.82	743.00	254.75	869.5
Ammonia (mg/L as N)	0.002	**0.077**	23	0.005	8.69	0.56	0.08	0.02	0.32
BOD (BOD5 mg/L)	15	1.8	22	1	13.20	3.76	3.05	1.88	5.00
Chlorophyll *'a'*	0.003	**0.064**	20	0.005	7.50	0.67	0.03	0.01	0.08
Dissolved Organic Carbon (mg/L)	-	16.9	20	14	43.80	23.84	21.60	17.68	28.98
Nitrate & Nitrite (mg/L as N)	-	**0.225**	23	0.01	13.34	1.31	0.14	0.02	1.61
Nitrate (mg/L as N)	-	0.197	23	0.005	12.97	1.24	0.11	0.01	1.51
Nitrite (mg/L as N)	-	0.028	23	0.005	0.37	0.07	0.02	0.01	0.06
Total Kjeldahl Nitrogen (mg/L as N)	-	1.13	22	0.147	9.52	2.12	1.40	1.10	2.76
Total Nitrogen (mg/L as N)	0.35	**1.35**	22	0.147	17.32	3.50	2.20	1.34	3.36
Total Phosphorus (mg/L P)	0.025	**0.133**	22	0.01	1.26	0.17	0.09	0.05	0.15
Phosphate (mg/L P)	0.02	**0.024**	22	0.005	0.21	0.05	0.02	0.01	0.07
Suspended Solids (mg/L)	40	36	22	4	527	48.35	26	10.33	39.5
Thermotolerant Coliforms (cfu/100mL)	1000	**10800**	21	10	65000	5525.5	1560	340	5200
# Bold denotes exceedance of WQO									

Table 4 Current results for SW2 (EPA8) with a summary statistics of the historic data set

SW2 (EPA 8) – current monitoring results, WQOs and summary statistics									
Parameter	WQOs	Current	n	Min.	Max.	Mean	Median	25th %ile	75th %ile
pH	6.5-8.0	6.85	23	6.24	8.85	7.13	7.02	6.63	7.46
EC dS/m	0.125-2.2	0.556	22	0.204	1.24	0.61	0.584	0.4175	0.731
TDS	-	378	20	160	841	451.65	419	364.5	552.5
Ammonia (as N)	0.002	0.083	23	0.005	1.3	0.16	0.06	0.03	0.139
(BOD-5 Day)	15	3.1	22	2.4	175	18.10	5	3.175	9.2
Chlorophyll '*a*'	0.003	0.28	21	0.004	5	0.61	0.087	0.013	0.315
Dissolved Organic Carbon	-	20	21	16	53.6	28.22	24.2	18.2	37.15
Nitrate & Nitrite (as N)	-	0.012	23	0.01	1.57	0.26	0.035	0.017	0.374
Nitrate (as N)	-	0.005	23	0.005	1.491	0.20	0.015	0.005	0.309
Nitrite (as N)	-	0.007	23	0.005	0.47	0.06	0.02	0.012	0.05
Total Kjeldahl Nitrogen (as N)	-	2.73	21	1	57.2	5.66	2.28	1.27	3.665
Total Nitrogen (as N)	0.35	2.74	22	1.13	57.2	5.74	2.45	1.3825	3.865
Total Phosphorus (mg/L P)	0.025	0.953	21	0.28	31.7	3.38	0.66	0.36	2.485
Phosphate (mg/L P)	0.02	0.039	23	0.01	3.74	0.52	0.12	0.077	0.511
Suspended Solids	40	2020	22	8	30540	1853.3	84.83	25.75	384.5
Thermotolerant Coliforms	1000	8000	21	100	188000	14598.1	2900	665	10000
# Bold denotes exceedance of WQO									

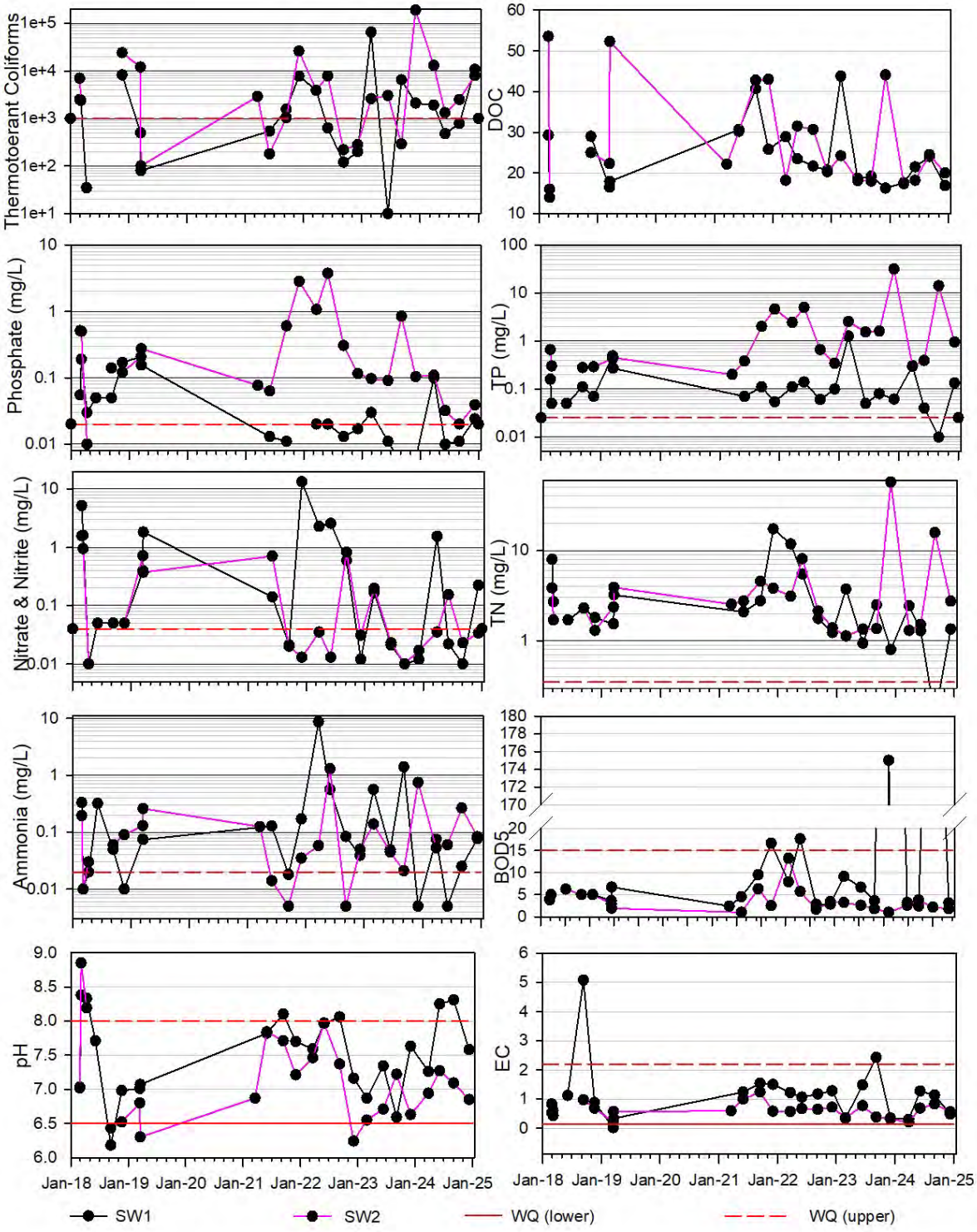

Figure 2 Surface water quality (EPA7, EPA8) graphs – routine monitoring only (select parameters)

3.0 Treated Effluent (EPA1) Monitoring

Sampling was undertaken by AWC in accordance with the EP Licence and EPA approved guidelines. Table 5 provides details of the effluent sampling. EAL performed all analysis.

Table 5 Treated Effluent (EPA1) Quality Monitoring details

Treated Effluent Quality Monitoring (EPA1) sampling details – NRLX	
Sample date	10/12/2024
Sampled by	Will Dale (AWC)
Sample time	12:45
Location	EPA1 shown on the site plan attached
Sample collection methods	Grab sample extracted from treatment pond adjacent the pump station: Sample bottle is rinsed three times with sample water prior to filling the bottle. Sample bottle is capped, minimising the air bubbles in the bottle, kept cool (stored on ice) and out of direct sunlight and sent/delivered to EAL for analysis.
Sample analytes	Refer results tables below and laboratory results sheets attached
Sample frequency	Quarterly

3.1 Treated Effluent (EPA1) Quality Results

Treated effluent results indicate the quality of water disposed via irrigation. Historic data is included in graph form and statistical summary. Table 6 shows the current monitoring results alongside summary statistics of the total data set for context. Figure 3 shows selected historic monitoring results in graph form. The entire data set and laboratory results sheet are included as an attachment.

Table 6 Treated effluent (EPA1) monitoring - current results and summary statistics of historic data set (select parameters)

Analyte	Unit	Current result	n	Min.	Max.	Mean	75th %ile	Median	25th %ile
Electrical Conductivity	(dS/m)	1.28	44	0.42	2.21	1.39	1.67	1.42	1.2
pH		8.86	44	7.62	9.53	9.1	9.07	8.73	8.18
Reactive Phosphorus	(mg/L)	1.32	43	0.434	10.7	4.47	4.47	2.77	1.86
Total Phosphorus	(mg/L)	1.79	44	1.3	13	5.54	5.54	4.6	2.692
Suspended Solids	(mg/L)	39	44	11	1500	131	132	77.5	36
Total Dissolved Solids	(mg/L)	868	18	323	1503	796	944	805	579.75
Total Nitrogen	(mg/L)	4.55	44	1.9	14	6.59	8.74	6.23	4.07
Alkalinity as calcium carbonate	(mg/L)	382	28	112	620	398	480	409	344.75
Sodium	(mg/L)	114	28	38.7	1100	298.6	514.5	126	104.75
Sodium Adsorption Ratio		4	18	1.9	5.40	3.6	4.29	3.75	2.98
Thermotolerant Coliforms	(cfu / 100ml)	NR	8	80	8000	2974	5675	2180	817.5

Key findings of the treated effluent monitoring include:

- All recorded concentrations are within the existing range of historic values
- Nutrient concentrations are high, as expected
  - All nutrient values are within the historic range

- Reactive Phosphorus (1.32 mg/L) and TP (1.79 mg/L) recorded values below their respective 25th%iles
- The SAR value of 4.0 is in the preferred range of <6, with the relationship to EC being in the preferred range in accordance with the DEC (2004) (*Environmental Guidelines: Use of Effluent for Irrigation*)
    - Effluent with a SAR (sodium adsorption ratio) of greater than 6 has been shown to raise exchangeable sodium percentage (ESP) in non-sodic soils, creating soils with poor structure that are susceptible to dispersion where effluent with a SAR of less than 3 may lower ESP in sodic soils.

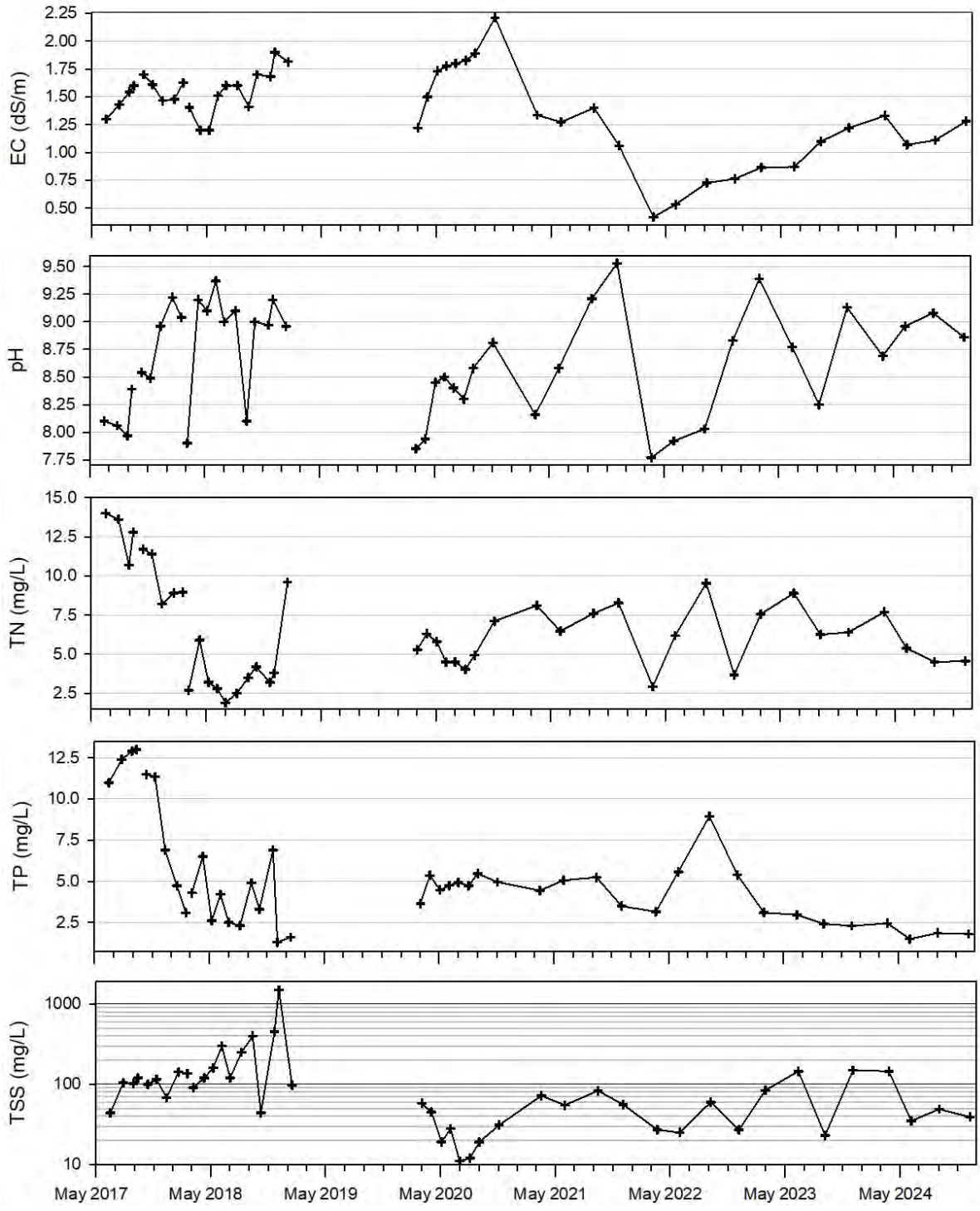

Figure 3 Historic treated effluent quality (EPA1) monitoring, select parameters (AWC commenced monitoring in March 2021)

4.0 Groundwater Quality Monitoring (EPA4, EPA5, EPA6)

Three groundwater monitoring bores have samples extracted on a quarterly basis with field parameters recorded. Laboratory analysis is undertaken on a six-monthly basis and was not performed during this sampling period. Bore locations are presented on the attached site plan. Groundwater is sampled as a requirement of Section P1.2 and M2 of EPL 3878. Table 7 provides details of the groundwater sampling.

Table 7 Groundwater Quality Monitoring details

Groundwater Quality Monitoring sampling details – NRLX			
Sample date	10/12/2024		
Sampled by	Will Dale (AWC)		
Sample time	GW1 (EPA4) 14:05	GW2 (EPA5) 13:25	GW3 (EPA6) 14:40
Location	GW1, GW2 and GW3; shown on the site plan attached		
Sample collection methods	Groundwater samples are extracted using a 50mm submersible bore pump. Bore purging followed methods set out in Sandaran *et al.* (2009); briefly, at least three times the volume of the bore (3 x πr^2 x height) was extracted before. Field parameters are recorded and laboratory samples are collected (6-monthly)		
Sample analytes	Refer results tables below (only field parameters are sampled for the quarterly sampling period).		
Sample frequency	Quarterly (some analytes only analysed quarterly)		

4.1 Groundwater Quality Monitoring Results – Field Parameters Only

Scheduled monitoring of field parameters (pH, Conductivity, ORP, DO and Temperature) with a calibrated water quality probe. Field results are shown in Table 8, historical groundwater results are shown in Attachment 3.

Table 8 Groundwater field monitoring results

Groundwater Field Monitoring sampling details – NRLX				
Sampled by		Will Dale (AWC)		
Site		GW1 (EPA4)	GW2 (EPA5)	GW3 (EPA6)
Sample time		14:05	13:25	14:40
Parameters	**WQO**			
Purge Volume (L)		35	47	44
EC (ds/m)	0.25-2.2	1.704	**5.248**	**4.13**
pH	6.5-8.0	6.70	**5.79**	6.72
ORP		NA	NA	NA
DO (%)	85-110	**71**	86.8	**63.7**
Temp		21.48	22.46	20.09
Odour		None	None	None
Colour		Cloudy brown/turbid	Pale brown, turbid	Pale brown, turbid
Bold and shaded cell denotes outside WQO value range				

Attachment 1 Historic treated effluent (EPA1) quality monitoring results

Date	Sampler	Electrical Conductivity	pH	Reactive Phosphorus	Total Phosphorus	Suspended Solids	Total Dissolved Solids	Total Nitrogen	Alkalinity (as calcium carbonate)	Sodium	Sodium Adsorption Ratio	Thermotolerant Coliforms
		(dS/m)		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)		(cfu / 100ml)
Monitoring Frequency		**Quarterly**	**Quarterly**	**Quarterly**	**Quarterly**	**Quarterly**	**Quarterly**	**Quarterly**	**Quarterly**	**##**	**Quarterly**	**Yearly**
16/06/2017		1.30	8.1	10.1	11.0	44	NR	14.0	390	468	NR	NR
27/07/2017		1.43	8.06	9.76	12.4	104	NR	13.6	NR	NR	NR	NR
29/08/2017		1.54	7.97	10.7	12.9	102	NR	10.7	NR	NR	NR	NR
12/09/2017		1.60	8.39	9.9	13.0	120	NR	12.8	NR	NR	NR	NR
12/09/2017		NR	NR	NR	NR	NR	NR	NR	520	545	NR	NR
13/10/2017		1.70	8.54	7.2	11.5	100	NR	11.7	NR	NR	NR	NR
10/11/2017		1.61	8.49	9.42	11.35	115.12	NR	11.4	NR	NR	NR	NR
12/12/2017		1.466	8.96	4.97	6.9	68	NR	8.21	480	563	NR	NR
19/01/2018		1.48	9.22	2.663	4.72	142	NR	8.91	540	530	NR	NR
16/02/2018		1.627	9.04	1.93	3.08	136	NR	8.96	NR	NR	NR	NR
12/12/2017		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
7/03/2018		1.404	7.9	2.9	4.3	91	NR	2.7	410	140	NR	2400
11/04/2018	RVC	1.2	9.2	2.6	6.5	120	NR	5.9	NR	NR	NR	NR
9/05/2018	RVC	1.2	9.1	2.6	2.6	160	NR	3.2	NR	NR	NR	NR
6/06/2018	EES	1.51	9.37	2	4.2	300	NR	2.8	520	960	NR	NR
2/07/2018	RVC	1.6	9	<0.05	2.5	120	NR	1.9	NR	1000	NR	NR
7/08/2018	RVC	1.6	9.1	1.8	2.3	250	NR	2.5	NR	1100	NR	NR
12/09/2018	EES	1.41	8.1	1.8	4.9	400	NR	3.5	620	1000	NR	NR
8/10/2018	RVC	1.7	9	1.4	3.3	44	NR	4.2	NR	NR	NR	NR
20/11/2018	EES	1.682	8.97	3.1	6.9	450	NR	3.2	530	170	NR	NR
4/12/2018	RVC	1.9	9.2	0.8	1.3	1500	NR	3.8	NR	NR	NR	NR
15/01/2019	RVC	1.815	8.96	1.1	1.6	97	NR	9.6	NR	NR	NR	NR
1/02/2019	RVC	Dry Ponds – no samples taken										
1/03/2019	EES											
1/04/2019	RVC											
1/05/2019	RVC											
1/06/2019	EES											
1/07/2019												
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1/10/2019												
1/11/2019												
1/12/2019												
1/01/2020												
1/02/2020												
3/03/2020	EES	1.22	7.85	3.149	3.65	58	NR	5.29	340	120	NR	NR
2/04/2020	RVC	1.498	7.94	3.981	5.35	45	NR	6.31	NR	NR	NR	NR
4/05/2020	RVC	1.73	8.45	2.77	4.47	19	NR	5.8	NR	NR	NR	NR
2/06/2020	EES	1.777	8.5	3.86	4.74	28	NR	4.5	480	171	NR	NR
3/08/2020	RVC	1.829	8.3	4.47	4.73	12	NR	4.03	NR	NR	NR	80
1/09/2020	EES	1.89	8.58	4.47	5.46	19	1285	4.93	605	NR	5.2	NR
3/11/2020	EES	2.211	8.81	0.434	4.95	31	1503	7.12	395	NR	5.4	NR
18/03/2021	AWC (AL)	1.336	8.16	3.637	4.428	72	936	8.107	462	131.73	4.08	1960
01/06/2021	AWC (AL)	1.273	8.58	4.21	5.06	55	816	6.48	193	104	3.3	NR
14/09/2021	AWC (AL)	1.4	9.21	3.54	5.24	83	967	7.6	466	125	3.7	NR
3/12/2021	AWC (AL)	1.06	9.53	2.32	3.49	56	447	8.28	411	109	3.8	NR
21/03/2022	AWC (AL)	0.419	7.77	2.53	3.15	27	323	2.93	140	38.7	1.9	610
2/06/2022	AWC (AL)	0.535	7.62	4.98	5.57	25	425	6.19	195	47.1	2	NR
8/09/2022	AWC (AL)	0.727	8.03	5.17	8.95	60	504	9.54	254	65	2.3	NR

Date	Sampler	Electrical Conductivity	pH	Reactive Phosphorus	Total Phosphorus	Suspended Solids	Total Dissolved Solids	Total Nitrogen	Alkalinity (as calcium carbonate)	Sodium	Sodium Adsorption Ratio	Thermotolerant Coliforms
		(dS/m)		**(mg/L)**	**(mg/L)**	**(mg/L)**	**(mg/L)**	**(mg/L)**	**(mg/L)**	**(mg/L)**		**(cfu / 100ml)**
6/12/2022	AWC (AL)	0.763	8.83	4.55	5.39	27	605	3.67	280	60.7	2.3	NR
28/02/2023	AWC (AL)	0.866	9.39	1.86	3.1	84	712	7.56	112	86.6	3.2	2600
13/06/2023	AWC (AL)	0.871	8.77	1.936	2.968	145	626	8.896	359	95	3.21	NR
6/09/2023	AWC (AL)	1.1	8.25	1.98	2.41	23	860	6.26	408	107	3.4	1440
4/12/2023	AWC (WD)	1.22	9.13	1.45	2.29	150	971	6.4	449	122	3.8	NR
27/03/2024	AWC (WD)	1.33	8.69	2.02	2.44	145	913	7.7	399	127	4.6	6700
6/06/2024	AWC (WD)	1.07	8.96	1.13	1.49	35	768	5.38	380	125	4.22	NR
3/09/2024	AWC (WD)	1.11	9.08	1.41	1.85	49	794	4.51	424	136	4.48	8000
10/12/2024	AWC (WD)	1.28	8.86	1.32	1.79	39	868	4.55	382	114	4	NR

##=no longer required as part of EPL
NR = not required during the monitoring period
Values in red denote results reported as less than (<)

Attachment 2 Historic monitoring results (field parameters) for GW1 (EPA4), GW2 (EPA5) and GW3 (EPA6)

Sampler	Date	Time	Purge Volume (L)	EC (dS/m)	pH	ORP	DO	Temp	Odour	Colour
GW1 (EPA4) Field Parameters										
Trigger values				**0.25-2.2**	**6.5-8.0**		**85-110**			
Michael K - EES	3/03/2020		12	**3.21**	**6.21**	-88.00		24.30	none	Cloudy brown
Amy Whitley - EES	2/06/2020		13	**3.52**	6.73	60.80		20.30	none	Milky brown
Daniel White - EES	1/09/2020		14	**2.85**	7.44	-64.00		20.40	none	Brown turbid
Daniel White- EES	3/11/2020		10	**3.23**	**5.49**	85.00		20.50	none	Brown turbid
AWC (AL)	18/03/2021	12:00	49	**2.54**	**6.39**	128.90	**51.0**	26.70	none	cloudy/milky
AWC (AL)	1/06/2021	12:30	35	2.03	**6.17**	179.80	**53.2**	20.30	none	Milky brown
AWC (JM)	*21/06/2021	14:20	30	**2.39**	**4.28**	405.00	**47.2**	-	none	Yellow/brown
AWC (AL)	14/09/2021	10:20	27	**3.6**	**6.01**	105.80	**55.0**	21.20	none	Milky brown
AWC (AL)	3/12/2021	13:25	32	1.56	**6.24**	43.6	**38.91**	26.23	None	Milky/Brown
AWC (AL)	21/03/2022	12:00	35	1.62	**6.35**	86.00	**36.0**	23.10	None	Milky brown/ turbid
AWC (AL)	2/06/2022	12:45	33	0.76	6.13	165	82	21.6	None	Milky brown
AWC (AL)	8/09/2022	14:00	31	0.995	6.88	36	**34.1**	21.8	None	Cloudy Brown/ Turbid
AWC (AL)	28/02/2023	10:30	28	**2.504**	**6.25**	33.00	**19.01**	26.10	None	Cloudy Brown/ Turbid
AWC (AL)	13/06/2023	12:30	29	**2.95**	**6.15**	24.1	**18.35**	24.5	None	Cloudy Brown/ Turbid
AWC (AL)	06/09/2023	12:00	27	**3.6**	**5.83**	-69.8	**41.9**	23.7	None	Cloudy Brown/ Turbid
AWC (WD)	4/12/2023	16:40	25	**2.7**	**6.18**	74	**32.08**	28	None	Cloudy Brown/ Turbid
AWC (WD)	27/03/2024	8:10	35	0.936	6.23	15.59	65.02	23.28	None	Cloudy Brown/ Turbid
AWC (WD)	6/06/2024	15:45	32	0.647	6.72	102.47	71.57	20.31	none	Cloudy Brown/ Turbid
AWC (WD)	3/09/2024	14:10	31	**2.41**	**6.15**	3.00	**49.50**	19.87	None	Cloudy Brown/ Turbid
AWC (WD)	10/12/2024	14:05	35	1.704	6.70	NA	**71.00**	21.48	None	Cloudy Brown/ Turbid
GW2 (EPA5) Field Parameters										
Michael K - EES	3/03/2020		22	**3.89**	6.06	-81.40		24.80	none	Cloudy
Amy Whitley - EES	2/06/2020		15	**3.75**	6.73	20.00		20.70	none	Cloudy brown
Daniel White - EES	1/09/2020		17	**3.23**	7.07	64.00		21.70	none	Cloudy brown
Daniel White- EES	3/11/2020		-	**22.5**	6.54	86.00		20.80	none	Brown
AWC (AL)	17/03/2021	12:25	47	**5.78**	**5.71**	162	**30.08**	22.3	none	Milky / cloudy
AWC (AL)	1/06/2021	11:45	47	**7.57**	**5.61**	421	**45.5**	21.6	none	Cloudy/Reddish/Brown
AWC (JM)	*21/06/2021	14:40	42	**5.39**	**6.31**	150	**54.9**	-	none	Brownish yellow
AWC (AL)	14/09/2021	9:50	39	**5.24**	**6.1**	73.9	**55**	20.1	none	Brownish yellow
AWC (AL)	3/12/2021	13:00	42	**4.64**	**6.09**	31.3	**36.06**	24.66	None	Cloudy/Reddish/Brown
AWC (AL)	21/03/2022	11:00	50	**6.71**	**5.01**	71	**32.1**	23.4	none	Cloudy brown
AWC (AL)	2/06/2022	12:00	46	**6.15**	**4.61**	341	**65.59**	21.2	none	Cloudy brown
AWC (AL)	8/09/2022	13:30	45	**5.98**	**5.98**	107	**60**	22.1	none	Cloudy brown/yellow
AWC (AL)	28/02/2023	11:00	42	**4.581**	**6.19**	25	**59**	26.88	None	Cloudy brown
AWC (AL)	13/06/2023	12:00	41	**4.75**	**5.93**	104	**23.9**	22.6	None	Cloudy brown
AWC (AL)	06/09/2023	11:40	40	**4.24**	**6.2**	-143.04	**44.8**	28.8	None	Clear
AWC (WD)	4/12/2023	16:00	40	**3.57**	**6.61**	134	86.77	24.64	none	Cloudy brown
AWC (WD)	27/03/2024	7:45	43	**5.038**	**5.75**	42.36	**37.27**	22.1	none	cloudy grey, turbid
AWC (WD)	6/06/2024	15:10	45	5.221	6.14	135.7	**70**	21.28	none	Pale brown, turbid
AWC (WD)	3/09/2024	13:35	45	**4.93**	**5.81**	39	**56.9**	20.62	None	Pale brown, turbid
AWC (WD)	10/12/2024	13:25	47	**5.248**	**5.79**	NA	86.8	22.46	None	Pale brown, turbid
GW3 (EPA6) Field Parameters										
Michael K - EES	3/03/2020		12	**19**	**6.47**	-83.00		24.90	none	Milky
Amy Whitley - EES	2/06/2020		20	**18.6**	6.86	2.60		19.30	slight anoxic odour	Dark brown (black sediment)
Daniel White - EES	1/09/2020		15	**21.6**	8.19	78.00		19.90	None	Cloudy brown
Daniel White- EES	3/11/2020		-	**22**	6.54	86.00		20.80	None	Brown
AWC (AL)	17/03/2021	12:50	35	**2.2**	6.51	166	**48.5**	23.7	none	milky / cloudy
AWC (AL)	1/06/2021	13:00	43	**3.467**	6.73	199	**21.8**	19.9		
AWC (JM)	*21/06/2021	13:50	40	**3.77**	**5.49**	77	**68.7**	-	none	Yellowish/brown
AWC (AL)	14/09/2021	10:45	40	**3.46**	6.68	11.3	**56.8**	21.1	none	milky / cloudy
AWC (AL)	3/12/2021	14:15	43	**3.76**	6.85	14.14	**68.3**	22.58	None	Milky
AWC (AL)	21/03/2022	11:35	45	**3.5**	6.66	29.0	**41.0**	23.1	none	Milky
AWC (AL)	2/06/2022	13:30	45	**4.28**	**6.49**	92.8	**24.13**	21.7	none	Milky
AWC (AL)	8/09/2022	14:50	43	**3.77**	6.52	60	**33.2**	20.9	none	Milky brown
AWC (AL)	28/02/2023	12:00	44	**4.01**	6.58	100	**53.36**	26.1	none	Cloudy
AWC (AL)	13/06/2023	13:00	42	**4.52**	6.46	31.3	**27.5**	21.96	none	Cloudy
AWC (AL)	6/09/2023	12:30	40	**3.84**	6.52	-33.8	**35.5**	22.3	none	Cloudy
AWC (WD)	4/12/2023	17:10	40	**4.24**	**6.29**	141.2	**47.7**	22.87	none	Cloudy
AWC (WD)	27/03/2024	8:40	43	**3.881**	**6.23**	14.52	**42.02**	21.2	none	pale brown turbid
AWC (WD)	6/06/2024	16:30	44	**3.7917**	6.68	189.2	**20.99**	20.19	no	pale brown turbid
AWC (WD)	3/09/2024	14:45	44	**4.16**	**6.41**	29	**37**	20.61	none	pale brown turbid
AWC (WD)	10/12/2024	14:40	44	**4.13**	6.72	NA	**63.7**	20.09	non	pale brown turbid

* Additional analysis run undertaken as full suite not collected on 18/03/2021

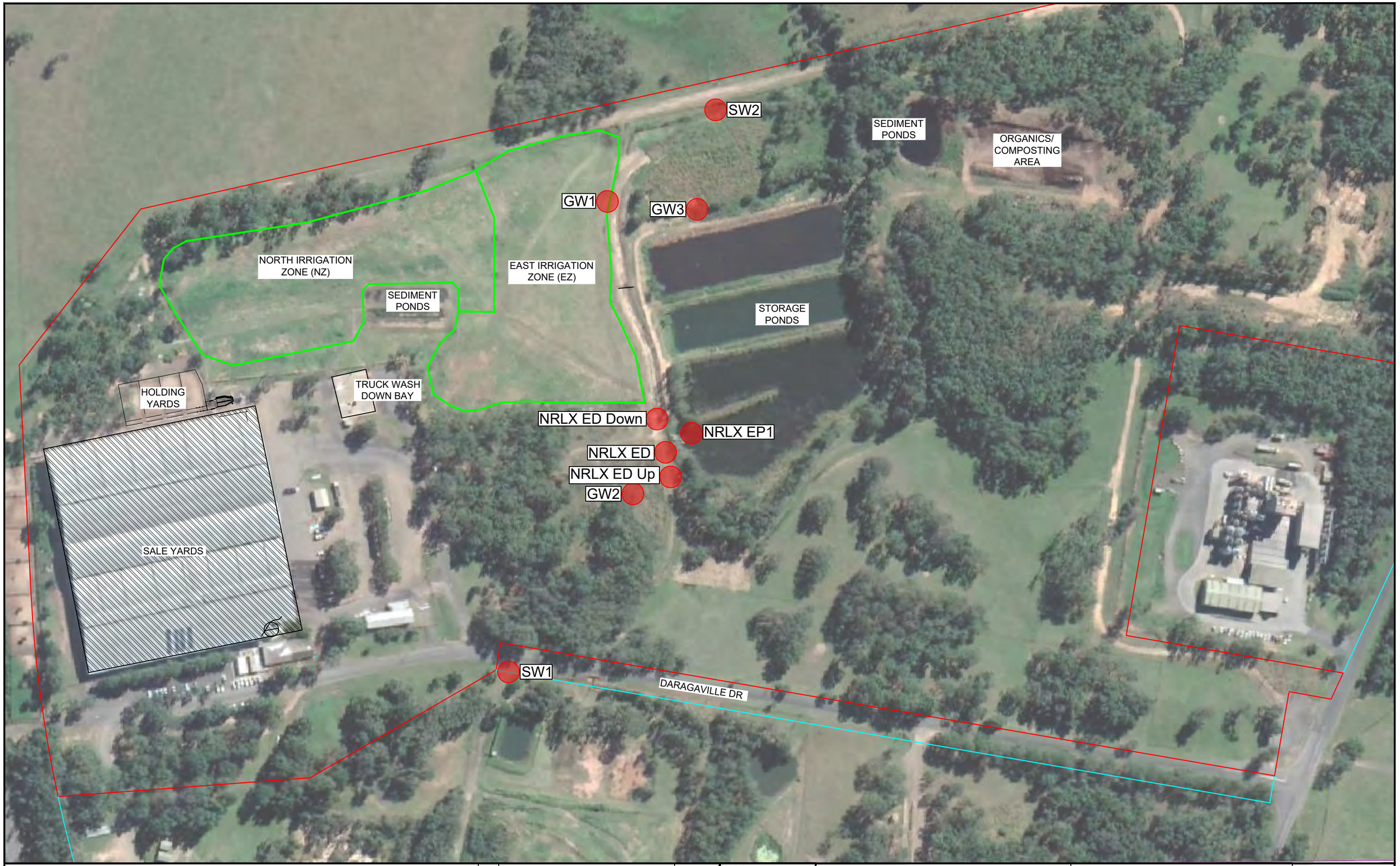
Bold and shaded cell denotes outside WQO value range

Attachment 3 Historic monitoring results for SW1 (EPA7) trigger event

Date	pH	EC	TDS	Ammonia (as N)	(BOD-5 Day)	Chlorophyll a	Dissolved Organic Carbon	Nitrate & Nitrite (as N)	Nitrate (as N)	Nitrite (as N)	Total Kjeldahl Nitrogen (as N)	TN	TP	Phosphate	Suspended Solids	Thermotolerant Coliforms
		uS/cm	(mg/L)	(mg/L)		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	cfu/100ml
15/12/2020	6.45	143	97	0.028	1.70	0.004	22.8		1.18	4.18	1.17	2.37	0.12	0.064	1	650
21/12/2020	7.33	704	479	0.32	2.00	0.027	35.8		5.161	0.11	0.87	6.14	0.19	0.094	6	3900
30/12/2020	7.01	242	165	0.024	2.60	0.009	39.8		0.136	0.021	1.75	1.91	0.18	0.055	12	3600
18/01/2021	6.96	126	86	0.067	5.80	0.017	18.7		0.567	0.028	1.2	1.8	0.37	0.243	95	13600
20/02/2021	7.26	257	175	0.428	3.60	0.01	29.9		4.719	0.125	3.72	8.57	0.18	0.071	27	4300
1/12/2021	7.36	248	169	0.122	1.70	0.011	14.3	1.239	1.195	0.044	1.31	2.55	0.41	0.062	48	12000
3/02/2022	7.07	0.193	131	0.340	3.7	0.021	17.2	0.442	0.370	0.072	1.59	2.03	0.263	0.044	55	128,000
24/02/2022	7.19	0.15	102	0.221	3.5	0.014	16.9	0.734	0.67	0.064	1.45	2.18	0.3	0.082	59	16000
24/10/2022	7.49	0.336	228	0.13	2.70	0.085	19.1	0.616	0.523	0.092	1.61	2.22	0.18	0.036	21	14000

Attachment 4 Historic monitoring results for SW2 (EPA8) trigger event

Date	pH	EC	TDS	Ammonia (as N)	(BOD-5 Day)	Chlorophyll a	Dissolved Organic Carbon	Nitrate & Nitrite (as N)	Nitrate (as N)	Nitrite (as N)	Total Kjeldahl Nitrogen (as N)	TN	TP	Phosphate	Suspended Solids	Thermotolerant Coliforms
		uS/cm	(mg/L)	(mg/L)		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	cfu/100ml
15/12/2020	7	284	193	0.117	4.8	0.005	19.8		4.18	0.099	1.28	5.56	0.32	0.174	15	520
21/12/2020	7.47	487	331	0.101	1.4	0.027	52.4		0.183	0.026	3.52	3.73	2.01	1.589	13	5200
30/12/2020	7.25	243	165	0.024	2.6	0.009	39.8		0.136	0.021	1.75	1.91	0.18	0.055	12	3600
18/01/2021	6.77	101	69	0.1	5.2	0.022	17.3		0.323	0.026	1.22	1.57	0.39	0.17	86	9000
20/02/2021	6.87	591	402	0.125	2.4	0.004	22.2		0.617	0.091	1.84	2.54	0.2	0.077	8	2900
1/12/2021	7.18	140	95	0.059	2	0.012	11.6	0.592	0.564	0.028	1.13	1.72	0.28	0.12	43	23000
3/02/2022	7.00	0.135	92	0.111	3.8	0.024	25.1	0.219	0.178	0.041	1.66	1.88	0.296	0.095	65	84,000
24/02/2022	7.07	0.127	86	0.211	4.2	0.021	13.3	0.294	0.029	0.265	1.34	1.63	0.3	0.23	53	21000
24/10/2022	7.26	0.175	133	0.105	4.1	0.01	19.6	0.263	0.228	0.035	1.34	1.6	0.310	0.141	16	16000



AWC
Australian Wetlands Consulting Pty Ltd
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BANGLOW NSW 2479
P (02) 6687 1550 | 1300 998 514
www.awconsult.com.au

CLIENT:

Richmond Valley Council

NRLX

REV.	ISSUE / AMENDMENTS	DATE
A	FIGURE ONLY	2021

Survey: Newton Denny Chapelle (2017)
Aerial imagery: Google Earth (2021)

DESIGNED JM
DRAWN JM
CHECKED MB

PROJECT
NRLX
ENVIRONMENTAL MONITORING

DRAWING
ATTACHMENT 6
MONITORING LOCATIONS

SCALE 1:2500 at A3
0m 50m 100m

DRAWING CREATED 10/12/2020

DWG No. 1-201335_NRLX_EnvMon_01

CAD FILE No. 1-201335_NRLX_EIMP

REV. A

Certificate of Analysis E24-00-2095

Client:	Australian Wetlands Consulting Pty Ltd	Laboratory:	Environmental Analysis Laboratory
Contact:	Jesse Munro	Contact:	EAL Customer Service Team
Address:		Address:	PO Box 157, East Lismore NSW 2480 Australia
Telephone:		Telephone:	(02) 6620 3678
Email:	jesse@awconsult.com.au	Email:	eal@scu.edu.au

Customer reference:	RVC Landfill	Request ID:	EAL /E24-00-2095
Number of samples:	1	Report ID:	E24-00-2095_EALP3_1
Date samples received:	12 December 2024	Issue date:	03 January 2025

Authorised by:	Alex Smith
Position:	Senior Technical Officer

Comments: EAL is a NATA accredited laboratory (14960), accredited for compliance with ISO/IEC 17025 - Testing.

Certificate of Analysis

Request ID: EAL/E24-00-2095 Report ID: E24-00-2095_EALP3_1 Issue date: 03 January 2025

			Client Sample ID:	NRLX - EPA 1
			EAL Sample ID:	E24-00-2095-0001
Parameter	**Unit**	**Method Reference**	**LOR**	**---**
pH	---	APHA 4500-H+ B	---	8.86
Electrical Conductivity	dS/m	APHA 2510-B	<0.01	1.28
Total Dissolved Salts (Calculation EC x 680)	mg/L	APHA 2510-B	<7	868
Sodium	mg/L	Total Available - APHA 3125 ICPMS	<0.5	114
Potassium	mg/L	Total Available - APHA 3125 ICPMS	<0.5	133
Calcium	mg/L	Total Available - APHA 3125 ICPMS	<0.5	24.8
Magnesium	mg/L	Total Available - APHA 3125 ICPMS	<0.5	22.9
Chloride	mg/L	Total Available - APHA 3125 ICPMS	<10	155
Sulfate	mg/L SO4	Total Available - APHA 3125 ICPMS	<9	< 9
Chloride/Sulfate Ratio	---	Total Available - APHA 3125 ICPMS	---	n.a.
Total Nitrogen	mg/L N	Inhouse W4	<0.01	4.55
Total Phosphorus	mg/L P	Inhouse W4	<0.01	1.79
Nitrate	mg/L N	APHA 4500 NO3-F	<0.005	< 0.005
Nitrite	mg/L N	APHA 4500 NO2-I	<0.005	0.007
Phosphate	mg/L P	APHA 4500 P-G	<0.005	1.32
Ammonia	mg/L N	APHA 4500 NH3-H	<0.005	0.132
Total Alkalinity	mg CaCO3/L	** APHA 2320	<1	382
Total Suspended Solids	mg/L	GFC equiv. filter - APHA 2540-D	<1	39
Sodium Absorption Ratio	---	** Calculation	---	4.0

Notes:

- ** denotes NATA accreditation does not cover the performance of this service.
- .. denotes not requested, no data/information or no guidelines available.
- All services undertaken by EAL are covered by the EAL Laboratory Services Terms and Conditions (available on request or at scu.edu.au/eal).
- Analysis conducted between sample arrival date and reporting date.
- This report is not to be reproduced except in full.
- Results only relate to the item tested.
- Analysis performed according to APHA. 2017. Standard Methods for the Examination of Water & Wastewater, 23rd Edition. Except where stated otherwise.
- Metals and salts analysed by Inductively Coupled Plasma - Mass Spectrometry (ICP-MS).
- mg/L = ppm
- For conductivity 1 dS/m = 1 mS/cm = 1000 µS/cm.

Certificate of Analysis E24-00-2097

Client:	Australian Wetlands Consulting Pty Ltd	Laboratory:	Environmental Analysis Laboratory
Contact:	Jesse Munro	Contact:	EAL Customer Service Team
Address:		Address:	PO Box 157, East Lismore NSW 2480 Australia
Telephone:		Telephone:	(02) 6620 3678
Email:	jesse@awconsult.com.au	Email:	eal@scu.edu.au

Customer reference:	RVC Landfill	Request ID:	EAL /E24-00-2097
Number of samples:	2	Report ID:	E24-00-2097_EALP3_1
Date samples received:	12 December 2024	Issue date:	03 January 2025

Authorised by:	Alex Smith
Position:	Senior Technical Officer

Comments: EAL is a NATA accredited laboratory (14960), accredited for compliance with ISO/IEC 17025 - Testing.

Certificate of Analysis

Request ID: EAL/E24-00-2097 Report ID: E24-00-2097_EALP3_1 Issue date: 03 January 2025

			Client Sample ID:	NRLX -SW1	NRLX - SW2
			EAL Sample ID:	E24-00-2097-0001	E24-00-2097-0002
Parameter	**Unit**	**Method Reference**	**LOR**	---	---
pH	---	APHA 4500-H+ B	---	7.58	6.85
Electrical Conductivity	dS/m	APHA 2510-B	<0.01	0.480	0.556
Total Dissolved Salts (Calculation EC x 680)	mg/L	APHA 2510-B	<7	326	378
Total Kjeldahl Nitrogen (TKN)	mg/L	** Calculation: TN – NOx	<0.01	1.13	2.73
Total Nitrogen	mg/L N	Inhouse W4	<0.01	1.35	2.74
Total Phosphorus	mg/L P	Inhouse W4	<0.01	0.133	0.953
Nitrate	mg/L N	APHA 4500 NO3-F	<0.005	0.197	< 0.005
Nitrite	mg/L N	APHA 4500 NO2-I	<0.005	0.028	0.007
Phosphate	mg/L P	APHA 4500 P-G	<0.005	0.024	0.039
Ammonia	mg/L N	APHA 4500 NH3-H	<0.005	0.077	0.083
Total Suspended Solids	mg/L	GFC equiv. filter - APHA 2540-D	<1	36	2020
Biochemical Oxygen Demand (BOD5)	mg/L	APHA 5210-B	<1	1.80	3.10
Dissolved Organic Carbon	mg/L	** APHA 5310-B	<1	16.9	20.0
Chlorophyll 'a'	mg/L	** APHA 10200-H	<0.001	0.064	0.280
Algal Biomass (Calc.)	mg/L	** APHA 10200-H	---	4.3	18.7
Faecal Coliforms	cfu/100 mL	APHA 9222-D	<1	10800	8000

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